



[WEAK] FORCE

LEA PORSAGER

Museet for
Samtidskunst

IV

4.10.56 3084

PROF. DR. W. PAULI

ZOLLIKON-ZÜRICH,
BERGSTRASSE 35

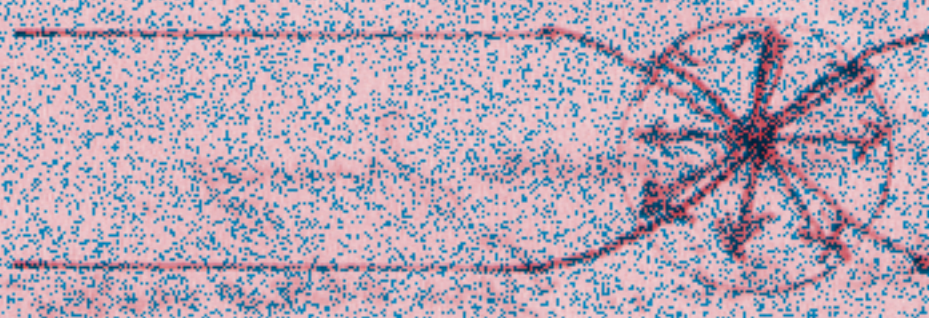
F. Nov. 1

Sehr geehrter Herr Professor Jung,

Unser letztes Gespräch über die „Synchrone“
Tasunen und anderen Ectoparasiten (Körperparasiten
der Tiere, „Synchiton“ auch dann, wenn Tiere
aufeinander kriechen) über 2-3 Stunden ^{von} einander be-
trug mir eine große Hilfe und ich möchte Ihnen
mal ich dafür danken.

Da Sie mir erzählt haben, Sie seien jetzt ge-
wollt Kolonial-geologie bei Harardata, beschäftigt, u.
ich mir, dass das gesamte Teil einer meiner Tränen
werden, die über vor 2 Jahren Holland u. wo sie
Kolonien - und damit die Baumlegriff - die Tränen
bestimmen. Vielleicht ist Ihnen diese ganze Zusammen-
hang bei den Fragen, die Sie jetzt beschäftigen, nicht
Naheliege. Vielleicht ist auch eine die Arbeit, die die
Begriffe im Bezug auf die Foyete, wäre die Tränen
nicht. Sie sind jetzt von Deutschland abgefahren.

vorstellung oder Axiomhypothese, die - in einfacher
Fall der Axiom - der Folge - also es
ist: Es soll die Gesamtheit von zwei (oder



einander fallend in den beiden) Blättern der
die im allgemeinen gebogen sind, aber in den
mittleren Mittelpunkt (zwischen den beiden
Blättern sind diese sehr gradig) zusammen
zu. Die Form der Blätter ist willkürlich, aber ist im
einfachsten Fall. Das Wesentliche ist, dass wenn die
Länge des Mittelpunktes (zwischen den Blättern)
in der Blatt Form ist fast ungetriggert
„radialen Kern“ ist eine von den Blättern
durch Ursache der „symmetrischen“ zusammen
von dem ^{e.B.} das eine (unter Blatt) in
best, hat ist einen gewissen Transparenz
e (oberes Blatt) darin, das von dem Kern aus
ist oder nicht. Sie von dem in einer Kreisform
den Mittelpunkt ausgehende die Kern
ist die



TÆT PÅ INTET, ALTET OG ALTING

‘Af intet kommer intet’, er et velkendt udtryk om, at intet forandrer sig, hvis intet gøres; en grundantagelse, som stammer tilbage til den græske filosof Parmenides. Den senere Demokrit tilskrives et svar på dette med teorien om, at alting kan deles i stadig mindre stykker indtil en nedre grænse. De mindste stykker kaldte han for atomer, som kan samles til større klumper og blive til synlige ting eller spredes, hvormed ting opstår og ændres eller helt forsvinder. Dog vil de udelelige atomer altid bestå, og dermed vil ‘intet komme ud af intet’ og forandring alligevel være mulig.

Mindre end atomet – meget mindre og så tæt på intet, som nok intet andet – er neutrinoen. Dens masse er uendelig lille, 100.000 gange mindre end en elektrons. Den er svær at påvise, den bombarderer vores kroppe og alt andet materiale konstant og kommer helt fra det ydre rum. Af (verdens-)altet kommer intet, kunne man måske foranledes til at sige.¹ Neutrinoen er tæt på intet at være, men den er dog. Oprindeligt udtænkt som en rest, der manglede i regnskabet, af fysiker Wolfgang Pauli (1900–1958) i 1930.

Tæt på intet, hvis det forstås som ikke-fysisk væren, er også tanken, bevidstheden, drømmen, fantasien. Eller spørgelset, hvis man tror på et sådant; en gestalt, der befinder sig på tærsklen mellem den fysiske og den ikke-fysiske verden. Alle disse ikke-materielle substanser synes at udgå fra Pauli, der tænkte og regnede sig til neutrinoen, der også kaldes ‘spøgelsespartiklen’, og drømte sig til en forståelse af en sammenhængende verden.

Pauli handlede og tænkte ikke i et vakuum, men stod i tæt relation til tidens største naturvidenskabelige forskere. Samtidigt tog han sine drømme overordentligt seriøst og korresponderede gennem en langvarig brevveksling med psykoanalytiker og drømmetyder C.G. Jung (1875–1961). Han interesserede sig også for den jødiske mysticisme, kabbala. Han søgte svar og symmetri i verdensordenen i sit professionelle virke med en strength, der satte andre på plads, og samtidig forårsagede hans blotte tilstedeværelse tilsyneladende alskens ulykker i laboratorier (kaldet ‘Pauli-effekten’); han horede på bordeller, drak og sloges, til han blev smidt ud af barer. Libido, neuroser, ambitioner og intelligens gjorde Pauli til et helt igennem meget fysisk og åndeligt menneske, tør jeg postulere. Og en fantastisk case for psykoanalytiker Jung, som Pauli påvirkede meget.

IND I TOMRUMMET

Museet for Samtidskunst har til huse i et barokpalæ fra 1733–1736, hvor mange ting har udspillet sig, og nogle har sat sig spor. Eftersigende i form af en blodplet fra en stakkels soldat, der i mange år ikke kunne vaskes af. Og i dag oplever nogle af vores overnattende gæster i en lille tilhørende lejlighed i portfløjen en tilstedeværelse af noget eller nogen, der står ved siden af sengen og forstyrrer søvnen.

Med *[WEAK] FORCE* har spøgelsespartiklen officielt taget ophold på museet. *[WEAK] FORCE* er en udstilling af Lea Porsager, der forfølger, fremmaner og manifesterer neutrinoen gennem en helt igennem porsagersk – og paulisk – omgang med naturvidenskaben og det spirituelt okkulte. ‘Spøgelset’ er en del af vores fysiske verden og vores kroppe i kortvarige, og heldigvis umærkelige glimt, og samtidig sin egen enhed helt ude fra universet. Nogle stammer helt tilbage til Big Bang. En enhed, der via sin vej, sin bane, sætter din krop, min krop, i direkte forbindelse med universet. Hele tiden! Mini Bang! Det er svimlende!

Porsager præsenterer værkerne *HORNY VACUUM*, der nu indgår i museets samling, samt det ældre værk *CØSMIC STRIKE*, der er udviklet under et ophold på Den Europæiske Organisation for Højenergifysik, CERN. *HORNY VACUUM* består af en 3D-animation; 3 teleskopiske stålhorn; 2 røde, oppustede Öko Tech Tube Walls, som bruges til at dæmme op for oversvømmelser samt et ‘baculum’, en penisknogle fra en hvalros.

3D-animationerne skal opleves med old school rød-cyan briller på samt med et nyt lilla felt i brillens midte til det tredje

DEAR RADIOAKTIVE

Birgitte Kirkhoff Eriksen

CONNECTING WITH NOTHING AND EVERYTHING

‘Nothing comes from nothing’, as the expression goes; a familiar turn of phrase claiming that nothing changes if nothing is done – a fundamental assumption which dates back to the Greek philosopher Parmenides. A later reply to this is attributed to Democritus, specifically his theory that everything can be split into ever-smaller pieces until a lower limit is reached. He called these pieces, smallest of all, ‘atoms’, ascribing them the ability to gather into larger clusters, becoming visible objects – or scattering – thereby causing things to appear, to change or to disappear altogether. However, the indivisible atoms will endure, meaning that ‘nothing comes from nothing’ and change need not be mutually exclusive.

Smaller than the atom – much smaller, in fact; as close to ‘nothing’ as anything ever gets – is the neutrino. Its mass is infinitely tiny, 100,000 smaller than that of an electron. Its presence is hard to prove, yet it constantly bombards our bodies and all other matter, arriving here from outer space. From the All comes nothing, one might be tempted to say.¹ The neutrino comes close to being nothing, nevertheless it *is* something. It was originally devised by the physicist Wolfgang Pauli (1900–58) back in 1930 as a missing piece in the quantum puzzle.

Other things are also close to nothing, if we understand that concept to mean non-physical entities: thought, consciousness, dreams, imagination. Even ghosts, if you believe in such things; an apparition hovering on the threshold between the physical and the non-physical world. All of these non-material substances seem to emanate from Pauli, who thought and calculated his way to the neutrino, also known as the ‘Ghost Particle’, and dreamt his way to an overall understanding of a coherent world.

No man is an island, and nor was Pauli: he did not think and act within a vacuum, but had close ties to the greatest scientists of the day. At the same time, he took his dreams very seriously indeed, engaging in a long and expansive correspondence with the psychoanalyst and interpreter of dreams C.G. Jung (1875–1961). He was also interested in Jewish mysticism, the kabbalah. Pauli sought diligently for answers in his professional life, looking for symmetry and order in the world with a stringency that caused him to often upbraid others. At the same time, his mere presence in a laboratory seemed to cause all sorts of mishaps and accidents, wrecking equipment without even touching it (a phenomenon known as the ‘Pauli effect’). He would go whoring at brothels, drink and pick fights at bars until he was thrown out. I have no hesitation in claiming that this distinctive blend of a strong libido, neuroses, ambition and intelligence made Pauli an extraordinarily physical *and* spiritual person. It also made him a marvellous case for the psychoanalyst Jung, on whom Pauli had a tremendous impact.

ENTERING THE VACUUM

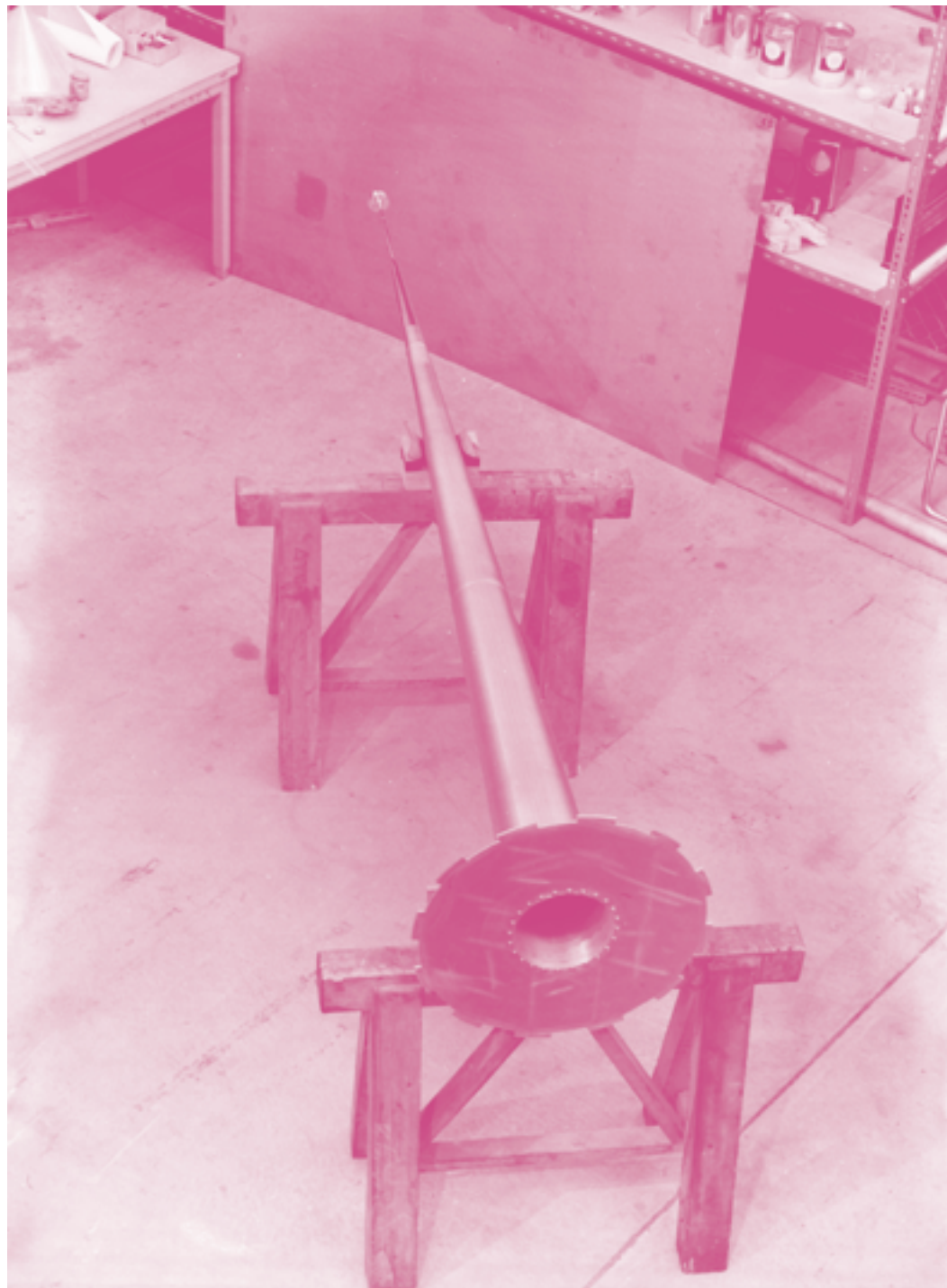
The Museum of Contemporary Art has its home in a Baroque mansion built in 1733–36. Much has taken place here through the ages, and some events have left lasting traces. It is said that the house once bore a persistent stain of blood from some ill-fated soldier; a stain which could not be washed out for many years. And today, some of our overnight guests staying in a small apartment in the gatehouse sense the presence of something or someone standing next to their bed, disturbing their sleep.

With *[WEAK] FORCE*, the ghost particle has officially taken up residence at the museum. Featuring the art of Lea Porsager, the exhibition *[WEAK] FORCE* pursues, conjures up and manifests the neutrino through an emphatically Porsagerian – and Paulian – approach to natural science and spiritual occultism. This ‘ghost’ is part of our physical world, even passing through our bodies in brief, fortunately imperceptible bursts, and at the same time it is its very own entity, reaching us from the vast universe out there. Some neutrinos date all the way back to the Big Bang. An entity which, on its pathway, its course, creates a direct connection between your body, my body, and the universe. All the time! A Mini Bang! It’s a staggering thought!

Porsager presents the work *HORNY VACUUM*, which is now part of the museum collection, as well as the older work *CØSMIC STRIKE*, developed during a stay at the European Organization



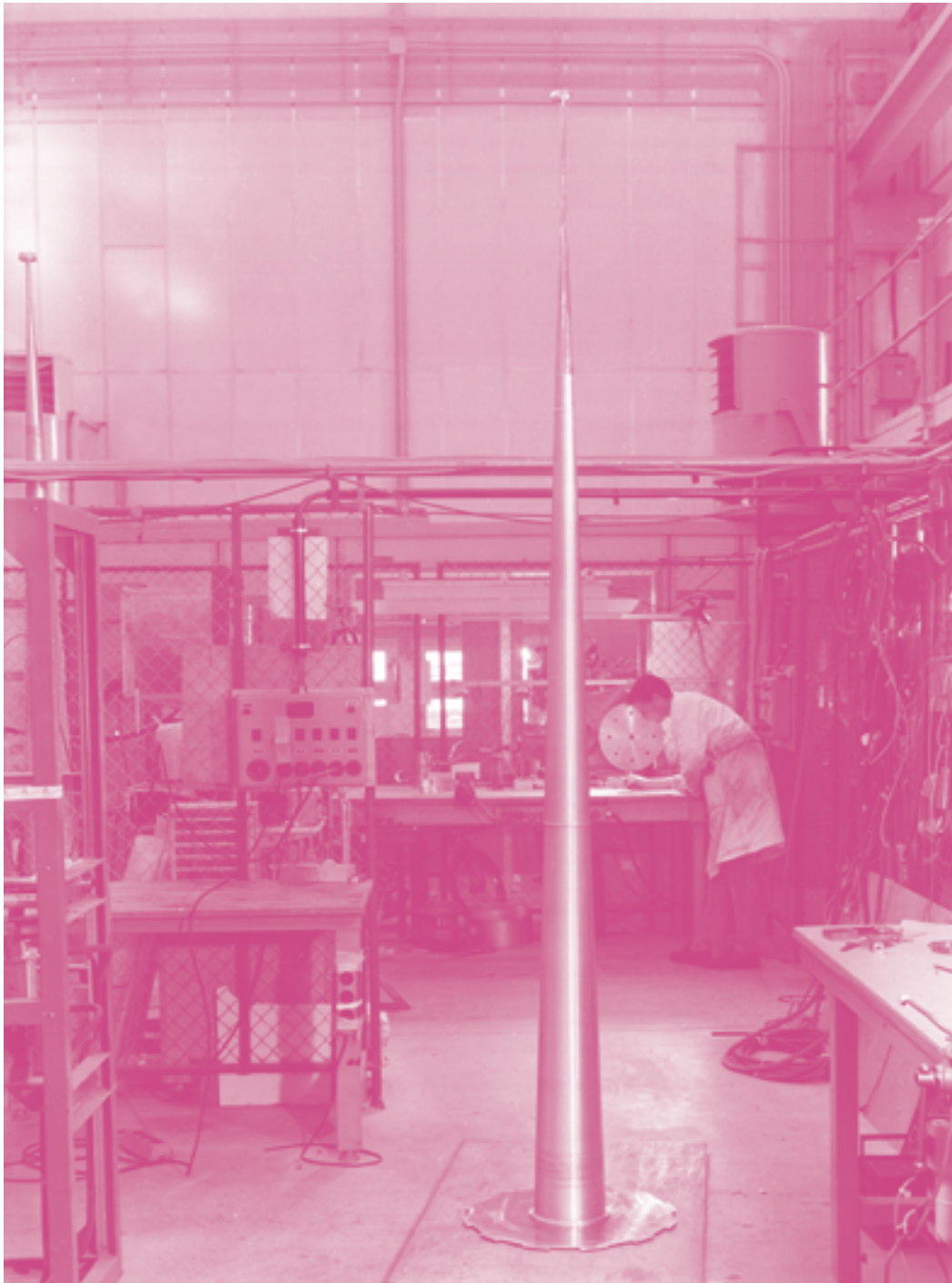
Wolfgang Pauli og hans hustru
Franziska Bertram, kaldet Franca.
Wolfgang Pauli and his wife
Franziska Bertram, called Franca.
Kilde / Source: CERN.



Neutrino-horn.
Neutrino horn.
Kilde / Source: CERN.



! Ø SPØUTING ! SWALLØWING CUNTS



Neutrino-horn.
Neutrino horn.
Kilde / Source: CERN.



Neutrino-horn.
Neutrino horn.
Kilde / Source: CERN.

TIRED HØRN(Y)
HARD TØ GET

øje. De gængse tre dimensioner er ikke nok. Animationen forestiller den evigt penetrerende neutrinos vej gennem materien og akkompagneres af en lydside af gong; et såkaldt gongbad.

De to røde, oppustede plastikcylindere, Tube Walls, bruges normalt til at beskytte områder mod oversvømmelse og er et alternativ til fx diger og sandsække. Cylinderne er fyldt med luft og kan holde store vandmasser væk, fordi de bruger vandets vægt som anker. Disse 2 x 10 m kystsikring i Porsagers værk sender en diskret hilsen til Risø – Nationallaboratoriet for bæredygtig energi – som forsker i nye energiformer. Risø ligger ved Roskilde Fjord, som flere gange er gået over sine bredder. Fx gav stormfloden i 2013 anledning til en ekstra indsats omkring Risø, der opbevarer atomaffald. Ved at tage kystsikringen omkring Risø med i værket, peger Porsager på et konkret sted, hvor der er radioaktivt affald, som henfalder. Det var præcis 'henfalds-regnskabet', der ikke gik op, hvorfor Pauli mente, at der måtte være en ekstra partikel – en spøgelsespartikel – ud over proton, neutron og elektron, nemlig neutrinoen.

De skulpturelle elementer, stålhornene og de røde tubes, ligner unægteligt minimalistiske skulpturer, som fra 1960'erne og frem har mimet industrielle produkter og handlet om volumen, rum og skala. Men hvor minimalisterne dengang afskrev enhver forestilling om et skjult indre i skulpturen, hvor der skulle gemme sig en større betydning end det, der var at se, så rummer Porsagers værker meget andet end dette indre tomrum, vakuummet, netop i erkendelsen af, at vakuummet (iflg. kvantefysikken) er fyldt med energi og aktivitet.

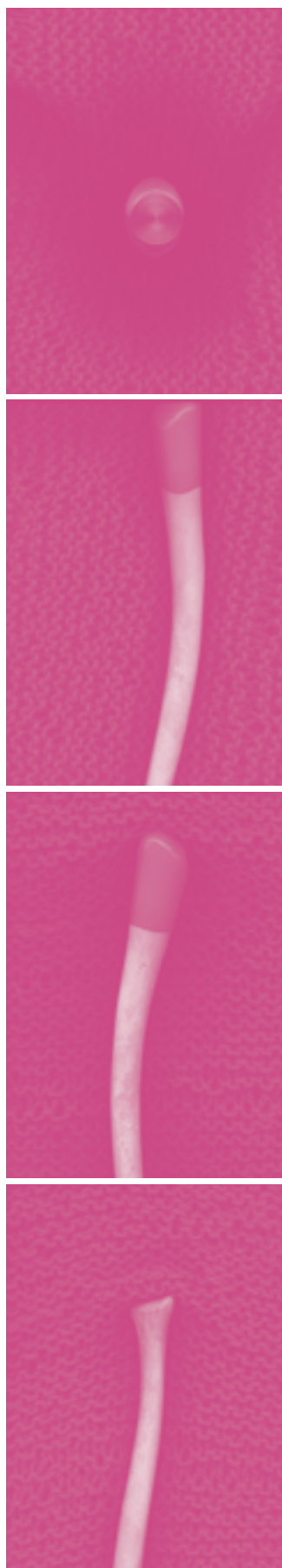
Så selv om det var et tomt kontor, Porsager mediterede i under sit ophold på CERN (det såkaldte *Tired Tantric Experiment*) og herigennem fik visionerne til *COSMIC STRIKE*, så var det ikke et energi-tomt rum. *COSMIC STRIKE* er hendes første undersøgelse af neutrinoen, som netop påvises ved hjælp af teleskopiske horn på CERN, hvor neutrinoflowet fokuseres til en stråle. Porsagers teleskopiske stålhorn i *HORNY VACUUM* referer til dem. Hornene er en af de naturvidenskabelige måder at påvise neutrinoen på. I deres arbejde leder forskerne efter det mindste (neutrino) i det største (universet) og deducerer, indtil de finder evidens. Porsager har nogle af de samme intentioner, men leder også efter det største i det mindste. Bevæger sig fra neutrinoen og ud, op. Hendes metode er kunstnerisk, shamanistisk, fri, syret. Og ældgammel.

YOGISKE VIBRATIONER

En måde, hvorpå mennesker i stort set alle religioner har prøvet at forbinde sig til noget større end dem selv, har gennem tusindvis af år været ved brug af mantraer og meditationer. Porsager har brugt mantraet *Ra Ma Da Sa Sa Say So Hung*; et healende mantra i kundalini-yogaen, som forbinde krop og sjæl med sol, måne, jord og uendelighed.

Udover at være uddannet billedkunstner fra Det Kgl. Danske Kunstakademi og i skrivende stund ph.d.-studerende ved Malmö Kunstakademi og Lunds Universitet, har Porsager delvist uddannet sig til kundalini-lærer som del af sin kunstneriske research.

Kundalini-yoga er en dynamisk yogaform, hvor øvelser, *kriyas*, gentages et særligt antal gange. Yoga betyder at forene, at forene kroppen med noget (guddommeligt), der er større end den, og har til formål at styrke og forberede kroppen til den efterfølgende – og vigtigere – meditation. Det gælder for alle yoga-former. Kundalini er dog kendetegnet ved at arbejde ud fra en forståelse af, at menneskekroppen indeholder energicentre, *chakraer*, som skal aktiveres og heales, hvis de er blokerede, for derigennem at åbne for et højere bevidsthedsniveau. Kundalini-energien skal rejse sig op gennem ryggraden (ofte afbildet som en slange, der er rullet sammen ved bunden af ryggraden) og ud gennem det øverste chakra på hovedet (kronechakra), hvormed der bogstaveligt talt 'kommer hul igennem'. Kundalini bruger hertil kropslige øvelser i særlige sekvenser, mantraer, musik, åndedrætsøvelser (*pranayama*), håndstillinger (*mudras*), 'kropslåse' (fx knibeøvelser) og meditation; alt sammen med specifikke intentioner om healing, om bedre blodcirkulation og immunforsvar mm.



Baculum (hvalros-penisknogle) omdannet til en 'kangling' (et knoglehorn). Denne oprejste figur er et stykke værktøj, der bruges i *HORNY VACUUM*. Den henfalder langsomt, blæser spøgelse ud! En håndholdt neutrino-generator.

Baculum (walrus penis bone) transformed into a Kangling (bone-horn). This erect figure is simply a tool used in *HORNY VACUUM*. Slowly decaying, blowing the ghosts out! A handheld neutrino generator.

for Nuclear Research, CERN. *HORNY VACUUM* consists of a 3D animation; three telescopic steel horns; two red, inflatable Öko Tech Tube Walls (a device used to counteract flooding), and a 'baculum', a penis bone; this one is taken from a walrus.

The 3D animations are intended to be viewed through old-school red-cyan glasses, in this case augmented by a new, purple lens in the centre of the glasses to accommodate your third eye. The usual three dimensions are not enough. The animation depicts the ever-penetrating neutrino's route through the world of base matter and is accompanied by a soundtrack featuring the sound of a gong; a so-called gong bath.

The two red, inflated plastic cylinders are known as Tube Walls; they are used to protect areas against flooding, offering an alternative to dikes and sandbags. Filled with air, such cylinders can keep large bodies of water at bay because they use the weight of the water as an anchor. Measuring 2 x 10 metres, the presence of such coastal management devices in Porsager's work is a subtle nod to Risø – Denmark's National Laboratory for Sustainable Energy, a research facility specialising in new forms of energy. Risø is located at Roskilde Fjord, which has burst its banks on several occasions. For example, a flood in 2013 necessitated special emergency measures around Risø, which stores nuclear waste. By incorporating the coastal protection devices used around Risø in her work, Porsager points to a specific place where radioactive waste is decaying. In fact, the problem of beta decay – where some energy seemed to be unaccounted for – was the very thing that prompted Pauli to come up with the idea of an extra particle, a ghost particle in addition to the proton, neutron and electron; there had to be a neutrino too.

The sculptural elements – the steel horns and the red tubes – quite undeniably resemble minimalist sculptures of the kind which have, ever since the 1960s, mimicked industrial products, addressing problems of volume, space and scale. But whereas the Minimalists of the past dismissed any notion of hidden inner meaning in the sculptures, rejecting any content beyond what could be seen, Porsager's works contain something more than this inner void, this vacuum – partly due to her recognition of how the vacuum is in fact (as described by quantum physics) full of energy and activity.

So even though Porsager used an empty office to meditate in during her time at CERN (her so-called *Tired Tantric Experiment*), thereby achieving the visions that prompted *COSMIC STRIKE*, that space was not empty of energy. *COSMIC STRIKE* constitutes her first exploration of the neutrino, whose existence is detected using telescopic horns at CERN, focusing them into a beam. Porsager's telescopic steel horns in *HORNY VACUUM* is a reference to the horns at the research facility, one of the scientific devices used to demonstrate the existence of the neutrino. Scientists search for the smallest (the neutrino) in the largest (the universe), making deductions until they find actual evidence. Porsager shares some of the same intentions, but she also looks for the vast in the tiny. Taking the neutrino as her starting point, she moves outwards and upwards. Her method is artistic, shamanistic, unfettered, psychedelic. And ancient as the hills.

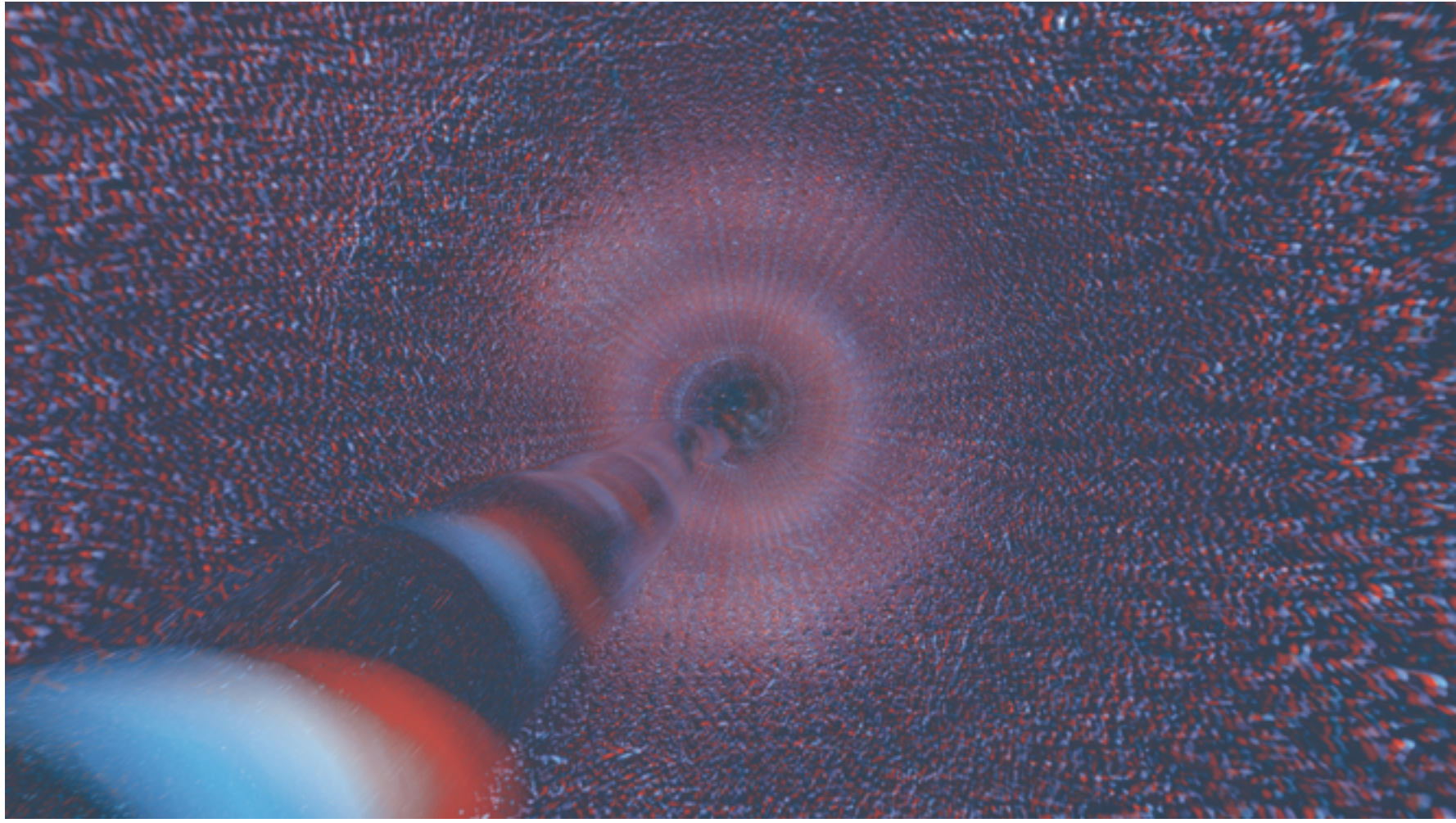
YOGIC VIBRATIONS

For thousands of years, humans from virtually all religions have used mantras and meditations in their efforts to connect with something greater than themselves. Porsager has used the mantra *Ra Ma Da Sa Sa Say So Hung*; a healing mantra from the tradition of Kundalini yoga, which connects body and soul to the sun, moon, soil and infinity itself.

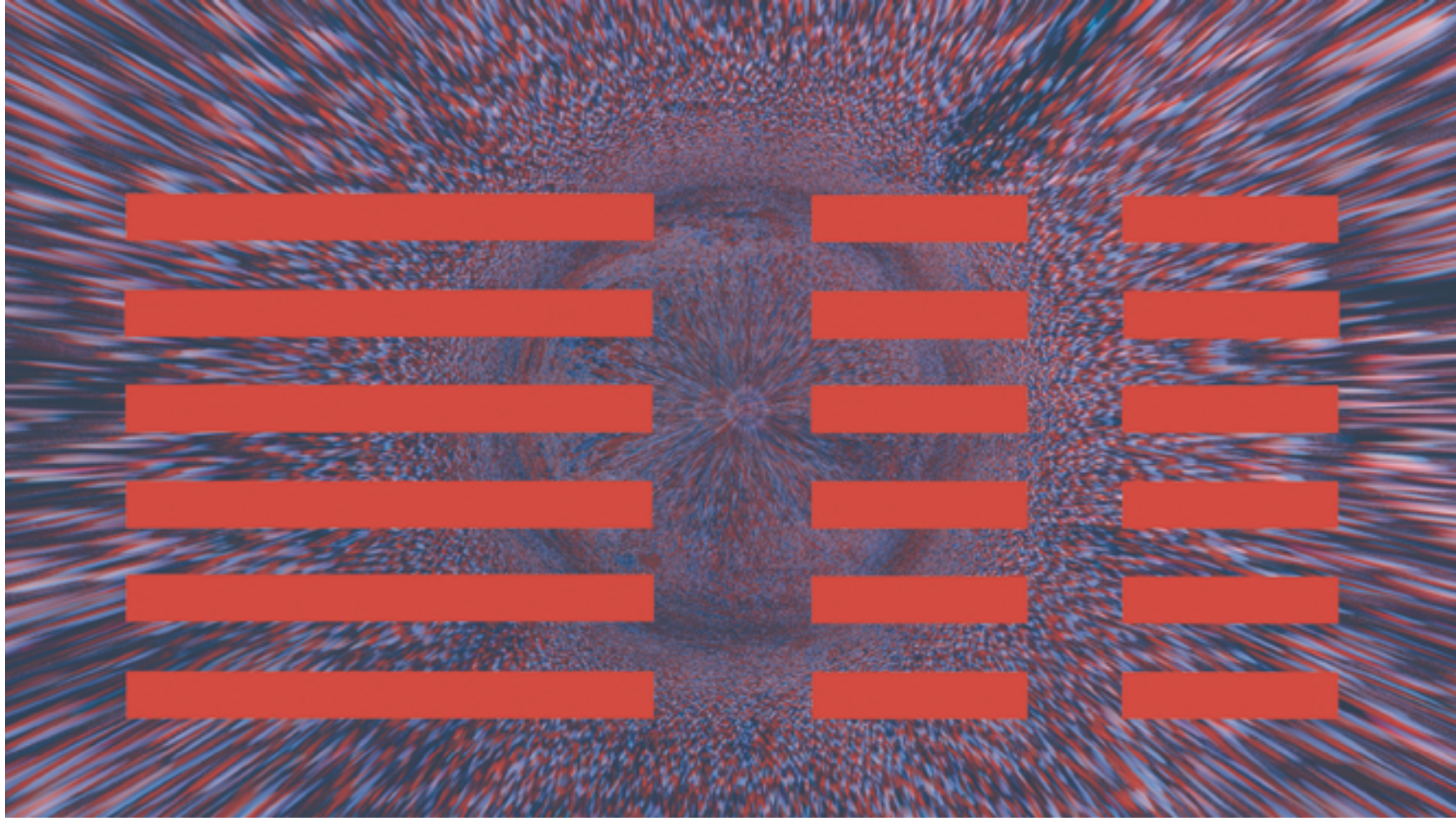
In addition to having graduated from the Royal Danish Academy of Fine Arts and currently conducting research as a PhD fellow at the Malmö Art Academy and Lund University, Porsager has also trained as a Kundalini teacher as part of her artistic research.

Kundalini yoga is a dynamic form of yoga in which the exercises, *kriyas*, are repeated a specific number of times. The term *yoga* means to unite, to connect the body to something (divine) greater than itself. The purpose is to strengthen and prepare the body for the subsequent – and more important – meditation that follows. This holds true of all yoga forms. However, Kundalini





Still-billede fra *COSMIC STRIKE*.
Still from *COSMIC STRIKE*.



Still-billede fra *COSMIC STRIKE*.
Still from *COSMIC STRIKE*.



Neutrinohorn fra CØSMIC STRIKE.
Neutrino horn from CØSMIC STRIKE.
Foto / Photo: Malle Madsen.

Kundalini-yogaen er en af de mere esoteriske² yogaformer og dyrkes ikke af mange herhjemme. Hatha-yogaen 'glider bedre ned' som en del af den efterhånden kommercialiserede mindfulness-bølge, hvor bare det at mærke sin krop, strække ordentligt ud og trække vejret dybt, kan afhjælpe stress. Kundalini-udøveren med det særlige hvide tøj, mantra-syn-gende, engageret i knap så hatha-yoga-elegante stillinger kan forekomme temmelig sekterisk i forhold hertil.

Et mantra (sanskrit, 'redskab for tanken, helligt ord') består af korte ord, der danner sætninger og gentages rytmisk, *chan-tes*, i længere tid. Chanting er en messende, meditativ aktivitet, og mantraet en slags syngende bøn eller hymne, som stilner sindets tankemylder, og er som sådan en kendt aktivitet i alle regioner. I hinduismen og buddhismen siges mantraet at være en form for lydligt billede på kosmiske kræfter, og vedholdende chanting kan føles ganske stærkt i kroppen, der bliver et slags resonansrum.

På samme måde kan *HORNY VACUUM*s lydside føles fysisk overvældende. I kundalini-yogaen er gongen et vigtigt instrument til at løsne fysiske spændinger og balancere (de tidligere nævnte) chakraer i kroppen og dertil skabe en meditativ tilstand. Gongen er en metalskive, der slås an, hvormed den vibrerer og skaber ganske komplekse mønstre af lyd.

3D-animationen opleves visuelt med 3D-briller, som har fået tilføjet et ekstra lilla brilleglas til det tredje øje. Det tredje øje er et af i alt syv chakraer, kaldet Ajna eller Guru chakra. I hindu-traditionen er det en del af hjernen, der bliver stærkere gennem meditation og yoga. Hvor en persons to øjne ser den fysiske verden, kan det tredje få indsigter om fremtiden og styrke intuitionen, dvs. se indadtil og opadtil.³

HORNY VACUUM blev første gang præsenteret på Bloom Festival i Søndermarken i maj 2019 i samarbejde med Ny Carlsbergfondet og Museet for Samtidskunst. Bloom er en videnskabsfestival, hvor internationale forskere, musikere, forfattere og billedkunstnere samles for at formidle



Ajna, det tredje øje.
Ajna, the third eye.

stands out with its fundamental idea that the human body contains energy centres, *chakras*, which must be activated and healed, if blocked, in order to pave the way for a higher level of consciousness. The Kundalini energy must rise up through the spine (often depicted as a snake coiled at the base of the spine) and out through the topmost chakra on the head (the crown chakra), literally opening up new doorways to an altered state of consciousness. The Kundalini approach uses physical exercises in special sequences, mantras, music, breathing exercises ('pranayama'), hand gestures ('mudras'), 'body locks' ('bandhas'), such as pelvic floor exercises and meditation; all involving specific purposes of healing, better blood circulation, an improved immune system, and so on.

Kundalini yoga is one of the more esoteric² variants of yoga, attracting only a limited number of devotees in Denmark. Here, Hatha yoga has proven more palatable to most, becoming part of the by now thoroughly commercialised mindfulness movement which claims that simply feeling your body, stretching properly and taking deep breaths can relieve stress. Compared to this, Kundalini practitioners can seem quite sectarian in their distinctive white clothes, chanting mantras and striking poses rather less elegant than those usually seen in Hatha yoga.

A 'mantra' (from Sanskrit, 'vehicle for thought', 'sacred word') consists of brief words arranged into sequences that are chanted for sustained periods of time. Chanting is a meditative activity where the mantra acts as a sing-song prayer or hymn that soothes and calms the mind; as such, the concept is familiar from all religions. In Hinduism and Buddhism, the mantra is said to be an aural representation of cosmic forces, and indeed persistent chanting can be felt very strongly in the body, making it resonate with the words.

Similarly, the auditory aspects of *HORNY VACUUM* can feel physically overwhelming. In Kundalini yoga, the gong is an important tool for releasing physical tension, balancing the chakras and bringing about a state of meditation. A gong is a metal disc; when struck, it vibrates, creating quite complex aural patterns.

Porsager's 3D animation is viewed through 3D glasses with an added purple lens intended to accommodate the third eye. The third eye is one of the seven chakras, known as 'Ajna' or the 'Guru chakra'. Hindu tradition sees the third eye as a part of the brain that grows stronger through meditation and yoga. Whereas our two regular eyes see the physical world, the third can gain insights about the future and strengthen our intuition, looking inward and upwards.³

HORNY VACUUM was first presented at the Bloom Festival in Søndermarken, Copenhagen, in May 2019, as a collaboration presented by the New Carlsberg Foundation and the Museum of Contemporary Art. Bloom is a science festival where international scientists, scholars, musicians, writers and artists come together to present and discuss their works with each other and with audiences. A precursor of the work was presented at Bloom the year before: a group of people sat on a flower-strewn lawn under a large oak tree, carrying out the Kundalini exercise 'Ego-Eradicator': breathing rapidly through the nose, they extended their arms and clenched fists towards the sky, forming a V shape with the thumbs poking upwards. Porsager and a gong master subsequently rewarded the group with a 'gong bath', where the sound of gongs of various sizes resonated with each of the participants – their egos eradicated – reverberating with their bodies, made up of 70% water and base elements.

The gong bath from this performance was recorded and published as a podcast, 'Far-Out Quantum Technology ~ Cosmic Gong Vibration', which is still available; search for Podcast for Samtidskunst. To accompany *[WEAK] FORCE*, Porsager and the museum release an record featuring gong sounds and a chanted mantra.

QUEER METHOD

For a long time now, all the way back to the generation born around 1860, many artists have been interested in anti-materialistic philosophy with mysticism and occultism at its core.⁴

Occultism (secret and hidden phenomena revealed only to initiates) and mysticism (practices aiming for a state of being one



De syv chakraer.
The seven chakras.

LUBRICATED SNAKE

TØØ STRAIGHT



Gong spejler græsset på Bloom 2018.
Gong mirrors the grass at Bloom 2018.
Foto / Photo: Longfei Wang.



Installationen fra *HORNY VACUUM* på Bloom 2019.
HORNY VACUUM installation at Bloom 2019.
Foto / Photo: Dennis Morton.



Festivaldeltagere ser 3D-filmen *HORNY VACUUM* på Bloom 2019.
Festival participants watching the 3D film *HORNY VACUUM* at Bloom 2019.
Foto / Photo: Malthe Folke Ivarsson.



Lea Porsager, *How to Program and use T-F*, 2013. I bogen *Thought-Forms* (skrevet 1901–1904) forsøgte teosofisterne Annie Besant og C.W. Leadbeater at give videnskabelige forklaringer på det okkulte. Teosofien trækker på filosofiske og religiøse systemer som spiritualisme, hinduisme, buddhisme og kristendom og beskæftiger sig med parapsykologiske fænomener som tankeformer og clairvoyance. Bogen giver eksempler på, hvordan forskellige tankeformer kan kategoriseres og analyseres ud fra geometriske former og farver. Porsager lod sig inspirere af Besant og Leadbeater og udformede T-F (type 1 og 2) samt en tredje – T-F (type 3) – som Porsager blev præsenteret for af en litauisk clairvoyant.

Lea Porsager, *How to Program and use T-F*, 2013. In the book *Thought-Forms* (written 1901–04) the theosophists Annie Besant and C.W. Leadbeater sought to provide scientific explanations for the occult. Theosophy draws on philosophical and religious systems such as spiritualism, Hinduism, Buddhism and Christianity and deals with parapsychological phenomena such as thought forms and clairvoyance. The book provides examples of how different thought forms can be categorised and analysed on the basis of their geometric shapes and colours. Inspired by Besant and Leadbeater, Porsager designed T-F (types 1 and 2) and a third – T-F (type 3) – introduced to Porsager by a Lithuanian clairvoyant.

Foto / Photo: Léa Nielsen.



TAMING TINIES

CONDUCTING THE
SMALL

og diskutere deres arbejde med hinanden og publikum. En forløber for værket fandt sted på Bloom året forinden under et stort egetræ, hvor en gruppe mennesker sad på tæpper på den blomstrende plæne, og lavede kundalini-øvelsen 'Ego-Eradicator', hurtigt nasalt-åndende med udstrakte arme og knyttede næver mod himlen i V-form og med tommeltotterne strittende opad. Porsager og en gongmester belønnede derefter gruppen med et 'gong-bad', hvor lyden af gonger i forskellige størrelser resonerede helt ind i hver af de ego-udslettedes 70% vand- og grundstoffylde sæk af en krop.

Gong-badet fra denne performance blev optaget og udgivet som podcast, 'Far-Out Quantum Technology ~ Cosmic Gong Vibration', på museets Podcast for Samtidskunsten ~ Cosmic Gong Vibration', på museets Podcast for Samtidskunsten, hvor den stadig kan høres. I forbindelse med [WEAK] FORCE udgiver Porsager og museet en LP med gong og chantet mantra.

QUEER METODE

Mange billedkunstnere, faktisk helt tilbage til generationen født omkring 1860, har interesseret sig for antimaterialistisk filosofi, som har mysticisme og okkultisme i sin kerne.⁴

Okkultismen (hemmelige og skjulte fænomener, der åbenbares for de indviede) og mysticismen (tilstand af at være ét med et højere, kosmisk plan) deler forskellige ideer: universet er én, levende substans; krop og sind er også ét; alting udvikler sig i dialektiske modsætninger (mand-kvinde, lys-mørk, positiv-negativ); udpræget mistillid overfor materialistiske værdier, mm. En stor forskel mellem det mystisk-okkulte og en institutionaliseret religion ligger i relationen til det guddommelige. Hvor sidstnævnte får formidlet adgang til 'kilden', Gud, gennem præsten, imamen eller andre autoriteter, så har førstnævnte ikke brug for formidlere, men har direkte adgang til kilden, fx gennem meditation.⁵

På den danske kunstscene indtager Lea Porsager en helt særegen position. Hun har konsekvent arbejdet med blandingen af spirituelle/okkulte og naturvidenskabelige undersøgelser gennem mange år. Hun sakser frit mellem forskellige former for viden og vidensparadigmer og lader umage verdener mødes, der hvor ideer og undersøgelser deles. Det har hun gjort i en slags spekulativ fabulering, hvor hun ser bort fra grænser og kategorier: mellem subjekt og objekt, selvet og andre, neurovidenskab og neurose, science fiction og biologi, clairvoyance og obskuritet, underbevidsthed og bevidsthed, bliven, væren og gøren.

'Queer' kunne man også kalde metoden og værkerne, uden at Porsager på nogen måde indskrives i en entydig kønsdiskussion. Nærmere queer som en form for radikal åbenhed, en dynamisk ustabilitet. Eller 'ironisk' – men uden ironiens distance og beskyttelse af den, der benytter sig af den, og mere som en fri jongleren med begreber og teorier uden dogmatik og bogstavelighed.

Porsager tænker ud over modsætninger som 'sand' eller 'falsk', og tillægger i stedet selve møderne, infiltrationerne mellem teorier og materialiteter, værdi. Hun arbejder ofte direkte med eller refererer til materialiteter, som er flydende, sammenklistrende, frem for afgrænsede og afgrænsende. Fx slim, snegle, slimsvampe, sæd og honning. Eller bevidsthedstilstande, som hverken kan kategoriseres som 'vågen' eller 'sovende' tilstand, men mellemtilstande som clairvoyance, meditation og hypnose. Porsager er inspireret af kvantefysiker og kønsforsker Karen Barad, der mener, at ingen kategorier er stabile eller adskilt fra hinanden, men derimod genereres i en gensidig udveksling.⁶ Måske netop derfor betoner Porsager ofte, at hendes værker er 'eksperimenter' frem for (stabile) værker.

I disse nye værker tyer Porsager til yogisk-tantriske teknikker for at hjælpe sin egen og publikums selvforglemmelse og tilsidesættelse af egoet på vej. Set i det lys er hun, udover at være kunstner, en lærer, en guru eller shaman, om man vil, men en humoristisk, uærbødig og obskøn en af slagsen.

ABSTRAKTION OG SPIRITUALITET

Porsagers værk er på ét sæt både ganske abstrakt og meget konkret. Abstrakt, fordi det er ultra komplekst og

with a higher, cosmic level of existence) share a range of beliefs: the universe is a single, vast living substance; body and mind are also one; everything evolves in a state of dialectic oppositions (man-woman, light-dark, positive-negative); materialistic values should be distrusted, etc. One of the major differences between the mystical/the occult and institutionalised religion concerns the relationship with the divine. Whereas the latter channels access to the 'source', meaning the main deity, through a priest, imam or other authority, the former does not need anyone else to act as a conduit; each individual practitioner has direct access to the source, for example through meditation.⁵

Lea Porsager holds a quite unique position on the Danish art scene. She has worked consistently with her distinctive melange of spiritual/occult and scientific explorations for many years now. Unfettered in her approach, she freely samples knowledge and paradigms from different fields, allowing disparate worlds to come together in a place where ideas and studies meet and merge. The results are speculative flights of the imagination that disregard all categorisations and boundaries: between subject and object, one's self and others, neuroscience and neuroses, science fiction and biology, clairvoyance and obscurity, the subconscious and consciousness, becoming, being and acting.

One might also use the term 'queer' to describe Porsager's method and works, even though Porsager in no way inscribes herself in a specific, clear-cut discussion of gender. Here, the notion of queerness may more accurately be regarded as a kind of radical openness, a dynamic instability. Another apt description would be 'ironic' – but without the sense of distance involved in irony, devoid of its efforts to protect the one who wields it. Rather, it should be understood as an unrestricted playing around with various concepts and theories, devoid of dogma or po-faced literal readings.

Porsager thinks beyond established opposites such as 'true' or 'false', instead attributing value to the encounters and mutual infiltrations between theories and matter. She often works with or references materialities that are liquid, viscous and sticky rather than those which are strictly delimited and delimiting. Examples include slime, slugs, slime mould, semen and honey. Or she works with states of mind that cannot be categorised as either 'awake' or 'sleeping', but which occupy a position in between – such as clairvoyance, meditation or hypnosis. Porsager is inspired by the quantum physicist and gender theorist Karen Barad, who believes that no categories are stable or distinctly separate from each other; they arise through mutual exchanges.⁶ Perhaps this is why Porsager often emphasises that her works are 'experiments' rather than (stable) works.

In these new works, Porsager turns to yogic-tantric techniques to help herself and her audience forget themselves for a while, eliminating their ego. From this perspective, she is not just an artist, but also acts as a teacher, a guru or a shaman, if you like – but an irreverent, humorous, even ribald one!

ABSTRAKTION AND SPIRITUALITY

Porsager's work is simultaneously quite abstract and very concrete. Abstract, because it is hugely complex, seeing to represent something (the neutrino) that cannot possibly be perceived by the human senses alone, making it impossible for us to recognise it as a neutrino (in the animation). It is an utterly imaginary representation. And concrete, because her work presents a physical space and thus an opportunity to experience the neutrino through sensory input. She asks her audience to surrender themselves to this sensation instead of seeking to 'figure something out' intellectually.

"Abstract art remains misunderstood by the majority of the viewing public. Most people, in fact, consider it meaningless", says Maurice Tuchman in the anthology *The Spiritual in Art: Abstract Painting 1890–1985*, which accompanied the eponymous exhibition at Los Angeles County Museum of Art (LACMA) in 1986–87.⁷ However, at the time when many groups of artists moved away from representational art around 1910, turning instead to abstraction and a preference for symbolic colours rather than natural ones, for signs and ideas over sensed reality, they never intended this as a downright rejection



prøver at repræsentere noget (neutrinoen), som på ingen måde kan opfattes med sanserne og dermed ikke genkendes som neutrino (i animationen). Det er en helt igennem forestillet repræsentation. Og konkret, fordi hendes værk præsenterer et fysisk rum og dermed en mulighed for oplevelsen af neutrinoen, hvor redskabet er sansning og overgivelse, snarere end at 'regne noget ud' på intellektuel vis.

"Abstrakt kunst forbliver misforstået af størstedelen af publikum. De fleste mennesker opfatter den som meningsløs", skriver Maurice Tuchman i antologien *The Spiritual in Art: Abstract Painting 1890–1985*; som ledsagede udstillingen af samme navn på Los Angeles County Museum of Art (LACMA) i 1986–87.⁷ Men da grupper af kunstnere omkring 1910 bevægede sig fra repræsentationel kunst (kunst, der ligner noget) til abstraktion, foretrak symbolske farver fremfor naturlige, tegn og ideer frem for sanset virkelighed, var det aldrig ment som en decideret afvisning af mening. Derimod hang det sammen med udviklingen af spirituelle ideer i Europa mod slutningen af det 19. årh. og begyndelsen af det 20. årh.⁸

Spirituelle grupper, der mødtes i seancer omkring det paranormale og forsøgte at forbinde sig til højere magter og opnå øget bevidsthed, var ganske udbredt i den periode. Således mødtes den svenske kunstner Hilma af Klint (1862–1944) med andre kvindelige kunstnere i gruppen De Fem og inkarnerede på mange måder den nysgerrighed, der dengang var omkring det spirituelle. Af Klint, som til en begyndelse malede figurativt, begyndte at male abstrakt allerede i 1906 – lang tid før sine mandlige 'kolleger', kunstnerne Wassily Kandinsky (1866–1944), Piet Mondrian (1872–1944) og Kazimir Malevich (1878–1935), som stadig opfattes som den abstrakte kunsts pionerer. Hun opfattede sig selv som et redskab for sine åndelige vejledere, og de tidlige malerier blev malet med stor kraft uden skitser og ændringer og forblev en gåde for hende selv.

Hun var inspireret af den russiske okkultist og filosof Helena P. Blavatsky og bekendt med antroposofien hos Rudolph Steiner, som hun mødte. Dog fandt hun sin egen spirituelle vej og producerede over 1000 okkulte værker, som hun aldrig viste til offentligheden. Da hun døde i 1944, skrev hun i sit testamente, at hendes malerier først måtte vises 20 år efter hendes død, da verden endnu ikke var klar.

Det havde hun så sandelig ret i. I 1970 blev værkerne tilbudt Moderna Museet i Stockholm som donation, men blev afvist. Først i 1984 blev hendes værker præsenteret under en konference af Åke Fant og udstillet for første gang på ovennævnte udstilling på LACMA i 1986. I foråret 2013 præsenterede Moderna Museet (endelig) en omfattende udstilling med Hilma af Klint, som året efter rejste til Louisiana Museum of Moderne Kunst, under overskriften *Hilma af Klint: Abstrakt pioner*. Dermed blev hendes værk præsenteret for et bredt dansk publikum for første gang.⁹

Hvorfor har det været så svært, kunne man spørge?¹⁰ Tuchman, der kuraterede udstillingen om spirituel kunst på LACMA i 1986, skriver, at 1930'ernes nazister fandt inspiration til ideen om arisk overlegenhed i okkult tankegods, kaldet *ariosofi*. Den politiske raceteoretiker Jörg Lanz von Liebenfels grundlagde Ny Tempelorden i 1907 og udgav magasinet *Ostara* om en ny race, bestående af ariske helte. Disse ideer blev inkorporeret af Hitlers løjtnanter i udviklingen af en 'race-mysticisme'. En forløber for racemysticismen var også den tyske forfatter Julius Langbehn's bog *Rembrandt als Erzieher (Rembrandt som opdrager)* (1890), hvori han beskrev en transformation af tyskere til kunstnere; til mænd, der besidder en kosmisk livskraft, der kan inspirere til national fornyelse.¹¹

Det okkulte og mystiske fik derfor en særdeles dårlig klang, og det blev i denne tid og tiden, der fulgte, iflg. Tuchman, decideret farligt for en kunstners karriere at bekende sig som 'spirituel'.¹² Samtidig skete det, at de abstrakte – og spirituelle – kunstnere fik tilskrevet en anden og mere videnskabelig bevæggrund for deres værker, i form af farve-, form- og skala-undersøgelser: Æstetiske undersøgelser om fx maleriet som maleri, grænserne for maleriet, opgør med

of meaning. Rather, the shift was associated with the development of spiritual ideas in Europe in the late nineteenth century and the early twentieth century.⁸

The practice of spiritism was quite widespread during the period: groups would meet for sessions that centred on the paranormal, seeking to connect to higher powers and reach a higher state of consciousness. For example, the Swedish artist Hilma af Klint (1862–1944) met with other women artists in a group known as De Fem (The Five); in many ways, their group is a quintessential example of the period's curiosity regarding spiritual matters. Originally a figurative painter, af Klint began painting abstract images as far back as 1906 – long before her male 'colleagues' Wassily Kandinsky (1866–1944), Piet Mondrian (1872–1944) and Kazimir Malevich (1878–1935), who are still regarded as pioneers of abstract art today. She saw herself as an instrument wielded by her spirit guides, and her early paintings – painted with great forcefulness, without any preliminary sketches or amendments – remained enigmas even to herself.

Af Klint was inspired by the work of the Russian occultist and philosopher Helena P. Blavatsky and familiar with the anthroposophy of Rudolph Steiner, whom she met. However, she found her own spiritual path, producing more than 1,000 occult works that she never put on public display. When she died in 1944, her will clearly stated that her paintings were not to be shown until 20 years after her death, as the world was not yet ready for them.

She was certainly right on that score. In 1970, Moderna Museet in Stockholm were offered the paintings as a gift, but the donation was rejected. Not until 1984 were her works presented at a conference, specifically by Åke Fant, and they were first exhibited at the aforementioned exhibition at LACMA in 1986. In the spring of 2013, Moderna Museet (finally) presented a comprehensive show of Hilma af Klint's art. The following year, that exhibition visited Louisiana Museum of Modern Art in Denmark under the headline *Hilma af Klint: A Pioneer of Abstraction*. Here, her art was presented to the Danish public for the first time.⁹

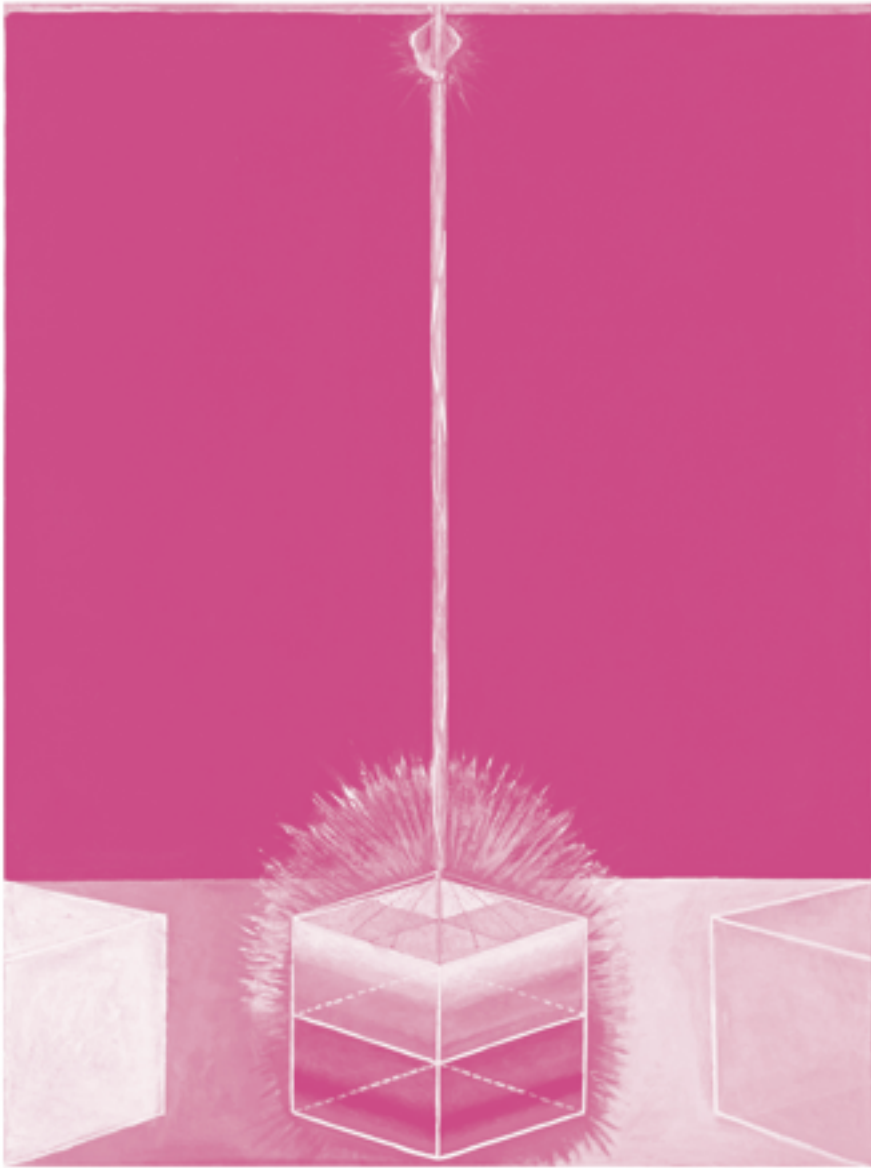
What took so long, one might well ask?¹⁰ Tuchman, who curated the exhibition on spiritual art at LACMA in 1986, states that in the 1930s, Nazi thinkers found inspiration for the notion of Arian superiority in occult theories known as *Ariosophy*. In 1907, the political race theorist Jörg Lanz von Liebenfels founded Order of the New Templars; he also published the magazine *Ostara* about a new race of Arian heroes. Hitler's lieutenants would subsequently incorporate these ideas into a kind of 'race mysticism'. Another precursor of this race mysticism was the German author Julius Langbehn's book *Rembrandt als Erzieher (Rembrandt as Educator)* (1890), in which he described a transformation of Germans, turning them into artists; into men in possession of a cosmic life force which could inspire national revival and reinvigoration.¹¹

Such connotations greatly tarnished the reputation of all things occult and mystical, and according to Tuchman, any artist pronouncing themselves 'spiritual' around this time and in the decades that followed did so at their own peril.¹² In a concurrent movement, a new set of motivations was ascribed to abstract – and spiritual – artists: they were now seen to be spurred on by a spirit of scientific inquiry, engaging in explorations of colour, form and scale: aesthetic studies of subjects such as 'painting as painting', the limitations of painting, a revolt against previous generations and a rejection of the figurative. In this discussion, spiritual content was not addressed, instead placing the main emphasis on form (hence the moniker 'formalism').

Two men within the professional world of art, both with a formalist approach, have had particular impact on the perception of abstract art. In his 1936 book *Cubism and Abstract Art*, Alfred Barr, director of MoMA in New York, sought to demonstrate how various artistic movements have replaced one another, each arising in response to what went before. In other words, he spoke of art that is very much about art in itself, *l'art pour l'art*. "An abstract painting is really a most positively concrete painting

EXCITED TRANS(RE)CEIVER CUTTING ACROSS SPACE-TIME

NØN-UNIFØRM
SNAKES



Hilma af Klint, *Duen, nr. 2*, 1915, olie på lærred.
Hilma af Klint, *The Dove, no. 2*, 1915, oil on canvas.
Kilde / Source: The Hilma af Klint Foundation.



Hilma af Klint, 1862–1944.
Hilma af Klint, 1862–1944.
Kilde / Source: The Hilma af Klint Foundation.



Lea Porsager, *Scrambled egg slime ~ ideal pea-sized troublemaker*, 2014. Dette værk beskæftiger sig med begrebet 'bevidsthed' gennem en undersøgelse af bl.a. pinealkirtlen (ses her på billedet). Filosofen René Descartes (1596–1650) mente, at pinealkirtlen er sjælens hovedsæde og tankernes udspring. Inden for yogaen er pinealkirtlen den fysiske manifestation af det sjette chakra og tredje øje, Ajna. Den teosofiske forfatter Helena Blavatsky (1831–1891) beskrev sagnriget Lemurien, hvis befolkning havde et tredje øje, hvilket gav dem stor indsigt. Dette øje sad bag på hovedet og rykkede senere ind i hjernen og blev til pinealkirtlen.

Lea Porsager, *Scrambled egg slime ~ ideal pea-sized troublemaker*, 2014. This work deals with the concept of 'consciousness' through a study of the pineal gland (seen here in the photo). The philosopher René Descartes (1596–1650) believed that the pineal gland is the seat of the soul and the wellspring of thought. Within yoga, the pineal gland is the physical manifestation of the sixth chakra and third eye, Ajna. The theosophical author Helena Blavatsky (1831–91) described the legendary realm of Lemuria, whose population had a third eye which gave them great insight. This eye sat on the back of the head and later moved into the brain, where it became the pineal gland.

Foto / Photo: Léa Nielsen.

HALF-INTEGERSPIN

! TULPAS INITIATED !



tidligere generationer og det figurative. Hermed blev det spirituelle indhold ikke italesat, og fokus blev på form (derfor kaldes det 'formalisme').

Særligt to formalistiske kunstprofessionelle mænd har haft betydning i opfattelsen af abstrakt kunst. Direktøren for MoMA i New York, Alfred Barr, søgte at påvise i sin bog *Cubism and Abstract Art* (1936), hvordan de forskellige kunstneriske strømninger har afløst hinanden og er opstået som svar på det, der lå forud. Med andre ord en kunst, som handler rigtig meget om, ja, kunst i sig selv, *l'art pour l'art*. "An abstract painting is really a most positively concrete painting since it confines the attention to its immediate, sensuous, physical surface far more than does the canvas of a sunset or a portrait", skrev han i bogen. Hans syn på den abstrakte kunsts udvikling blev bestemmende for, hvad museet udvalgte og indkøbte, og formede således MoMAs samling. Den anden betydende herre var kunstkritiker og den største formalist af dem alle, Clement Greenberg, hvis karriere tog fat i slutningen af 1930'erne. På linje med Barr udpegede han hovedstrømninger og udelod det, der ikke passede ind i fortællingen om den rette udvikling af kunsten.¹³

Først i 1960'erne og 1970'erne opstod en ny, seriøs kunsthistorisk forskning om den abstrakte kunst og dermed også dens forbindelse til det okkulte og det mystiske. I sen-1970'erne begyndte museer også at beskæftige sig med emnet, fx i *Art of the Invisible* på Bede Gallery i 1977, og flere fulgte.¹⁴

PAULI OG JUNG

Opfattelsen af Jung og Pauli og deres betydning inden for hvert deres felt er iflg. professor i videnskabsfilosofi og -historie Arthur I. Miller også blevet fejl- eller undervurderet efter deres død. I 2000 bad magasinet *Physics World* forskere om at stemme på de 10 mest betydningsfulde fysikere i det 20. årh. Pauli blev slet ikke nævnt, og han fik ikke en eneste stemme. Og det til trods for at han gjorde tre opdagelser, der ændrede fysikken: 'Udelukkelsesprincippet' (som han modtog Nobelprisen i fysik for i 1945, efter at være blevet indstillet af Albert Einstein), neutrinoen og 'CPT symmetri', alle uomgængelige for udviklingen af kvantemekanikken. Selv om Pauli var involveret i nogle af de største fremskridt inden for fysikken, tog han ikke æren for det. Pauli var beskednen og ikke interesseret i berømmelse og anerkendelse.¹⁵ Han publicerede ikke i faglige tidsskrifter, men lagde vægt på korrespondancer og ideudvekslinger med Werner Heisenberg, Niels Bohr og andre af tidens store forskere.

Jung bidrog til nye måder at betragte sindet på og var pioner inden for psykoanalysen, som han åbnede for alkymi, mysticisme og fjernøstlige religioner. Men kredsen af psykoanalytikere kritiserede ham for netop dette, ikke mindst i Sigmund Freuds cirkler. Senere blev han adopteret af New Age-bevægelser, hvilket ikke hjalp hans omdømme – for slet ikke at forglemme hans påståede nazi-sympatier. Ligesom det spirituelle indhold i den abstrakte kunst blev underkendt i perioden efter krigen, så blev Jung og Pauli det også.¹⁶

Paulis enke Franca tog sig særligt af arven efter ham: Hun brændte hans nedskrevne drømme efter hans død, brugte tre årtier på at finde et passende sted for hans bøger, personlige papirer og korrespondancer, og gjorde sit bedste for at forhale udgivelsen af hans korrespondance med Jung (som hun ikke brød sig om). Hun mente, at den ville ødelægge hans image som seriøs fysiker.¹⁷

Jung og Pauli kan siges at repræsentere de to forskellige sider af Porsagers værker: interessen for bevidstheden, egoet, det okkulte (Jung) på den ene side og det naturvidenskabelige, kvantefysikken og dens utrolige verden (Pauli) på den anden side. At de to ikke alene har korresponderet over mange år, men også påvirket hinandens områder, er temmelig interessant og ikke alment kendt.

Da Jung og Pauli begyndte deres korrespondance i 1932, havde Pauli desperat brug for hjælp. I tiden op til deres møde var Jung blevet veletableret og meget berømt. Han havde mødt Einstein, blev optaget af fysikken og dens paralleller til psyken, og han opfattede med tiden libido som en psykisk pendant til

since it confines the attention to its immediate, sensuous, physical surface far more than does the canvas of a sunset or a portrait," is one of the statements made in his book. Barr's outlook on the evolution of abstract art came to determine what the museum selected and bought, thereby shaping the collection at MoMA. The other important man addressed here was the art critic and formalist *par excellence* Clement Greenberg, whose career truly took off in the late 1930s. Like Barr, he pointed out main trends and movements, leaving out all that did not fit the overall narrative about the proper development of art.¹³

Not until the 1960s and 1970s did a new, serious wave of art historical studies of abstract art emerge, delving into its connections to the occult and mystical. By the late 1970s museums began to address the theme too; for example, Bede Gallery presented *Art of the Invisible* in 1977, and more shows were to follow.¹⁴

PAULI AND JUNG

The general perception of Jung and Pauli and of their impact within their separate fields has also, according to professor of history and philosophy of science Arthur I. Miller, been misinterpreted or underestimated after their death. In 2000, the journal *Physics World* asked its readers to vote for the ten most important physicists of the twentieth century. Pauli was not even mentioned in the set-up, and he did not receive a single vote. This in spite of the fact that he made three discoveries that changed the realm of physics: the 'Exclusion Principle' (for which he received the Nobel Prize in 1945, having been nominated by Albert Einstein), the neutrino, and the 'CPT Theorem' about charge, parity, and time reversal symmetry. All three were key factors in the development of quantum mechanics. Even though Pauli was involved in some of the greatest leaps ahead within the realm of physics, he never took credit for this. Pauli was modest, having little interest in fame and acclaim.¹⁵ He did not publish his discoveries in journals, but was far more concerned with his correspondence and exchanges of ideas with Werner Heisenberg, Niels Bohr, and other great scientists of the era.

Jung paved the way for new ways of looking at the human mind, and he was a pioneering force within psychoanalysis, opening up the field to aspects from alchemy, mysticism and oriental religions. However, the psychoanalytical community criticised him for this, not least the circles associated with Freud. Jung was later adopted by New Age movements, which did nothing to remedy his reputation – to say nothing of the claims regarding his alleged Nazi sympathies. Just as the spiritual aspects of abstract art were dismissed during the period after the war, so too were Jung and Pauli.¹⁶

Pauli's widow, Franca, tended to his legacy in distinctive fashion: she burned his written accounts of his dreams after his death, spent three decades finding a suitable place for his books, personal papers and correspondence, and did her best to delay the publication of his correspondence with Jung (whom she disliked). She believed that such a book would wreck Pauli's image as a serious physicist.¹⁷

Jung and Pauli can be said to reflect two different aspects of Porsager's art: on the one hand we have an interest in human consciousness, ego and the occult (Jung), and on the other we have the incredible world of science and quantum physics (Pauli). The fact that the two men not only engaged in correspondence for many years, but also mutually informed each other's areas of expertise, is rather interesting and not widely known.

When Jung and Pauli first began their correspondence in 1932, Pauli desperately needed help. Just prior to their meeting, Jung had become a well-established figure and very famous. He had met Einstein, become interested in the world of physics and its parallels to the mind, and he gradually came to perceive the libido as a mental counterpart to physical energy. He collected ancient texts on alchemy¹⁸ and became interested in the Chinese outlook on time when receiving, in 1928, a German translation of a Chinese text on alchemy, *Das Geheimnis der Goldenen Blüte* (The Secret of the Golden Flower). In such alchemical/mystical texts, he saw connections pointing all the way back



ZANY UNSEEN PERVERTED GHØST

THOUGHTS COLLIDE

WEAK VIØLATION

fysisk energi. Han samlede på gamle alkymistiske¹⁸ tekster og fattede interesse for den kinesiske forståelse af tid, da han i 1928 modtog en tysk oversættelse af en kinesisk, alkymistisk tekst *Das Geheimnis der Goldenen Blüte*. I alkymistisk-mystiske tekster så han forbindelser helt tilbage til gnostikere fra 1. årh. e.Kr., Platon og Pytagoras. Han så et historisk modstykke til sin psykologi om det ubevidste og blev overbevist om, at alkymistiske symboler og billeder og ideer om 'transmutation'¹⁹ var endnu en måde at forstå psyken på.²⁰

Pauli levede i årene op til mødet med Jung en slags 'Dr. Jekyll og Mr. Hyde'-tilværelse.²¹ Som Dr. Jekyll gik det ham utroligt godt. Han havde studeret i München med Arnold Sommerfeld som vejleder, og modtog sin ph.d.-grad som 21-årig. Sommerfeld bad Pauli skrive en artikel om relativitetsteorien; en artikel på 237 sider, der tog ham blot to måneder af skrive, og som fik ros af Einstein. Pauli arbejdede et år ved Göttingen Universitet og året efter ved Københavns Universitets Institut for Teoretisk Fysik, som i 1965 blev til Niels Bohr Institutet. Fra 1923 til 1928 var han forelæser ved Hamburgs Universitet. Det var i denne periode, at Pauli blev en af de ledende forskere inden for udviklingen af den moderne kvantefysik. I 1928 blev han udnævnt til professor i teoretisk fysik ved ETH Zürich i Schweiz, hvor han opnåede betydelige videnskabelige resultater. I 1930 studerede han radioaktivt betahenfald og forudså eksistensen af en hidtil ukendt neutral nukleopardikel med en meget lille masse, mindre end 1% af en protons masse; en partikel, som den italienske fysiker Enrico Fermi navngav 'neutrino' i 1934, og som blev endeligt bekræftet med eksperimenter i 1956 af Frederick Reines og Clyde Cowan, to og et halvt år før Paulis død. Da Pauli modtog nyheden, svarede han med et telegram: "Tak for meddelelsen. Alting kommer til den, der ved hvordan man venter. Pauli."²²

I 1923, i Hamburg-perioden, udviklede den unge, dygtige fysiker sin Mr. Hyde-side. Om dagen arbejdede han hårdt på universitetet, og om natten frekventerede han barer, drak, sloges og besøgte bordeller i byens *red light district*, som ironisk nok hed Skt. Pauli (!) Han giftede sig endog med en cabaretdanser, som elskede en anden, og blev skilt et år efter. Hans fremragende forskningsresultater stod i skarp kontrast til hans miserable, kaotiske personlige liv. Til sidst tog han imod et råd fra sin i øvrigt forhadte far (der havde forladt moren til fordel for en yngre kvinde, hvorefter moren havde begået selvmord): Han søgte hjælp hos Jung.²³

Jung beskrev ham som en "rationalist i tilstand af panik". Pauli fortalte Jung, at hans heftige drømme påvirkede ham kraftigt, også i vågen tilstand, og Jung opdagede, at drømmene var fulde af "arkaisk materiale" og syntes at springe ud af det 17. århundredes videnskab. Han dirigerede ham i første omgang i retning af sin studerende Erna Rosenbaum, da han mente, at hun som kvinde lettere ville kunne få adgang til hans ubevidste. Året efter behandlede han ham selv og vblev med det i to år. Pauli fortsatte derefter med at sende sine drømmerapporter til Jung, som modtog i alt 1300 af Paulis drømme og studerede et udvalg af de første 400 stykker. Resten af deres korrespondance kan ses som et samarbejde og udveksling af ideer.²⁴

KAOS-LIDERLIG LIBIDO

Paulis sprog var besk og bidsk. Han blev kaldt 'fysikkens samvittighed' og 'Guds pisk', berømt og berygtet for sin kritiske vurdering af andres arbejde.

Lea Porsagers sprog er også skarpt og skrap, om end på en anden måde: Hendes arbejde med sproget i sine tekster og værktitler har libidoen og liderligheden som grundtone. Enkelte af hendes tekster fremstår som en insisterende blanding af et manifest og et Tourette-udbrud med en god portion '!!!!', obscøne ytringer og bydeformer.

Det yogiske svar på liderligheden som kraft findes inden for 'tantraen'; en spirituel tradition med rod i Indien, hvor den feminine kraft (*Shakti*, lokaliseret i nederste chakra, ved roden af rygsøjlen) forenes med den maskuline (*Shiva*, kro-nechakraet på toppen af hovedet). Under orgasmen bevæger

to Gnostics from the first century CE, to Plato and Pythagoras. He saw a historic counterpart to his psychology of the unconscious, becoming convinced that alchemy and its symbols, imagery and ideas of 'transmutation'¹⁹ offered yet another way of understanding the human psyche.²⁰

In the years leading up to his encounter with Jung, Pauli led a 'Dr Jekyll and Mr Hyde' existence.²¹ As far as his Dr Jekyll aspect was concerned, things were going impressively well for Pauli. He had conducted his studies in Munich with Arnold Sommerfeld as his tutor, receiving his PhD degree at the age of 21. Sommerfeld asked Pauli to write an encyclopaedia article on the theory of relativity; penned in just two months, the result was a 237-page article that received praise from Einstein. Pauli spent a year working at the University of Göttingen, followed by a year at the University of Copenhagen Institute of Theoretical Physics, which was renamed the Niels Bohr Institute in 1965. He lectured at the University of Hamburg from 1923 to 1928. During this period, Pauli became one of the leading scientists in the development of modern quantum physics. In 1928 he was appointed professor of theoretical physics at ETH Zürich in Switzerland, where he achieved significant scientific results. In 1930 he studied radioactive beta decay, theorising the existence of a hitherto unknown neutral nuclear particle with a tiny mass, less than 1% of the mass of a proton; a particle which the Italian physicist Enrico Fermi named the 'neutrino' in 1934, and whose existence was finally proven in experiments conducted in 1956 by Frederick Reines and Clyde Cowan, two and a half years prior to Pauli's death. When Pauli received the news, he responded by night letter: "Thanks for message. Everything comes to him who knows how to wait. Pauli".²²

In 1923, during his Hamburg period, the gifted young physicist developed a Mr Hyde aspect to his persona. By day, he would work hard at the university, and by night he would go bar-hopping, drink, fight and visit brothels in the city's red-light district, which rather ironically bears the name St. Pauli (!) He even married a cabaret dancer who loved another man; they divorced the following year. His brilliant research formed a stark contrast up against his miserable, chaotic personal life. Finally, he accepted a piece of advice from his father, whom he otherwise reviled (his father had left his mother for a younger woman, whereupon his mother committed suicide): he turned to Jung for help.²³

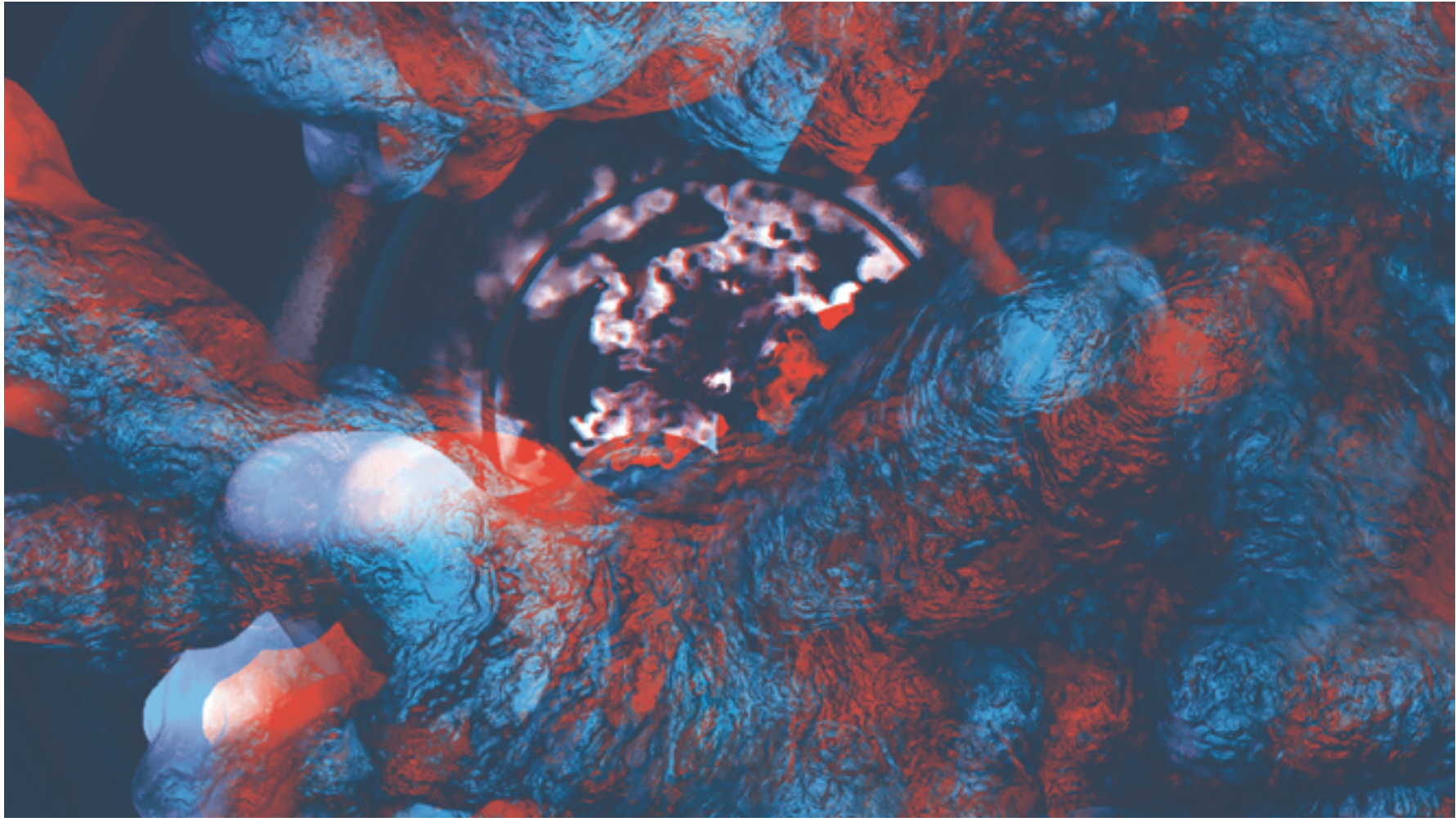
Jung described him as a "rationalist in a state of panic". Pauli told Jung that his ferocious dreams had a strong impact on him, including while awake, and Jung discovered that his dreams were full of 'archaic material', seemingly springing from seventeenth-century science. Jung initially referred Pauli to a student of his, Erna Rosenbaum, believing that she, being a woman, would have easier access to his subconscious and unconscious mind. The following year, Jung treated Pauli himself; he continued to do so for two years. Pauli subsequently continued to send reports of his dreams to Jung, who received a total of 1,300 dreams from Pauli and studied a selection of the first 400. The rest of their correspondence can be seen as a collaborative, ongoing exchange of ideas.²⁴

CHAOTIC-HORNY LIBIDO

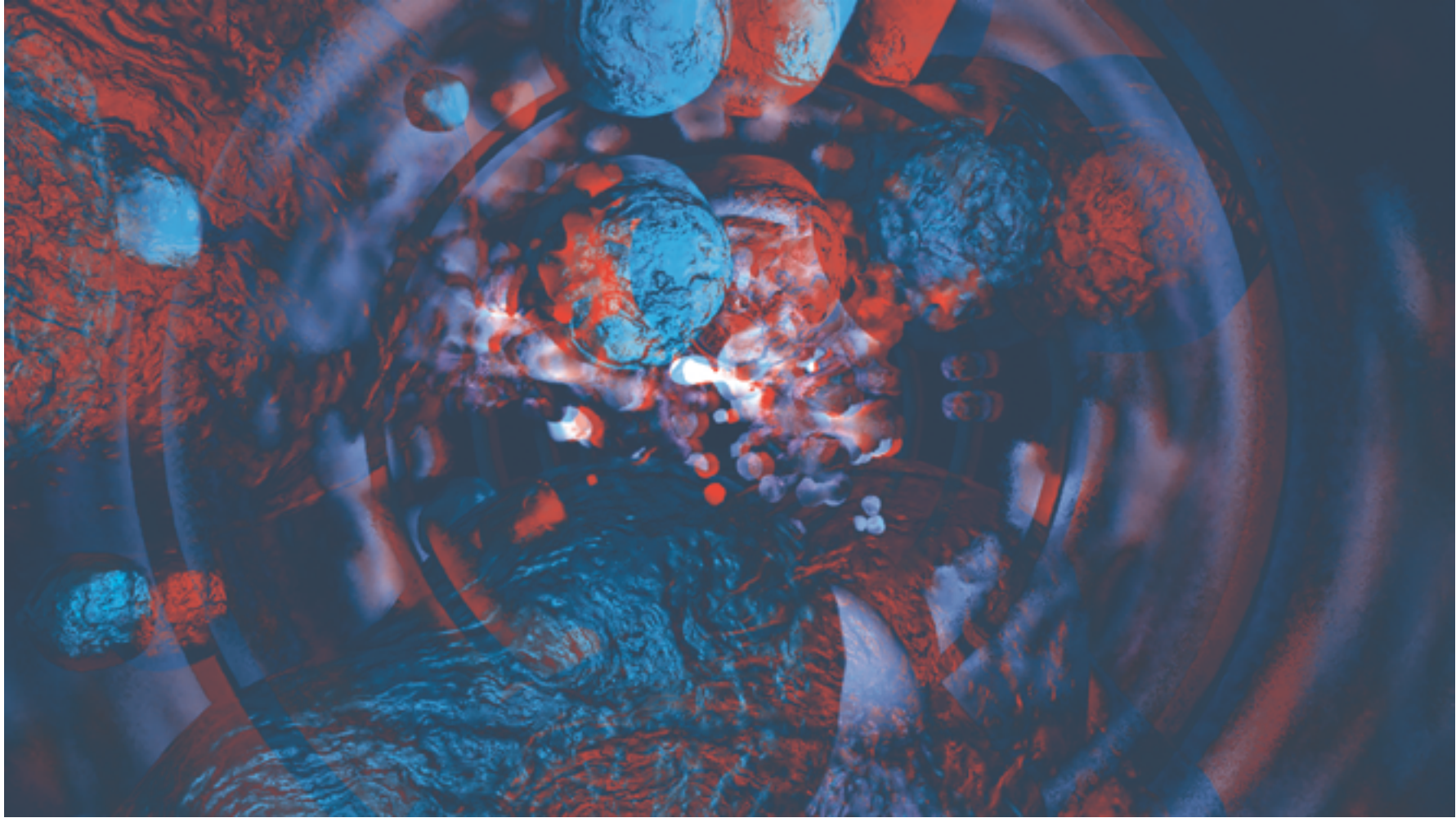
Pauli's tone was biting and acerbic. He was known as 'the conscience of physics' and 'the whip of God', famed and infamous for his critical assessments of the work of others.

Lea Porsager also uses sharp language, albeit in different ways: In her texts and titles, her use of language has the human libido, lust and downright horniness as its basic tenor. Some of her texts become insistent hybrids, part manifestos, part Tourette tics with plenty of '!!!!', obscene utterances and injunctions.

The yogic take on lust as a major force can be found within the realm of 'tantra', a spiritual tradition rooted in India which focuses on the union between the feminine force (*Shakti*, located in the lowermost chakra, at the base of the spine) and the masculine (*Shiva*, the crown chakra, located on the top of the head). During orgasm, Shakti moves towards Shiva, giving rise to inspiration and insight. In other words, tantra merges



Still-billede fra *HORNY VACUUM*.
Still from *HORNY VACUUM*.



Still-billede fra *HORNY VACUUM*.
Still from *HORNY VACUUM*.





Lea Porsager, *VULGUS*, 2017. Som sit bidrag til kunstmuseet KØS' 'Eksperiment 111' lod Lea Porsager 137 lilla tungeagtige figurer besætte museets forplads. Tungerne sneglede sig op af sprækkerne mellem betonelementerne som autonome organer, løsrevet fra menneskekroppen. Tungen forbinder det, der er inde i mennesket – tanker og følelser der kan komme til udtryk gennem tale – og selve menneskets indre, de vitale organer, halsen, tarmene osv. med det, der er udenfor. Tallet 137 er et mystisk tal, som refererer til Pauli, jf. side 137.

Lea Porsager, *VULGUS*, 2017. In her contribution to the KØS museum's 'Experiment 111', Lea Porsager had 137 purple, tongue-like figures occupy the courtyard in front of the museum. The tongues poked out of the cracks between the concrete elements like autonomous organs, detached from the human body. The tongue connects what is inside the human being – thoughts and emotions that can be expressed through speech – while also connecting the insides of the human body, its vital organs, throat and intestines, with what is outside. The number 137 is a mysterious, 'magic' number and a direct reference to Pauli, cf. page 137.

Foto / Photo: Anders Sune Berg.



Shakti sig mod Shiva og inspiration og indsigt opstår. Tantra forener med andre ord det spirituelle med seksuel energi, hvor den seksuelle energi er en vej til en højere bevidsthed.

Jeg er ikke sikker på, at Paulis tilstand af panik ville være blevet beroliget af indsigt i det tantriske univers. Uden at være psykoanalytiker vil jeg tillade mig at sige, at han havde nogle uhensigtsmæssige forstyrrelser i sin libido, seksualdriftens psykiske energi, og med sin kaosadfærd var hans partikel hans udtrykte billede: den evigt penetrerende neutrino.²⁵ Hvor Freud blev anklaget for at forklare alt seksuelt (fx at neuroser, angst og narcissisme skyldes manglende udløsning for libidoen, og at de højeste sociale, kunstneriske og religiøse manifestationer er forvandlet libido), lagde Jung vægt på libidoen som psykisk energi, en slag universel livskraft.²⁶

Paulis stærke livskraft fik også untenderet effekt på hans nærmiljøer; hans intense, indre spændinger manifesterede sig fysisk. Faktisk forårsagede hans blotte tilstedeværelse kaos.

Fra tidligt i hans karriere lagde kolleger mærke til, at laboratorieudstyr gik i stykker, når Pauli trådte ind ad døren. Det kunne jo ikke være rigtigt, det måtte være tilfældigt, det skete bare igen og igen. I 1920'erne var der fx et massivt nedbrud i et laboratorium i Göttingen, hvor et kompliceret apparat til studier af atomer kollapsede, tilsyneladende uden grund. Denne gang kunne det ikke skyldes Pauli, mente hans lettede kolleger, for Pauli var ikke i landet. En professor skrev et humoristisk brev til Pauli om episoden, og det viste sig, at Pauli havde befundet sig i et tog på vej til København og var stoppet på Göttingen station på det præcise tidspunkt, hvor udstyret brød sammen. Pauli troede selv fuldt og fast på Pauli-effekten og begyndte at overveje, om han havde paranormale evner.²⁷

TID OG RUM: UNUS MUNDUS – I ÉN TEORI, I ÉT TAL, I ÉT BILLEDE

Jung arbejdede med en idé om 'Unus mundus', én verden, og hvis der var én verden, kunne der også være én bevidsthed, hvilket han kaldte det kollektivt ubevidste.

I 1920'erne begyndte han at undersøge parallelle mellem (paranormale) ud-af-kroppen-oplevelser og mentale tilstande. Et eksempel fra en egen oplevelse er, at Jung en dag i 1928 tegnede en mandala, som så ganske kinesisk ud, og senere samme dag modtog han oversættelsen af den førnævnte kinesiske, alkymistiske tekst, *Das Geheimnis der Goldenen Blüte*. Den slags oplevelser kender vi nok alle: at meningsfulde, beslægtede begivenheder opstår parallelt og uafhængigt af hinanden og kan ikke forklares ud fra årsag. Netop kinesisk videnskab er baseret på et synkronicitetsprincip, en parallel tidsforståelse, hvilket i Vesten betragtes som overtro, skrev Jung.²⁸

I Vesten er tidsforståelsen lineær, alting falder i kausale sekvenser (en ting fører til den næste), men Jung blev overbevist om, at begivenheder udspiller sig i vertikale og horisontale forbindelser, sådan at alle begivenheder, der finder sted rundt omkring i verden er forbundne i en form for netværk. Han interesserede sig for *I Ching*; en flere tusind år gammel 'spådomskunst', hvor mønter (oprindeligt røllikestilke) kastes, og talværdier opstår, hvilket fortolkes i et særligt heksagram, sammensat af to trigrammer. Hver linje fortolkes i et vers og en overordnet titel-linje udgør versets idé. Samlet beskriver versene almenmenneskelige livssituationer og kommer med anvisninger og gode råd. Jung lod sig inspirere af *I Chings* principper, og så disse ('såkaldte', som han nok ville sige) tilfældigheder som manifestationer af psyken i den ydre verden. Jung udviklede sin idé om synkronicitet, som han selv syntes var en af de bedste ideer, han nogen sinde havde fået.²⁹

Jung vidste godt, at hans teori havde brug for en videnskabelig overbygning. Det var på dette tidspunkt, at han mødte Pauli, som mange år senere, i 1948, opfordrede Jung til at skrive sine ideer ned, og leverede en hård kritik. Da Jung og Pauli sammen udgav bogen *Naturerklärung und Psyche* i 1952, præsenterede Jung første del, *Synchronizität als ein Prinzip akausaler* og Pauli anden del *Der Einfluss*

spiritualism and sexual energy, positing sexual energy as a pathway towards a higher consciousness.

I am not certain that Pauli's panicked state would have been soothed by insight into the realm of tantric practices. While I am no psychoanalyst, I would nevertheless venture to say that he had a number of adverse disruptions to his libido, the psychic energy of sexual desire, engaging in chaotic behaviour that is perfectly and metaphorically encapsulated by 'his' particle: the eternally penetrating neutrino.²⁵ While Freud was accused of explaining everything in terms of sexual root causes (claiming, for example, that neuroses, anxiety and narcissism were caused by repression of the libido, and that the highest manifestations of social, artistic and religious endeavours are the result of a sublimated libido), Jung placed emphasis on the libido as mental energy, as a kind of universal life force.²⁶

Pauli's strong vital force also had unintentional side effects on his immediate surroundings: his intense inner tensions manifested themselves physically. In fact, his mere presence caused chaos.

Right from an early stage of his career, colleagues noticed that laboratory equipment would inexplicably break when Pauli entered the door. Of course, everyone told themselves that this could not possibly be true, but nevertheless it happened over and over again. In the 1920s, for example, a laboratory in Göttingen suffered a major breakdown when a complicated piece of equipment used to study atoms just collapsed, seemingly for no reason. His colleagues saw one silver lining, reassuring each other that this time the incident could not possibly be attributed to Pauli, because he was abroad. When a professor wrote a humorous letter to Pauli about the incident, it turned out that Pauli was on a train headed for Copenhagen at the time and had had a stopover at the Göttingen station at the exact same time when the equipment crashed. Pauli himself believed firmly in the Pauli effect, prompting him to consider the idea that he might have paranormal abilities.²⁷

TIME AND SPACE: UNUS MUNDUS – IN ONE THEORY, ONE FIGURE, ONE IMAGE

Jung entertained the notion of 'Unus Mundus', One World, and if there was such a single world there might also be a single consciousness, which he termed the collective unconscious.

In the 1920s, he began to explore parallels between (paranormal) out-of-body experiences and mental states. He quotes one example from personal experience: one day in 1928, Jung drew a mandala that looked quite Chinese, and later that same day he received a translation of the aforementioned Chinese text on inner alchemy, *The Secret of the Golden Flower*. Most of us will have had similar experiences ourselves: instances where meaningful, interrelated events arise parallel to and independently of each other, without any specific cause to explain the coincidence. Jung stated that Chinese science is based on a principle of synchronicity, an outlook on time which is regarded as superstitious in the West.²⁸

In the West, we perceive time as linear: everything is sequential, governed by causality (one thing leading to another), but Jung grew convinced that events take place within a network of vertical and horizontal connections that link up everything that happens in the world. He was interested in the *I Ching*; an ancient method of divination in which coins (originally yarrow stalks) are cast, giving rise to numerical values that are then interpreted by means of a special hexagram composed of two trigrams. Each line is interpreted in a verse, and an overall title line encapsulates the main idea of the verse. Taken as a whole, these verses describe universal aspects of the human condition, offering directions and good advice. Jung was inspired by the principles of the *I Ching* and saw its ('so-called', as he would probably say) coincidences as outward manifestations of the psyche. Jung honed and developed this idea of synchronicity, which he himself believed to be one of the best ideas he ever had.²⁹

Jung was aware that his theory required some scientific superstructure. It was around this time that he first met Pauli, who would later – in 1948 – encourage Jung to write down an account of his ideas, acting as a harsh critic along the way. When Jung and Pauli published their jointly authored *Naturerklärung und Psyche* in 1952, Jung presented the first part, *Synchronizität als ein*

DARTH HAI
AKASH HAI



*archetypischer Vorstellungen auf die Bildung naturwissenschaftlicher Theorien bei Kepler.*³⁰ Jung lænede sig op ad kvantefysikken gennem sin viden fra Pauli, som han havde diskuteret med over årene.

Pauli var optaget af videnskab, filosofi og religion hele sit liv. På linje med Jung ledte Pauli efter én komplet teori, og kvantefysikken var ikke svaret, da den ikke kan forklare biologiske og mentale processer, såsom bevidsthed. Samtidig med sine forskningsmæssige landvindinger, arbejdede han også mere hemmeligt (han fortalte aldrig sine kolleger om sine diskussioner med Jung) med sit behov for en fusion af fysikken med Jungs analytiske psykologi for at forstå det ubevidste og det bedste. Svaret på en 'unus mundus', en verdens enhed, blev udtrykt i hans teorier om symmetri som en form for basal strukturerende kraft i naturen.³¹

Én ting er at finde en sammenhængende teori om verden, men der er gennem alle tider også søgt efter det ene kosmiske tal, der styrer verden – hvis det altså findes. For mange i oldtiden var 4 noget helt særligt. Men 4 og andre bud på kosmiske tal overgås af 137, som spiller en mytisk rolle i mange sammenhænge. 137's berømmelse inden for naturvidenskaberne skyldes først og fremmest, at tallet er det reciprokke af finstrukturkonstanten alfa ($\alpha = 1/137$) – en størrelse, der kombinerer elektronens ladning, lysets hastighed og Plancks konstant i ét tal.

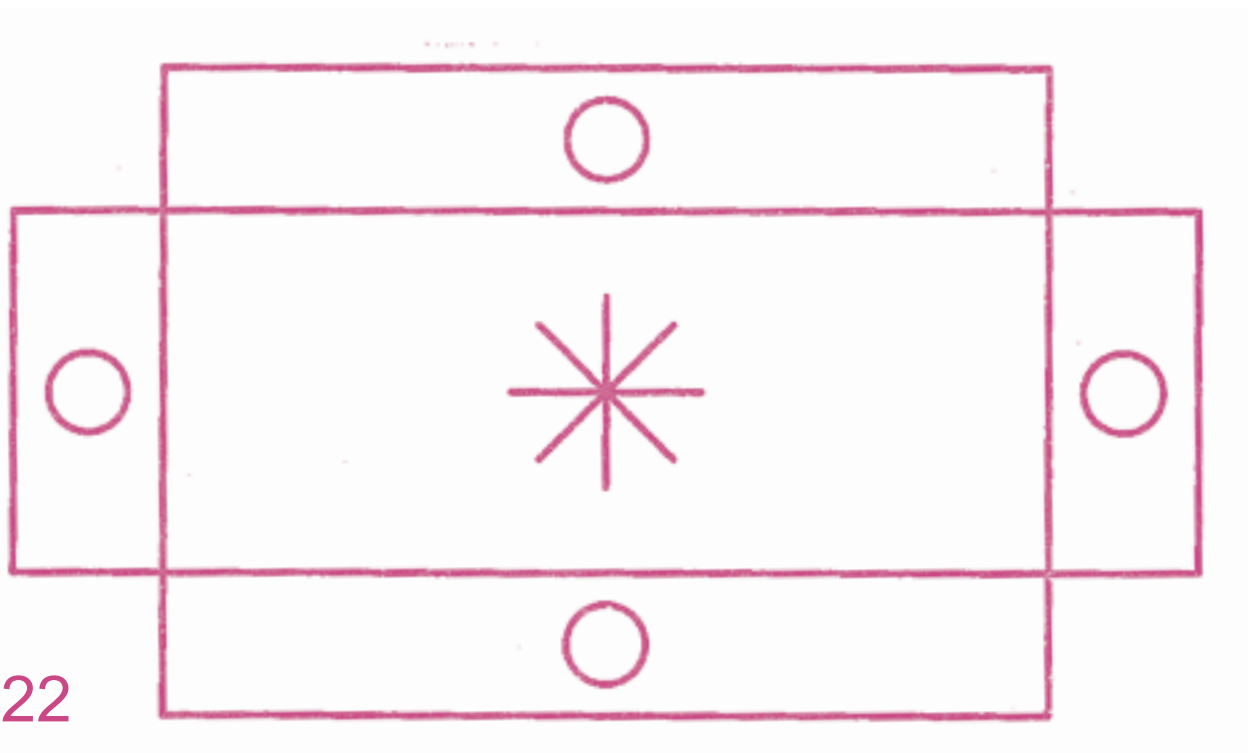
Det var Paulis lærer, Arnold Sommerfeld, der introducerede finstrukturkonstanten i 1916 i en forklaring af spektrallinjerne i hydrogen-atomet. Finstrukturkonstanten forklarer, hvor fintunet vores univers er. Var dens størrelse blot fire procent større eller mindre, ville stjerner ikke være i stand til at danne kulstof og oxygen – og livet, som vi kender det, ville ikke kunne eksistere. Tallet er dertil særligt, fordi det er et ualmindeligt primtal og det har en interessant relation til det gyldne snit.

Pauli var opdraget som katolik, men var af jødisk afstamning. Det var måske af samme grund, han allerede i sin ungdom interesserede sig for jødisk mysticisme i form af kabbala. På hebræisk skrives kabbala med fire tegn. I *gematria*, et jødisk regelsæt for fortolkning af Torahen, er der til ethvert tegn knyttet et tal. Summen af talværdierne for kabbala er 137. Pauli diskuterede tallet med Jung og en af hans drømme om verdensuret er tolket som en beskrivelse af denne konstant.³²

Hvis 137 er matematikkens og fysikkens svar på et kosmisk tal, så er mandalen et visuelt svar på hele kosmos i én tegning. Helt tilbage til palæolitisk tid, hos pueblo-indianere, i hinduismen og buddhismen har mandala været brugt. Mandala (sanskrit, 'cirkel, kreds') er et magisk diagram, der

Paulis forvrængede mandala. Paulis første mandala kom til ham i en drøm. I drømmen forsøger han at gøre den symmetrisk, men det lykkes ikke. Mandalaen holder fire skåle, som er fyldt med farvede væsker, der repræsenterer de fire aristoteliske elementer – rød (ild), gul (luft), grøn (vand) og blå (jord) – men i skålen med blå er væsken gennemsigtig. Jung fortolkede mandalaens mangel på symmetri og dybde som tegn på, at Pauli stadig var domineret af sit ego.

Pauli's distorted mandala. Pauli's first mandala came to him in a dream. In this dream he tried to make it symmetrical, but failed. The mandala holds four bowls filled with coloured liquids representing the four Aristotelian elements – red (fire), yellow (air), green (water) and blue (earth) – but the blue liquid is transparent. Jung interpreted the mandala's lack of symmetry and depth as evidence that Pauli was still dominated by his ego.



Prinzip akausaler, while Pauli presented the second part, *Der Einfluss archetypischer Vorstellungen auf die Bildung naturwissenschaftlicher Theorien bei Kepler.*³⁰ Jung shored up his claims by means of quantum physics, having acquired insight into the field through his many discussions with Pauli over the years.

Pauli was interested in science, philosophy and religion throughout his entire life. Like Jung, Pauli was looking for a single, complete theory of everything, but quantum physics was not the answer due to its inability to explain biological and mental processes such as consciousness. Concurrently with his scientific discoveries he also worked clandestinely (he never told his colleagues about his discussions with Jung) to merge the realm of physics with Jung's analytical psychology in order to understand the unconscious and the conscious. In his theories, the search for an 'Unus Mundus', a single, unified world, found expression in the idea of symmetry as a fundamental structuring force in nature.³¹

Such efforts to find a single, cohesive theory about the world is not a new thing: throughout the ages, scholars have searched for a single, cosmic number that governs the world. Whether such a figure exists is a matter of contention. To many ancients, the number 4 held special significance. However, 4 and many other proposed cosmic figures are outdone by the magic number 137, which has mythical significance in many contexts. Within the realm of science, 137 is particularly noted for being the reciprocal of the so-called fine-structure constant, denoted by the Greek letter alpha ($\alpha = 1/137$) – a unit that combines the speed of light, the charge carried by a single electron, and Planck's constant in a single number.

The fine-structure constant was introduced by Pauli's tutor, Arnold Sommerfeld, in 1916 as part of an explanation of the spectral lines emitted by the hydrogen atom. The fine-structure constant explains how finely tuned our universe is. If its value was changed by just four per cent, stars would not be able to form carbon and oxygen – and life as we know it could not exist. To this we may add that 137 is an unusual prime number and bears an interesting relationship with the golden ratio.

Pauli was raised a Catholic, but was of Jewish descent. Perhaps this was why he became interested in Jewish mysticism, kabbalah, as a young man. In Hebrew, the word 'kabbalah' is written by means of four characters. The 'Gematria' method for interpreting the Torah assigns a number to every word, and the sum of the numerical values of the Kabbalah is 137. Pauli discussed this number with Jung, and his famous 'world clock' dream has been interpreted as a description of this constant.³²

Just as 137 is a number offered up by mathematics and physics to describe the cosmos, the mandala is a visual rendition of the entire cosmos in a single drawing. Mandalas have been used all the way back in Palaeolithic times, among the Pueblo people, in Hinduism and Buddhism. A mandala (from the Sanskrit for 'circle') is a magic diagram used for ritual purposes and as an object of meditation in Hindu and Buddhist tantra. It is a symmetrical figure adorned by sacred symbols, usually set within a circle that represents unity and infinity. The main significance of the mandala rests on its use as an object of meditation. The person meditating enters the mandala, going on a spiritual walkabout within it, identifying with the universe symbolically represented there, thereby recognising that the macrocosm and microcosm are identical – an insight necessary in order to achieve salvation, *nirvana*.³³

Jung painted his first mandala in 1916. The image flowed out of him automatically, and he did not know why he drew it. This prompted him to believe that a mandala was a message from the unconscious.³⁴ Pauli's accounts of his wild dreams include circles and patterns right from the outset of the two men's correspondence, and over time the mandalas in his dreams grew increasingly perfect. Jung took this as signifying that Pauli had developed a healthier persona, achieving greater balance of mind; an equipoise between the conscious and the unconscious.

EGO DEATH

Ego dominance leads to no good. In all spiritual and religious practices, the ego constitutes an aspect that must be diminished in scope, preferably eradicated altogether,



Ø ENJØYMENT

SPØILED TØP KNØT

Lea Porsager, *Twenty-two Ground Protection Mats ~ ET*, 2016.

Jern, hver 300 × 200 × 1.5 cm.

Fra solo-udstillingen *E(AR)THERIC SLIME ~ PRE-OP*, 2016. Se mere på s. 40.

Lea Porsager, *Twenty-two Ground Protection Mats ~ ET*, 2016.

Iron, each mat 300 × 200 × 1.5 cm.

From the solo exhibition *E(AR)THERIC SLIME ~ PRE-OP* (2016).

Corresponding with page 40.

Foto / Photo: Malle Madsen.



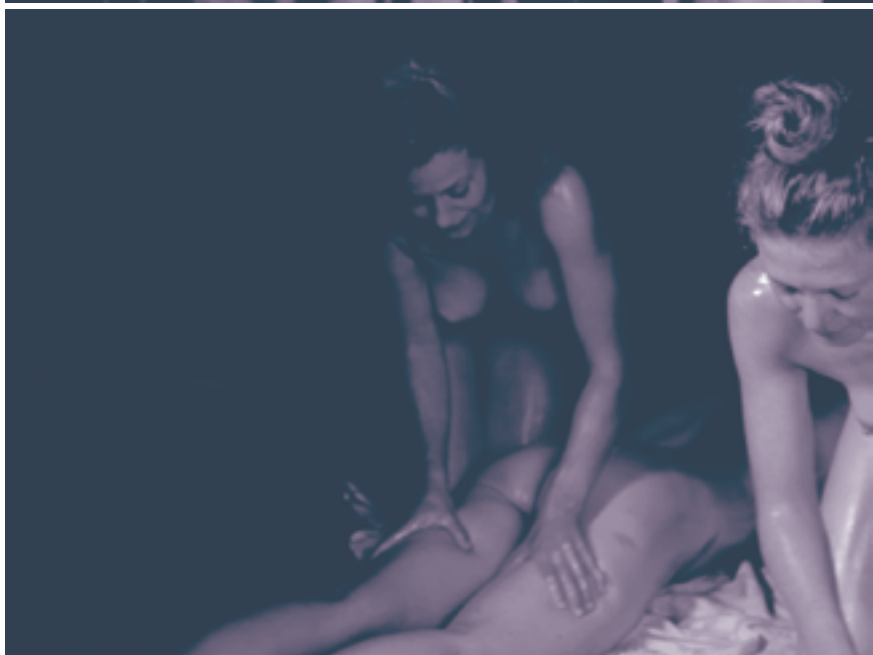
Lea Porsager, *Anatta Experiment*, 2012 (præsenteret på dOCUMENTA (12), 2013). *Anatta Experiment* fandt sted på Monte Verità, Sandhedens bjerg, i Schweiz og tog udgangspunkt i de eksperimentelle, spirituelle bevægelser, som holdt til på bjerget i begyndelsen af 1900-tallet. Porsager inviterede syv venner til en uges ophold i Anatta-huset på bjerget, hvor de udførte forskellige kollektive, tantriske eksperimenter for at ophæve 'jeg'et', med udgangspunkt i den buddhistiske forståelse af anatta (ikke-selv). Processen blev dokumenteret filmisk undervejs, og filmen indgik i det færdige værk sammen med skulpturelle og billedlige elementer – alt sammen installeret i et lille træhus, inspireret af det oprindelige Casa Anatta.

Lea Porsager, *Anatta Experiment*, 2012 (presented at dOCUMENTA (12), 2013). *Anatta Experiment* took place on Monte Verità, the Mountain of Truth, in Switzerland and was based on the experimental, spiritual movements that took up residence on this mountain in the early 1900s. Porsager invited seven friends for a one-week stay at the Anatta House on the mountain, where they performed various collective, tantric experiments to abolish the 'I', based on the Buddhist understanding of anatta (non-self). The process was documented on film along the way, and the film was included in the finished work alongside sculptural and pictorial elements – all of them installed in a small wooden house inspired by the original Casa Anatta.

Foto / Photo: Anders Sune Berg.

ØNGØING

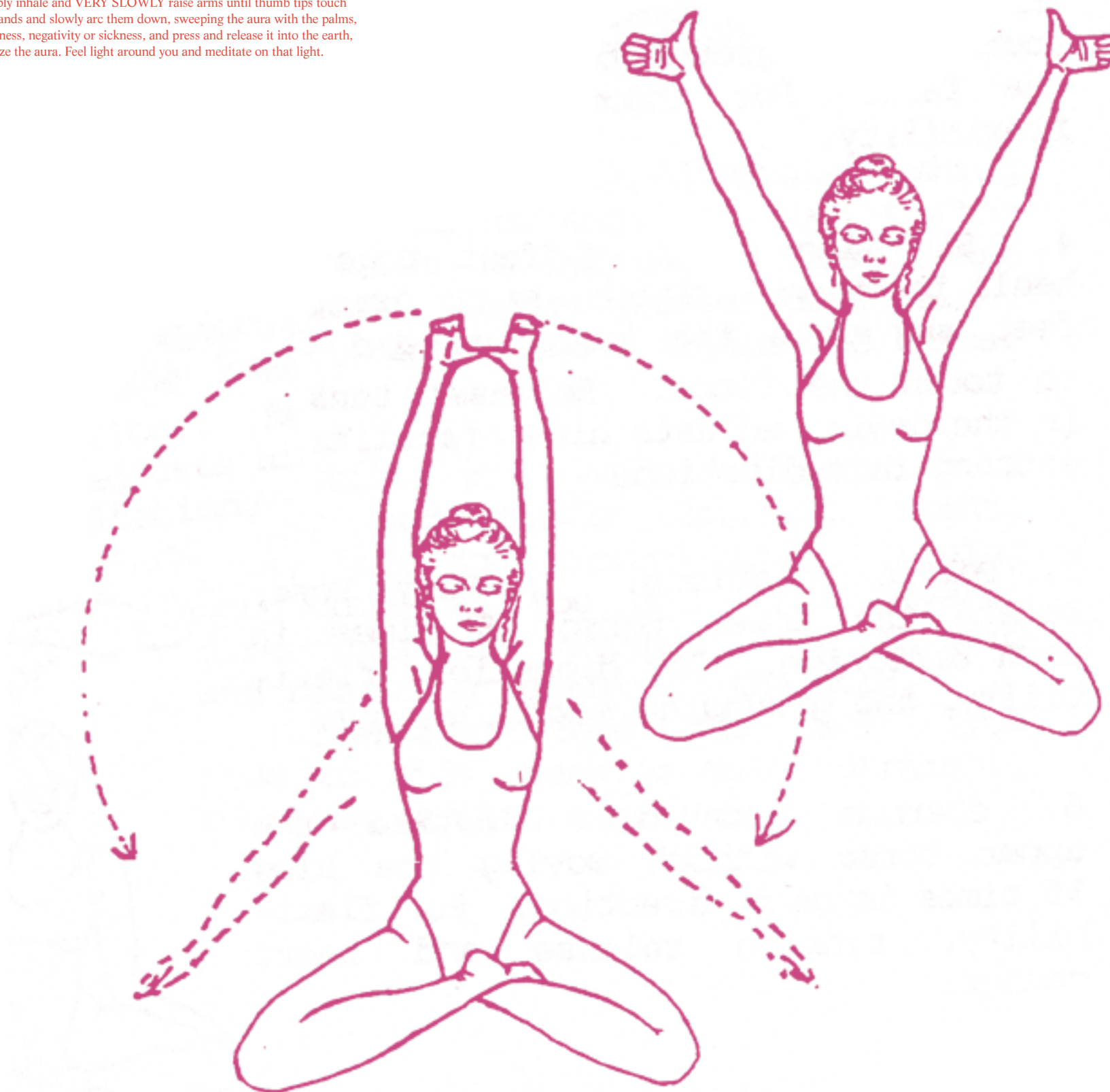
GANG BANG IN THE LØØP-HØLE



Still-billeder fra *Anatta Experiment*.
Stills from *Anatta Experiment*.

Ego-Eradicator. Sid i meditationsstilling og løft armene op i en 60° vinkel med tommeltotterne pegende opad og de øvrige fingre bøjet, så fingerspidserne møder håndfladen. Brug Breath of Fire-åndedrættet i to minutter. Tag så en dyb indånding og løft MEGET LANGSOMT armene, indtil tommelfingerspidserne mødes over hovedet, gør hænderne flade og før dem langsomt ned, mens du stryger auraen med håndfladerne og opsamler det mørke, den negativitet eller sygdom, der måtte være, og pres og slip det fri ned i jorden for at rense og aktivere auraen. Føl lyset omkring dig og mediter på det lys.

Ego-Eradicator. Sit in Easy Pose and raise arms to 60° out to the sides, fingertips on pads of fingers, thumbs extended straight up and hold with Breath of Fire for 2 minutes. Then deeply inhale and VERY SLOWLY raise arms until thumb tips touch overhead, flatten hands and slowly arc them down, sweeping the aura with the palms, collecting any darkness, negativity or sickness, and press and release it into the earth, to clean and energize the aura. Feel light around you and meditate on that light.





- 1 “Når Tor Nørretranders udtaler at ‘alting består mestendels af ingenting’ har han i høj grad ret: Den fysiske virkelighed består basalt set af tomrum og vekselvirkninger mellem partikler, der ikke har nogen kendt udstrækning. Universet er set på denne måde stort set det rene ingenting, og det er derfor af stor interesse at forstå dette tomrum – det såkaldte vakuum. I tråd med religionens Nirvana, der betegner tomhed og den ultimative virkelighed, kunne man kalde det ‘Kvanternes Nirvana’ idet elementarpartiklerne i vakuum er selvudslettende og på sin vis definerer et ultimativt nulpunkt. Men hvordan ser kvanternes Nirvana ud? Det er ikke et totalt fravær af alt, men derimod en stadig ‘summen’ af partikler, der bliver skabt og kort efter tilintetgjort.” Ulrik Ingerslev Uggerhøj, “Kvanternes Nirvana” i *A k t u e l N a t u r v i d e n s k a b | 2 | 2 0 0 4*, <http://users-phys.au.dk/ulrik/an2ulrik.pdf>
- 2 I filosofisk kontekst betyder ‘esoterisk’ oprindeligt de tekster, som kun var forståelige for de indviede (indadvendte), modsat ‘eksoterisk’, som var de tekster, der var beregnet for offentligheden (udadvendte). Begrebet anvendes også i religionshistorisk sammenhæng om religioner, der enten forudsætter hemmeligt medlemskab, eller hvis riter og hellige tekster kun er tilgængelige for de indviede (de initierede), fx islamisk mystik (sufisme); retninger inden for mahayana-buddhismen, fx den japanske shingonbuddhisme med dens hemmelighedsfulde initiationer i forbindelse med meditation foran mandalaer samt adskillige okkulter og spiritualistiske bevægelser i europæisk historie, fx frimurerne, rosenkreuzerne, teosofi, antroposofi samt visse nye religioner, fx Scientology. http://denstoredanske.dk/Sprog,_religion_og_filosofi/Filosofi/Oldtidens_filosofi/esoterisk <https://en.wikipedia.org/wiki/Ajna>
- 3 Tuchman, s. 19
- 4 Tuchman, s. 19
- 6 Karen Barad har opfundet begrebet intra-aktion og siger: “Diskursive praksisser og materielle fænomener står ikke uden for hinanden; det materielle og det diskursive er gensidigt involveret i intra-aktivitetens dynamik. Det ene kan ikke reduceres til det andet. Det materielle og det diskursive er hver især en logisk konsekvens af hinanden. [...] Ingen af delene har forrang i forhold til at bestemme den anden.” Det er ikke verdens letteste citat, men beskriver hvordan der i mødet mellem tanke og ting, bevidsthed og materialitet, kunstner og materialitet, betragter og betragtet, opstår en slags udveksling, hvorigennem betydning eller erkendelse opstår. Barad, s. 822

- 7 Tuchman, s. 17 [min oversættelse]
- 8 Tuchman, s. 17
- 9 <https://www.hilmaafklint.se/about-hilma-af-klint/> Fant, s. 155–161
- 10 Det har endog været svært helt op til vor tid, hvor det er først inden for det seneste årti, at det spirituelle for alvor fylder på den yngre del af den danske kunsts-cene, og er blevet accepteret.
- 11 Tuchman, s. 18, s. 58
- 12 Tuchman, s. 18
- 13 Tuchman, s. 18, s. 58
- 14 Tuchman, s. 19
- 15 Miller, s. 273–274
- 16 Miller, s. 274
- 17 Miller, s. 271
- 18 Alkymi blev opfattet som en måde hvorpå man kunne forstå forbindelser fra vores livsverden op til himlen. Der var to slags alkymister: de videnskabelige (som går forud for moderne kemikere og metallurgister, som prøvede at forvandle metaller til guld) og de mystiske (som opfattede forvandlingsprocesserne i laboratorierne som en spirituel vej til frelse). Herfra stammer udtrykket “De vises sten”, på latin kaldet *lapis philosophorum*, som er et stof med fantastiske, til tider magiske egenskaber, som stammer fra alkymisternes arbejde. Stoffet angives at kunne forvandle uædle metaller som f.eks. bly til guld, og til at fremstille en eliksir, der gav evigt liv. Miller, s. 47 og https://da.wikipedia.org/wiki/De_vises_sten
- 19 Transmutation i alkymien er “omdannelse af et metal til et andet, idet man forestillede sig, at det skete ved udskiftning af de elementer, som man mente, metallet var opbygget af”, www.denstoredanske.dk
- 20 Miller, s. 49–50.
- 21 Filmatisering af Dr. Jekyll and Mr. Hyde udkom i samme periode, i 1931.
- 22 https://da.wikipedia.org/wiki/Wolfgang_Pauli
- 23 Greenberg, s. vii–viii
- 24 Greenberg, s. ix–xii. Paulis ægteskab med Franca Bertram i 1934 (varede til Paulis død) satte en stopper for hans terapi, da hun ikke brød sig om Jung.
- 25 Pauli omtalte den senere som “Det fjollede barn af en krise i mit liv (1930–1), som ydermere opførte sig fjollet!” (min oversættelse), Miller, s. 118
- 26 http://denstoredanske.dk/Krop,_psyke_og_sundhed/Psykologi/Psykoanalyse_og_egopsykologi/libido
- 27 Miller, s. 18, s. 57
- 28 Miller, s. 188–190
- 29 “De gamle kinesere anskuede kosmos på en måde, der kan sammenlignes med den moderne fysiker, som ikke kan benægte, at hans verdensmodel er en psykofysisk struktur. Det psykofysiske inddrager iagttageren i fuldt ud samme grad som den virkelighed, der ligger til grund for I Ching, også omfatter subjektive, dvs. psykiske, forhold i den samlede øjeblikkelige situation.”

SWAY
SWAY

AROUSING ZEROØS

- 1 “When Tor Nørretranders states that ‘everything is mostly made up of nothing’, he is quite right: physical reality basically consists of empty space and interactions between particles of unknown scope and delimitation. Seen in this way, the universe is mostly nothing at all, making it a matter of great interest to understand this emptiness – this so-called vacuum. In keeping with the religious idea of Nirvana, which designates emptiness and ultimate reality, one might call this a ‘Quantum Nirvana’; the elementary particles in a vacuum are self-destructive and can in some sense be said to constitute an ultimate zero point. But what does this Quantum Nirvana look like? It is not a total absence, but rather a constant ‘humming’ of particles being created and, shortly afterwards, destroyed again”. Ulrik Ingerslev Uggerhøj, “Kvanternes Nirvana” in *A k t u e l N a t u r v i d e n s k a b | 2 | 2 0 0 4*, <http://users-phys.au.dk/ulrik/an2ulrik.pdf>
- 2 In philosophy, the term ‘esoteric’ originally meant texts that could only be understood by a select coterie of those in the know (introvert); as opposed to ‘exoteric’ texts, which were intended for the general public (extrovert). The concept is also used in the study of religion, designating religions that either required secret membership, or whose rites and sacred texts are only accessible to the initiated; examples include Islamic mysticism (Sufism); certain schools within Mahayana Buddhism, such as Shingon Buddhism with its secret initiations that involve meditation in front of mandalas, as well as numerous occult and spiritualist movements within European history, such as the Freemasons, Rosicrucians, theosophy, anthropology and certain new religions such as Scientology, freemasonry, Rosicrucian Order, Theosophy, and Anthroposophy frimurerne, rosenkreuzerne, teosofi, antroposofi. http://denstoredanske.dk/Sprog,_religion_og_filosofi/Filosofi/Oldtidens_filosofi/esoterisk <https://en.wikipedia.org/wiki/Ajna>
- 3 <https://en.wikipedia.org/wiki/Ajna>
- 4 Tuchman, p. 19
- 5 Tuchman, p. 19
- 6 Karen Barad coined the term intra-activity, stating that: “Discursive practices and material phenomena do not stand in a relationship of externality to one another; rather, the material and the discursive are mutually implicated in the dynamics of the intra-activity. But nor are they reducible to one another. The relationship between the material and the discursive in one of mutual entailment. [...] Neither has a privileged status in determining the other.” This is obviously not the easiest quote in the world, but it does describe how the encounter between thought and thing, between consciousness and materiality, artist and materiality, observer and observed involves a

- kind of exchange that gives rise to meaning or insight. Barad, p. 822
- 7 Tuchman, p. 17
- 8 Tuchman, p. 17
- 9 <https://www.hilmaafklint.se/about-hilma-af-klint/> Fant, p. 155–161
- 10 This has even been difficult far up into our present day; not until the last decade have spiritual aspects truly gotten a foothold within the younger part of the Danish art scene – and become accepted.
- 11 Tuchman, p. 18, p. 58
- 12 Tuchman, p. 18
- 13 Tuchman, p. 18, p. 58
- 14 Tuchman, p. 19
- 15 Miller, pp. 273–274
- 16 Miller, p. 274
- 17 Miller, p. 271
- 18 Alchemy was regarded as a way of understanding connections and pathways from our life world to that of the heavens. Two kinds of alchemists existed: the scientific ones (predecessors of modern chemists and metallurgists, seeking to transform base metals into gold) and the mystics (which regarded the processes of transformation seen in the laboratories as a spiritual road to salvation). Hence the expression ‘The Philosopher’s Stone’, from the Latin *lapis philosophorum* – a substance with fantastic, sometimes magical properties arising out of the alchemist’s work. The substance is said to be able to transform base metals such as lead into gold, and to produce an elixir that brings eternal life. Miller, p. 47 and https://da.wikipedia.org/wiki/De_vises_sten
- 19 In alchemy, transmutation denotes “the transformation of one metal to another. Scholars believed that this involved changing and replacing the elements from which the metal was believed to be built”. www.denstoredanske.dk
- 20 Miller, pp. 49–50.
- 21 A film version of *Dr Jekyll and Mr Hyde* premiered around the same time, in 1931.
- 22 https://da.wikipedia.org/wiki/Wolfgang_Pauli
- 23 Greenberg, pp. vii–viii
- 24 Greenberg, pp. ix–xii. Pauli’s marriage to Franca Bertram in 1934 (the marriage lasted until Pauli’s death) put an end to his therapy; she did not like Jung.
- 25 Pauli would later refer to this as “That foolish child of the crisis of my life (1930–1) – which further behaved foolishly!”, Miller, p. 118
- 26 http://denstoredanske.dk/Krop,_psyke_og_sundhed/Psykologi/Psykoanalyse_og_egopsykologi/libido
- 27 Miller, p. 18, p. 57
- 28 Miller, å. 188–190
- 29 “The ancient Chinese mind contemplates the cosmos in a way comparable to that of the modern physicist, who cannot deny that his model of the world is a decidedly psychophysical structure. The psychophysical even includes the observer just as much as the reality underlying the I Ching comprises subjective, i.e., psychic conditions



(Uddrag af Jungs forord fra 1949 i Wilhelm/Baynes engelske oversættelse af den oprindelige kinesiske tekst) <https://www.carl-jung.net/iching.html> og https://da.wikipedia.org/wiki/I_Ching. Lea Porsager refererer til I Ching i værket CØSMIC STRIKE, hvor heksagrammer pryder animationens billedside som særlige brudte (yin) eller hele (yang) linjer.

- 30 Fortolkning af naturen og psyken; Synkronicitet. Et akausal, forbindende princip og Arke-typtiske ideers indflydelse på Keplers videnskabs teorier [min oversættelse]
- 31 Miller, s. xxiii, s. 161–162; Zabrieskie, s. xli, s. xlvii
- 32 Alt om tallet 137 er fra Ramskov, <https://ing.dk/artikel/er-137-det-kosmiske-tal-der-styrer-verden-115567?amp>
- 33 Mandalaen har forskellige anvendelsesområder i buddhismen og man kan bruge den som beskyttelse mod farer og ulykker, bede om materielle goder, mm. En typisk buddhistisk mandala er en symbolsk afbildning af hele det buddhistiske univers med dets buddhaer, bodhisattvaer, guder, dæmoner osv. I mandalaens inderste del, der i reglen er firkantet og symboliserer et palads, er disse elementer placeret med en buddha i centrum og en buddha i hvert hjørne. Buddhaer og guddomme kan afbildes i deres ikonografiske form eller ved hjælp af deres våben eller symboler. Mandalaens indre omsluttes af en række cirkelbælter med forskellige symboler, bl.a. for visdom og erkendelse. http://denstoredanske.dk/Sprog,_religion_og_filosofi/Religion_og_mystik/Buddhisme/mandala
- 34 Miller, s. 16–17
- 35 Zabrieskie, s. xli
- 36 Miller, s. 269
- 37 Miller, s. 118
- 38 Sagde Yogi Bhajan, gurun som stod bag udbredelsen af kundalini-yogaen i Vesten. <https://www.3ho.org/yogi-bhajan/yogi-bhajan-lecture-ego-guru-guide>

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in the totality of the momentary situation”. (From Jung’s introduction to the 1949 Wilhelm/Baynes translation of the original Chinese text) <https://www.carl-jung.net/iching.html> and https://da.wikipedia.org/wiki/I_Ching.

- Lea Porsager refers to the I Ching in the work *CØSMIC STRIKE*, where hexagrams adorn the visuals found in the animation as broken (yin) or solid (yang) lines.
- 30 *The Interpretation of Nature and the Psyche; Synchronicity. An Acausal Connecting Principle* (Jung); *The Influence of Archetypical Ideas on the Scientific Theories of Kepler* (Pauli)
 - 31 Miller, p. xxiii, pp. 161–162; Zabrieskie, p. xli, p. xlvii
 - 32 All information about the figure 137 in this article is based on Ramskov, <https://ing.dk/artikel/er-137-det-kosmiske-tal-der-styrer-verden-115567?amp>
 - 33 The mandala serves a range of functions within Buddhism: you can use it as protection against dangers and misfortune, to request material things, and more. A typical Buddhist mandala is a symbolic representation of the entire Buddhist universe with its Buddhas, bodhisattvas, gods, demons and so on. Within the innermost part of the mandala, which is usually square in shape and symbolises a palace, these elements are arranged with a Buddha at the centre and one at every corner. Buddhas and deities may be depicted in their iconographic form or represented by their arms or symbols. The inner part of the mandala is surrounded by concentric circles containing a range of symbols, including symbols for wisdom and insight. http://denstoredanske.dk/Sprog,_religion_og_filosofi/Religion_og_mystik/Buddhisme/mandala
 - 34 Miller, p. 16–17
 - 35 Zabrieskie, p. xli
 - 36 Miller, p. 269
 - 37 Miller, p. 118
 - 38 According to Yogi Bhajan, the guru behind the spread of Kundalini yoga in the West. <https://www.3ho.org/yogi-bhajan/yogi-bhajan-lecture-ego-guru-guide>

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CØSMIC
CLUSTERFUCK

UNHØLY
IMPACT

EXHAUSTED
EXCLUSION

DØWNWARD
SPIRAL



the desperate remedy craved the
existence of ghosts. messengers Of
the throbbing abyss. left. left. left.
lefthanded ghosts. left path pipe
dream. horny smackdown all the
way. this is a left field method. the
conductor is a loaded dickbone!
this erect figure is simply a tool.
mammoth critter cockbone
decay. yoni. yoni. the bone enters
the yonic field, sensitizing the
mountains. DUNES Of luminous
stars, bombs, bones. big bang gang
bang gong. blow the horn.

the apparatus is an Oscillatory
inspection lens. the rest is virtual.

work force worm their way

weak forces worm their way
through muddy portals. spurting
through lubricated channels. their
tentacles are the most brilliant ones.
currents that cut through the banded
continuum. vibrating their way in /
out of vacuous pipes. grimy flavors
to the core. the dense mountain in
italy. as if the ghosts are sort of pre-
membering something. this is queer
oscillation, too straight through
deep corroding corridors. Puffed-up
decay looms out of the red.

an escape of sorts. the
tireless discomfort of constant
continuation. brutal sensitization,
senseless opening!





Jeg er i Sverige, hvor jeg støder på et vigtigt brev. Jeg kan ikke rigtig huske brevets begyndelse. Men på et tidspunkt står der, at der er noget væsentligt anderledes ved mig i forhold til C.G. Jung. Forskellen er, at hos mig er tallet 206 ændret til 306, og det er det ikke hos Jung. Jeg ser igen og igen tallet 206 blive til 306. Brevet er underskrevet "Aucker".

Kontekst. Dette er en meget mystisk drøm, som jeg ikke har været i stand til at stille ret meget op med. Jeg aner ikke, hvad jeg skal tro om denne "Aucker". Det forekommer mig sandsynligt, at der er en form for undertrykkelse på spil her, hvilket også antydes af min manglende evne til at huske brevets begyndelse. Jeg tror, "Aucker" er en slags camouflage, og jeg har på fornemmelsen, at drømmens egentlige betydning må være temmelig ubehagelig. Af ren vane bemærkede jeg, at tallene har følgende primfaktorer: $206 = 2 \times 103$; $306 = 2 \times 3 \times 3 \times 17$.^{viii} [...]

^{viii} $(2 + 6 = 8 = 2$
 $3 + 6 = 9 = 3$
 Fader og moder
 Progression fra mor til maskulinitet til manglende handling i selvrealiseringen (inferiør funktion!) fastholder alt i det ubevidste laboratorium.

Fra Atom and Archetype: The Pauli/Jung Letters, 1932–1958 (red. C.A. Meier), s. 137.

I am in Sweden where I come across an important letter. I cannot recall the beginning of the letter very well. But then at one point it says in the letter that with me there is something essentially different from C.G. Jung. The difference is that with me the number 206 has changed to 306, but not with Jung. I keep seeing 206 turn into 306. The letter is signed "Aucker".

Context. This is a very puzzling dream, one that I have not been able to do much with in the past. I have no idea what to make of "Aucker". It seems likely with me that there is some form of repression going on here, which is also suggested by my inability to remember the beginning of the letter. I think "Aucker" is some sort of camouflage, and I have the feeling that the real meaning of the dream must be rather unpleasant. Out of sheer habit I noted that the factorization of the numbers $206 = 2 \times 103$; $306 = 2 \times 3 \times 3 \times 17$.^{viii} [...]

^{viii} $(2 + 6 = 8 = 2$
 $3 + 6 = 9 = 3$
 Father and mother
 Progression of suspension from mother to masculinity to lack of action in realization (inferior function!) keeps everything in the unconscious laboratory.

From Atom and Archetype: The Pauli/Jung Letters, 1932–1958 (ed. C.A. Meier), p. 137.

Min hustru og jeg befinder os i et hus, der ligger i troperne. En kobra rejser sig fra gulvet i rummet. Jeg kan se, at den ikke vil gøre mig fortræd. Jeg gør mit bedste for at være venlig overfor den og vise, at jeg ikke er bange, og det lykkes mig. Den lader os derfor være. Men så dukker en anden kobra op af jorden foran vinduet. Jeg kan se, at den leder efter den første kobra, og ikke efter os. Slangerne er et par, en han og en hun. Da jeg først har vænnet mig til de to kobraers tilstedeværelse, kan jeg høre stemmer, der tilhører to fysikere fra min bekendtskabskreds, B. (schweizisk) og K. (hollandsk). Jeg ser dem senere foran huset.

Kommentarer: Troperne peger tilbage på vores tur til Indien (1952), ganske ligesom kobraerne. Den første kobra får mig til at tænke på, hvordan gnostikerne satte lighedstegn mellem Nous (verdensfornuft) og slangen i paradiset. Den anden kobra, der er af chthonisk oprindelse, sender mine tanker i retning af Fysis (natur). De gnostiske legender fortæller, at foreningen mellem Nous og Fysis skabte de syv første hermafroditiske væsener og de syv metaller. De to fysikere, der hører til den bevidste sfære, og de to kobraer, der repræsenterer de dybere lag af det ubevidste, danner tilsammen en mandala, hvori min kone også er indarbejdet. De to slanger kan sættes i forbindelse med spejlings-tanken og det komplementære forhold mellem Fysis og Ånd, som Jung har understreget i *M. Coniunctionis II*, s. 282 [...] Drømmen synes at sige, at selve muligheden for Fysis hviler på disse kendsgerninger. Men den situation, den ridser op, synes at insistere på at inddrage psyken "uden for egoet". Den næstfølgende drøm handler om netop dette, og jeg vil komme med udtømmende kommentarer i den forbindelse.

Fra Atom and Archetype: The Pauli/Jung Letters, 1932–1958 (red. C.A. Meier), s. 142–43.



Together with my wife I am in a house that is located in the Tropics. A cobra rises from the floor of the room. I can see that it will not harm me. I try my best to be friendly toward it and to show that I am not frightened, and in this I succeed. As a result, it leaves us alone. But then a second cobra rears up out of the ground in front of the window. I can see that it is looking for the first cobra and not for us. The snakes are a pair, a male and a female. Once I have got accustomed to the presence of the two cobras, I can hear the voices of two physicists of my acquaintance, B. (Swiss) and K. (Dutch). Later, I then see them in front of the house.

Comments: The Tropics are a reminder of our trip to India (1952), as are the cobras. With the first cobra, I am put in the mind of the Gnostic identification of the Nous with the serpent in paradise. And with the second cobra, which is of chthonic origin, I think of Physis. According to Gnostic legend the union of Nous and Physis led to the creation of the first seven hermaphroditic creatures and the seven metals. Together with the two physicists, who belong to the conscious sphere, the two cobras, which represent the deeper layers of the unconscious, form a mandala into which my wife is also incorporated. The two snakes can be brought into relation with the mirror-image quality and the complimentary relationship of Physis and Spirit stressed by Jung in *M. Coniunctionis II*, p. 282 [...] The dream seems to be saying that the possibility of Physis rests on these facts. But this situation seems to be pressing for the inclusion of the psyche "outside the ego." The following dream deals with this, and I shall comment on it at length.

From Atom and Archetype: The Pauli/Jung letters, 1932–1958 (ed. C.A. Meier), p. 142–43.



LIDT OM NEUTRINOER – OG EN FYSIKERS BETRAGTNINGER

34

D. Jason Koskinen

INTRODUKTION

Neutrinoer er, for at sige det ligeud, helt vildt underlige. De er blandt de mest talrige partikler i det kendte univers, men ikke desto mindre har de unikke egenskaber, der adskiller dem fra alle de andre elementarpartikler, vi kender til. Helt specifikt kan de ændre type undervejs i deres rejse – fysikerne taler om, at de skifter ‘flavour’, altså smag. Det kaldes for neutrino-oscillationer. Neutrinoen er den eneste kendte elementarpartikel, der udviser en sådan adfærd. For bedre at forstå neutrinoens usædvanlige egenskaber har forskere brugt naturlige neutrino-kilder såsom vores sol eller jordens atmosfære til at undersøge, hvordan neutrinoer ændrer type (smag). I løbet af de sidste par årtier er vi også begyndt at bruge menneskeskabte neutrino-kilder i form af meget kraftige partikelacceleratorer beliggende i USA, Japan og Europa. Lea Porsagers værk *HORNY VACUUM* er inspireret af neutrinoernes kvantemekaniske oscillation, altså af det faktum, at de kan skifte type undervejs, men trækker også på et visuelt element, der fungerer som en slags katalysator, nemlig de neutrinohorn, der er med til at skabe og styre de menneskeskabte neutrinostråler. I dette bidrag vil jeg forsøge at opridsede neutrinoens baggrund og historie og dele nogle tanker om fremtiden inden for forskningen i denne mystiske partikel.

LIDT HISTORIE

Neutrinoerne har eksisteret i vores univers lige siden ganske få øjeblikke efter Big Bang, men inden for videnskabens verden har man kun beskæftiget sig med dem fra 1930 – til at begynde med på et rent teoretisk plan. Det var omkring det tidspunkt, at forskere bemærkede, at noget ikke stemte i energibesparelsen i radioaktivt betahenfald, hvor en neutron henfalder for derved at skabe en elektron og en proton – de tre grundlæggende byggesten i et atom. Den kombinerede energi fra den nydannede elektron og proton var nemlig altid mindre end den originale neutrons energi, hvilket var i modstrid med en meget grundlæggende regel i fysik, nemlig at mængden af energi altid forbliver uændret. Selv strålende begavelser som Niels Bohr overvejede i den forbindelse tanken om, at energien måske ikke altid forbliver konstant. Men så foreslog Wolfgang Pauli i et brev, at der måtte være en ekstra partikel indblandet i beta-henfaldsprocessen; en ‘spørgelsespartikel’, der ikke kunne måles direkte, men som stadig bar en vis mængde energi. Det er denne partikel, der nu er kendt som neutrinoen.

I min egenskab af eksperimentel neutrinfysiker fandt jeg i sin tid nogen trøst i at finde ud af, at Pauli selv følte en vis uro over sin nye tanke. Som han sagde til sin ven Walter Baade: “Jeg har gjort noget frygteligt i dag, noget som ingen teoretisk fysiker nogensinde burde gøre. Jeg har fremført en tese, der aldrig kan verificeres i et eksperiment.” [1] På trods af denne pessimistiske forudsigelse blev neutrinoens eksistens rent faktisk påvist i 1956 af C. Cowan og F. Reines ved Savannah River-kernekræfterværket i USA.

Så hvorfor gik der næsten et kvart århundrede fra neutrinoens eksistens blev foreslået på teoretisk plan før den blev opdaget og påvist i et konkret eksperiment? Grunden skal næsten udelukkende findes i neutrinoens ‘spørgelsesagtige’ egenskaber, nemlig det faktum, at neutrinoen ikke kolliderer med ting. I modsætning til elektroner, fotoner (lys, radiobølger, røntgenstråler) og alle andre kendte partikler, har neutrinoen den laveste sandsynlighed for at kolliderer eller interagere med atomer, fordi neutrinoen kun interagerer med de to svageste naturkræfter: den *svage* kraft og *tyngdekraften*.¹ I netop dette øjeblik, mens du læser dette, passerer der næsten 1 billion neutrinoer fra solen gennem din krop, og det gør der hvert eneste sekund hver dag. Selv om natten passerer disse neutrinoer let gennem hele jordkloden – i modsætning til lyspartiklerne fra Solen, som relativt hurtigt optages, når de rammer bygninger, skyer eller jord. Denne modvilje mod at interagere med de atomer, der jo udgør det gængse stof i vores univers, er netop grunden til, at fysikerne har brug for kraftige kilder til neutrinoer for overhovedet at kunne observere blot nogle få neutrino-interaktioner i specialkonstruerede apparater. Fysikernes bruger for det meste én af disse neutrino-kilder: solen;

THE SCIENCE OF NEUTRINOS & THOUGHTS FROM A PHYSICIST

D. Jason Koskinen

INTRODUCTION

Neutrinos are weird, very weird. They are some of the most numerous particles in the known universe, yet have unique properties unlike any of the other fundamental particles we know about. Specifically, their quantum property of ‘flavour’ can change as they travel, which is known as neutrino oscillation. It is the only known fundamental particle which exhibits this behavior. To better understand the exotic properties of the neutrino, scientists have used natural neutrino sources such as our Sun or the Earth’s atmosphere to examine how neutrinos change flavour. Over the past few decades we have also started to rely on dedicated man-made neutrino sources from intense particle accelerators located in the US, Japan, and in Europe. *HORNY VACUUM* by Lea Porsager was inspired by the concept of neutrino oscillation as well as the visual catalyst of neutrino horns, which help guide and develop the manmade neutrino beams. In this contribution, I set out to provide some background and history of the mysterious neutrino and provide some views about the future.

BRIEF HISTORY

Neutrinos have existed in our Universe since moments after the Big Bang, but have only existed as a physics concept since 1930. At the time, scientists observed a violation of energy conservation in radioactive beta decay, where a neutron decays to produce an electron and a proton – the three basic building blocks of an atom. The combined energy of the newly formed electron and proton was always less than the original neutron, which contradicted the very basic rule in physics that energy is always conserved. Even brilliant minds such as Niels Bohr were considering the idea that energy, might not always be conserved. But, in a letter from Wolfgang Pauli he proposed that there was an additional particle involved in the beta decay process; a ‘ghost particle’ that was undetected yet still carried some energy. This was the particle that is now known as the neutrino.

As an experimental neutrino physicist, I was comforted to find out that Pauli himself had some unease about his new idea, which is captured by Pauli telling his friend Walter Baade: “I have done a terrible thing today, something which no theoretical physicist should ever do. I have suggested something that can never be verified experimentally.” [1] Despite the pessimistic prediction the neutrino was in fact discovered in 1956 by C. Cowan and F. Reines at the Savannah River nuclear power plant in the United States.

So, why the almost quarter century delay between theoretical proposal of the neutrino and its experimental discovery? The reason is almost entirely related the neutrino’s ghost-like property of not colliding with things. Unlike electrons, photons (light, radio waves, x-rays), and all other known particles, the neutrino has the lowest probability of colliding, or interacting, with atoms because the neutrino only interacts via the two weakest forces: the *weak* force and *gravity*.¹ Right now, while you read this, nearly 1 trillion neutrinos from the Sun are going through your body – every single second of the day. Even at night, these neutrinos easily pass through the entirety of the Earth, unlike particles of light from the Sun which are absorbed rather quickly when they encounter buildings, clouds, or dirt. This aversion to interacting with the atoms that make up the normal matter in our Universe is why physicists need intense sources of neutrinos in order to observe just a few neutrino interactions in specially built detectors. The most common neutrino sources for physicists are: the Sun, cosmic ray collisions with the Earth’s atmosphere producing neutrinos, nuclear reactors, and man-made accelerator beams.

Before I cover some of the interesting science involving neutrinos, I think it’s worthwhile to note the commonality in language between intellectual disciplines – specifically art, spirituality, and physics – and how by sheer coincidence unrelated ideas can share the same definitions. In discussions with Lea about neutrinos, it was interesting that some of the physics terms that I have become accustomed to hearing are also used within the concepts of spirituality and meditation that are familiar to Lea and part of her art. For example, all neutrinos are left-handed, where just like a person’s left hand, the spin of the neutrino (the direction your fingers curl) has a specific alignment when compared to the momentum direction (outstretched thumb) of the neutrino. Tantra and Kundalini practices

de kosmiske stråler, der rammer jordens atmosfære og derved producerer neutrinoer; atomreaktorer; eller stråler frembragt i partikelacceleratorer.

Inden jeg dykker nærmere ned i nogle af de interessante videnskabelige aspekter af neutrinoen, er det værd at bemærke de sammenfald, man kan se i sprogbrugen inden for forskellige former for tænkning – her tænker jeg specifikt på kunst, spiritualitet og fysik – og hvordan ideer, der ellers intet har med hinanden at gøre, ved rene tilfældigheder kan bruge samme definitioner. I mine samtaler med Lea om neutrinoer var det interessant at bemærke, at nogle af de udtryk fra fysikkens verden, som jeg er vant til at høre i min hverdag, også bruges inden for meditation og den spirituelle verden; områder, som Lea kender meget til, og som hun trækker på i sin kunst. For eksempel er alle neutrinoer ‘venstrehåndede’: fingrene på et menneskes venstre hånd bøjer i en bestemt retning i forhold til den udstrakte tommelfinger, og på samme måde roterer neutrinoen til venstre rundt om sin egen akse parallelt med sin bevægelsesretning. Inden for tantra og kundalini-yoga opererer man med begreber, der har at gøre med ‘den venstre sti.’ For en fysiker dækker begrebet ‘venstrehåndet’ over forhold, der har at gøre med kiralitet (spejling) / helicitet / svagt isospin og sammenhængene mellem visse partikler, f.eks. neutrinoer, og andre elementarpartikler i forhold til vektor-aksial (V-A) teori og den svage kernekraft. Det betyder således bestemt ikke det samme inden for fysikkens verden som når man taler om ‘at gøre ting med venstre hånd’ og ‘venstrehåndethed’ inden for andre tankefelter. Så det er forfriskende at se, hvordan *HORNY VACUUM* er inspireret af og henviser til dette fælles sprog og disse fælles begreber uden at forsøge at fremdrage absolutte paralleller.

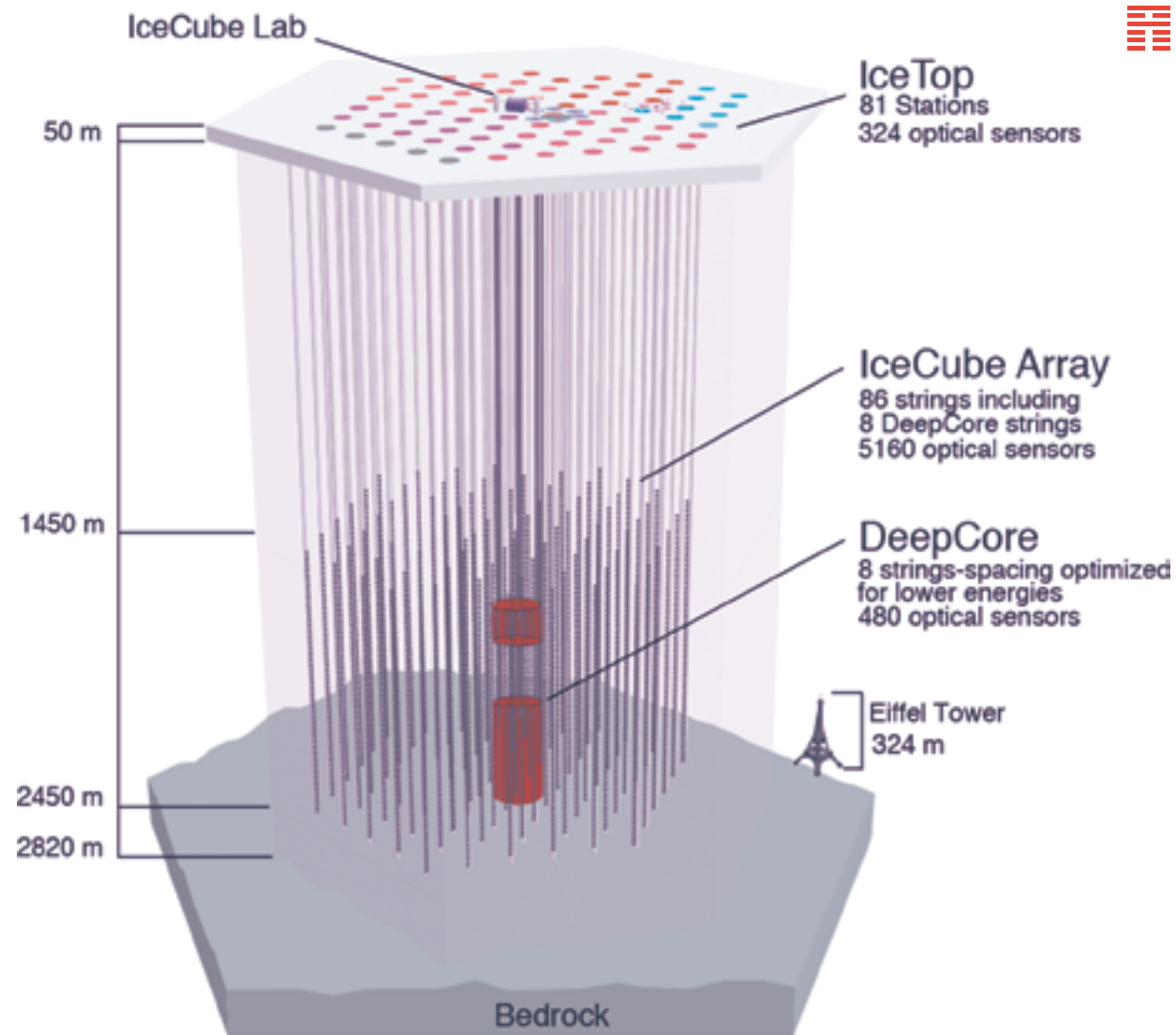
DET VIDENSKABELIGE ASPEKT

En af de underligste ting ved neutrinoer – og en af grundene til, at jeg og mange andre synes, de er så fascinerende – er, at selv om der findes tre forskellige typer neutrinoer (elektron-, myon- og tauneutrinoer), kan en given neutrino, der begynder som en bestemt type, rent faktisk ændre type helt af sig selv mellem det tidspunkt, hvor den skabes, og hvor den interagerer med andet stof. Forskerne siger, at den skifter ‘flavour’ – altså smag. Det kaldes også for oscillationer. Når neutrinoen sådan skifter type, påvirker det ikke nogen af dens andre egenskaber. Hverken dens energi, ladning, spin eller momentum ændrer sig, idet neutrinoen fortsætter sin rejse. Neutrinoer er de eneste partikler, der sådan kan ændre type/‘smag’ uden at gennemgå en bestemt form for henfald eller interaktionsproces ... de gør det bare.

Man kan opstille en analogi mellem is og neutrinoernes oscillation. Forestil dig, at to personer begge har købt chokoladeis i samme butik. Da Person A kommer hjem, opdager han, at isen stadig har alle de samme egenskaber, som da han købte den i butikken (temperatur, mængde, kalorieindhold osv.), men nu er smagen ikke længere 100% chokolade, men 50% chokolade og 50% vanilje. Person B bor lidt længere væk, og da han kommer hjem, opdager han, at hans is på samme måde stadig har de samme egenskaber som i butikken, men at smagen nu er 33,3% chokolade, 33,3% vanilje og 33,3% jordbær. Den samme smagsændring sker hver eneste gang, disse personer besøger butikken. Hvis du nu kan forestille dig, at noget tilsvarende sker helt nede på det mest allermest grundlæggende niveau af partikelfysikken, får du en fornemmelse af, hvorfor neutrinoer og deres oscillationer er så fascinerende.

For at studere dette fænomen er det afgørende at: 1) have masser af neutrinoer, 2) kende neutrinoernes oprindelige smag, og 3) måle neutrinoerne, efter at de har bevæget sig over en vis afstand og muligvis ændret smag. Ved at måle energien og identificere smagen, efter at nogle af neutrinoerne har ‘oscilleret’, altså skiftet type, undersøger fysikerne de enestående grundlæggende egenskaber, der kendetegner nogle af de mest talrige partikler i vores univers.

Denne type forskning kan virke temmelig abstrakt. Som partikelfysiker er jeg gennem flere årtier ofte blevet stillet spørgsmålet, “Men hvad skal det til for? Kan vi overhovedet



Figur 1. Illustrationen viser partikeldetektoren IceCube. Anlægget er specielt udviklet til at lede efter høj-energi neutrinoer, der er opstået uden for vores galakse, mens DeepCore-afdelingen er optimeret til at arbejde med partikelfysik, fx at studere neutrinoernes oscillation. Eiffeltårnet er indsat for at anskueliggøre anlæggets størrelse.

Figure 1. Illustration of the IceCube Neutrino Observatory. The full 1 km³ volume is optimized to search for high-energy astrophysical neutrinos, and the DeepCore sub-array is optimized for doing particle physics such as studying neutrino oscillations. The Eiffel Tower is shown as an illustration of the detector size.
Kreditering / Credit: NSF/IceCube.



bruge neutrinoer til noget?”. Inden for partikelfysikken kaster forskningen heldigvis altid vigtige ikke-abstrakte biprodukter af sig; afledte opdagelser, der gavner vores samfund som helhed. Som eksempler kan nævnes opfindelsen af world wide web, udviklingen af kunstig intelligens og i øvrigt også selve fremdriften i at have flere og flere højtuddannede forskere, der står klar til at løse nye problemer. Men alt dette er ikke den primære motivation, der driver fysikere og forskere til at udføre forskning. Ligesom kunstnere er forskerne drevet af en særlig lidenskab; de brænder for ideer og koncepter, der findes helt ude på grænsen af vores individuelle eller kollektive forståelsesramme. De rækker ud efter noget ukendt, som nærmest synes at trygle om at blive udforsket.

Når vi nu taler om begrebet ‘det abstrakte’, har jeg egentlig aldrig tænkt nærmere over, hvilke paralleller og forskelle, der findes mellem tanken om det abstrakte i henholdsvis kunstnerisk og videnskabelig forstand. Når jeg bliver spurgt om, hvilke fordele der findes ved at udføre abstrakt fysikforskning, peger jeg som regel på de afledte samfundsmæssige fordele, som forskningen i fysikkens grænseland har (nye studerende, ny computerteknik, afledte tekniske opfindelser osv.). Hvad angår ligheder mellem de to felter, tænker jeg, at det at beskæftige sig med det abstrakte inden for både kunsten og videnskaben har at gøre med en form for indre nødvendighed; man føler en TRANG til at gøre det. Til at undersøge, stille spørgsmålstegn ved, vide, udvide. Men jeg synes ikke rigtigt, jeg har de fornødne kompetencer til at kommentere på eventuelle paralleller med abstrakte begreber inden for den kunstneriske praksis.

Der findes også helt konkrete, ikke-abstrakte grunde til, at det er en god idé at forske i neutrinoer. For eksempel er neutrinoer nødvendige for, at kollapsende stjerner kan eksplodere som supernovaer, hvilket rent faktisk er en proces af afgørende vigtighed for alt liv på jorden: supernovaeksplosioner spreder nemlig ilt ud i kosmos; ilt, som ellers ville gå tabt, fordi den enten ville forblive fastholdt inde i stjernernes kerner eller presset sammen i neutronstjerner og sorte huller. Hvis vi vil forstå supernovaer og baggrunden for selv den luft, vi indånder her på jorden, er det nødvendigt at forstå neutrinoernes grundlæggende egenskaber.

I min egen forskning studerer jeg neutrinoernes omskiftelighed ved hjælp af IceCube Neutrino Observatory; en én kubikkilometer stor neutrinodetektor, som er indfældet i den klare gletsjeris ved Sydpolen i Antarktis; anlægget er afbildet i figur 1. Detektoren har 5160 ekstremt følsomme lyssensorer, som registrerer det svage lys, der udsendes, når neutrinoerne kolliderer med isen. Sensorerne er placeret 1,5–2,5 km langt nede i et heksagonalt 3-dimensionelt gittermønster. Med en samlet masse på én gigaton (109 ton!) er IceCube verdens største neutrinodetektor af sin art. Andre detektorer bruger også vand / is som detektormateriale, men er mindre (de kan veje fra et par ton og op til 50,000 ton). Nogle bruger en række enorme magnetiserede jernplader, der er indsat mellem materiale, som kan registrere de ladede partikler, der opstår ved neutrino-kollisioner, og i dag bruger nogle fysikere endda store kryostatkamre fyldt med ultra-rens kryogen væske (som fx flydende argon med en temperatur på under -186°C), der så fungerer som neutrinodetektorer. Disse detektorer ligger rundt omkring i hele verden: udover Sydpolen findes der anlæg på bunden af Middelhavet, i underjordiske miner i Canada og Japan, og endog ved siden af en motorvejstunnel, der går gennem et bjerg i Italien.

Modellerne og diagrammerne over de forskellige neutrinodetektorer giver naturligt nok fin mening for mig; de knytter an til en konkret, synlig virkelighed. Derimod synes jeg, at det er enormt svært at visualisere neutrinoer og deres oscillation ud fra et partikelfysikperspektiv; man støder hele tiden på et forfærdeligt rod af selvmodsigelser. Når jeg forsker, tænker jeg for det meste på neutrinoer som individuelle punkter – en slags billardkugler – der bevæger sig gennem rummet. Når jeg forklarer neutrinoernes oscillation, synes jeg, det er nemmest at forestille sig den enkelte neutrino som en blanding af tre forskellige bølger, der bevæger sig ved forskellige hastigheder. Men ingen af disse visualiseringer er helt retvisende.

also have concepts related to the left hand path. For a physicist, left-handed is a mathematical reference relating to the chirality/helicity/weak isospin and coupling of some particles, e.g. neutrinos, to other fundamental particles via vector-axial (V-A) theory and the weak nuclear force. This is definitely not the same concept as what’s found when looking at the same term, left hand, in other spheres of thought. So, it is refreshing to find that the *Horny Vacuum* is inspired and references this shared language of concepts without trying to make absolute parallels.

SCIENCE

One of the weirdest things about neutrinos, and why myself and others find them fascinating, is that while neutrinos come in three different flavours (electron neutrino, muon neutrino, and tau neutrino), an individual neutrino which begins as one specific type can undergo a change in flavour between when it is created and when it interacts. This flavour oscillation does not affect any other property of the neutrino. So energy, charge, spin, and momentum do not change as the neutrino travels along its way. Neutrinos are the only particles which undergo a change in flavour without undergoing a specific decay or interaction process... they just kind of do it.

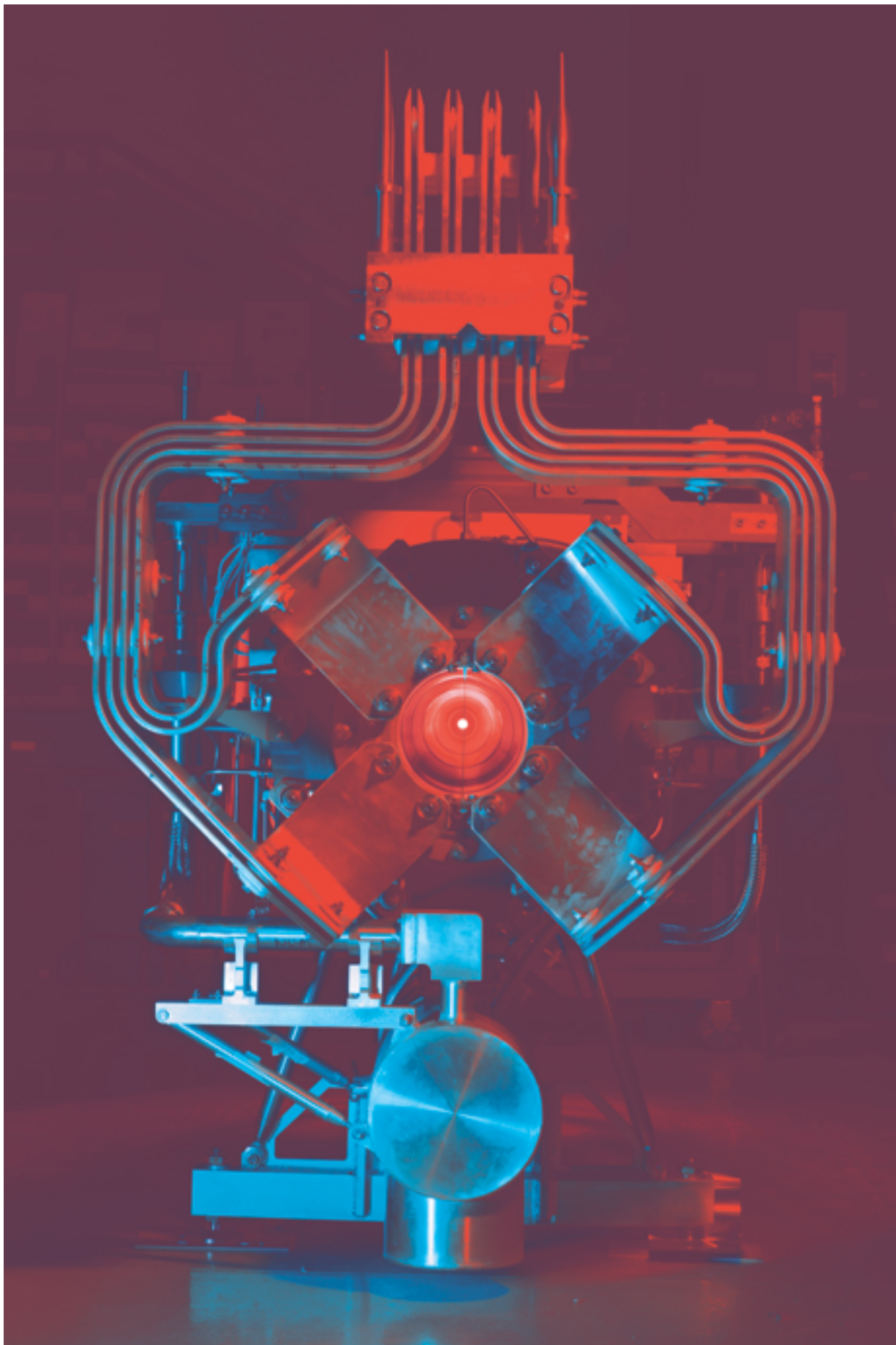
There is an analogy regarding ice cream and neutrino oscillation. Imagine two people who both bought 100% chocolate ice cream at the same store. Person A gets home to find that the ice cream has all the same properties (temperature, amount, calories, etc.) as at the store, but now the flavour is 50% chocolate and 50% vanilla. Person B lives slightly further away and when they get home, they find their ice cream has the same properties as at the store, but their flavour is now 33.3% chocolate, 33.3% vanilla, and 33.3% strawberry. The same flavour change happens each time each person goes to the store. Now, if you can imagine this happening at the most fundamental level of particle physics then it is possible to get a sense of why neutrinos and neutrino oscillations are so fascinating.

In order to study this phenomenon it is critically important to: 1) have lots of neutrinos, 2) know the flavour of the original neutrinos, and 3) detect the neutrinos after they have travelled some distance and possibly changed flavour. By measuring the energy and identifying the flavour after some of the neutrinos have ‘oscillated’, physicists probe the unique fundamental properties of some of the most numerous particles in our Universe.

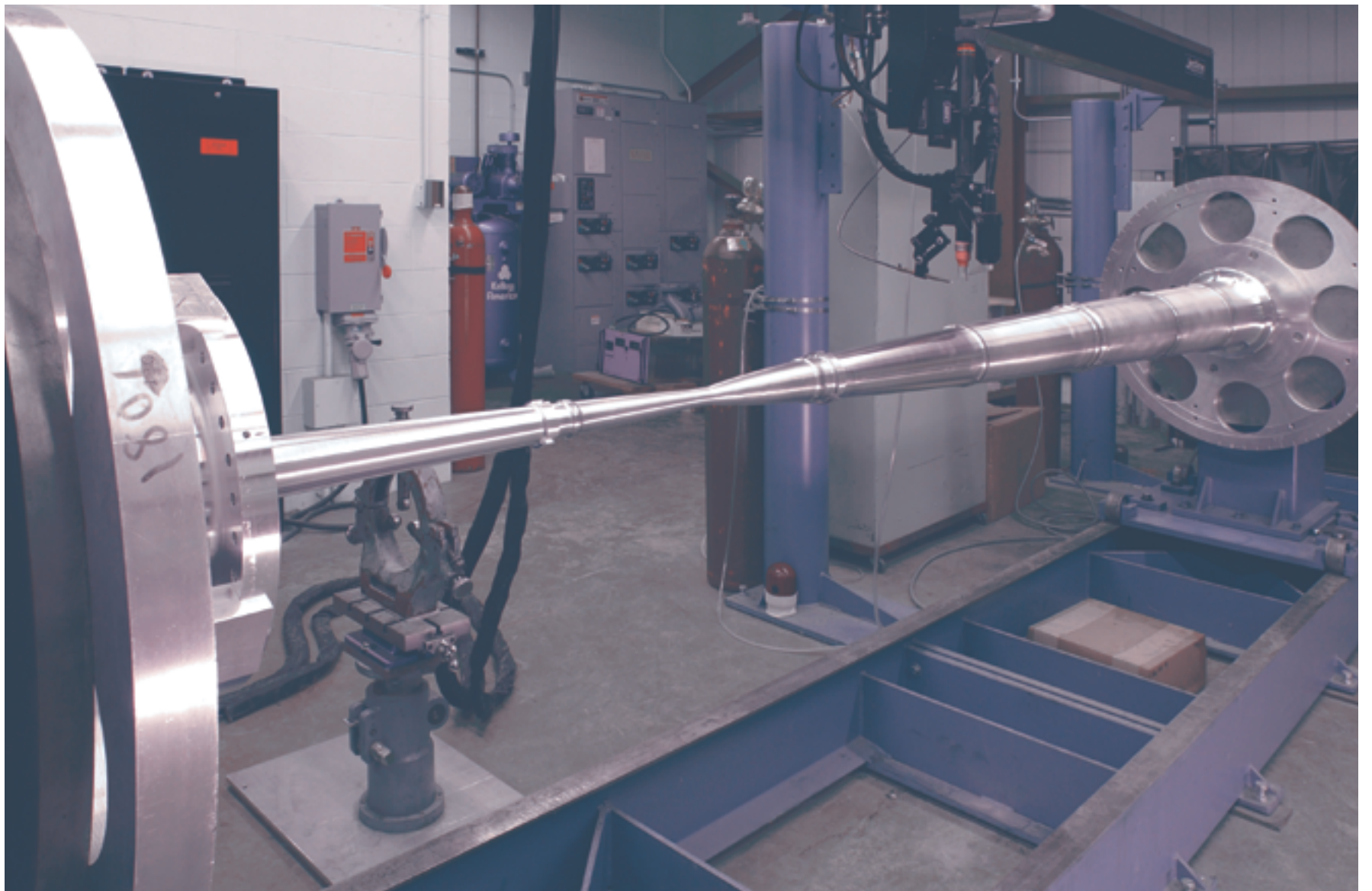
This kind of research can seem rather abstract. As a particle physicist I have decades of experience in getting the question “What is it good for? Can we use neutrinos for something specific?”. In particle physics there are always fortunate and important non-abstract by-products that benefit our society as a consequence of research, such as the creation of the world wide web, real world applications and development of artificial intelligence, or the creation of highly educated scientists that are prepared and inspired to solve new problems. But these aren’t the primary inspirational drivers for physicists or scientists to conduct research. Like artists, scientists are passionate about ideas and concepts that exist at some frontier of either our individual or collective understanding. Some unknown that feels like it *has* to be explored.

There are also specific and non-abstract reasons to investigate neutrinos. For instance, neutrinos are necessary for collapsing stars to explode as supernovas, which is a critically important process for all life on the Earth because supernova explosions spread oxygen into the cosmos that would otherwise be lost; either locked within the cores of stars, or compacted into neutron stars and black holes. To understand supernovas and the creation of the air we breathe on Earth it is critical to understand the basic properties of neutrinos.

In my own research, I study neutrino oscillations using the IceCube Neutrino Observatory; a cubic kilometre neutrino detector deployed in the clear glacial ice at the South Pole in Antarctica shown in Figure 1. The in-ice detector has 5160 light sensors which record the dim light emitted by the remnants of neutrino collisions with the ice. The sensors are deployed 1.5–2.5 km deep in a hexagonal 3-dimensional grid. With a total mass of one gigaton (109 tonnes!), IceCube is the largest instrumented neutrino detector in the world. Other detectors also use water/ice as the detector material, but are smaller (from a few tons, and up to



(a)



(b)

Figur 2. (a) Et magnetisk horn af den type, der bruges til at fokusere partiklerne, her vist med støtteanordninger og kølerør. De pioner og kaoner, der henfalder for at skabe neutrinoer, fokuseres til en stråle ved hjælp af magnetisme; hertil bruges flere horn. (b) Her ses den indre leder i et moderne neutrinohorn; udstyret minder om det, Lea Porsager har genskabt i sit værk.

Figure 2. (a) The on-axis view of a magnetic focusing horn with the attached support structure and cooling pipes. The pions and kaons that decay to produce neutrinos are magnetically focused into a beam using multiple focusing horns. (b) The side view of only the inner conductor of a modern neutrino horn, similar to Lea Porsager's recreation.

Foto / Photo: Reidar Hahn, Bob Zwaska & Fermilab.

For at kunne forestille sig og 'se' det usete, sammenholder jeg altid det givne partikelfysiske begreb, jeg prøver at forstå, med noget velkendt; noget, som andre mennesker også har let ved at forestille sig (for eksempel is i forskellige smagsvarianter, flere bølger, der krydser hinanden, eller billardkugler, der støder ind i hinanden). Målet er at illustrere emnet på en måde, der gør det nemt at forholde sig til, og som ikke skubber for hårdt til grænserne for vores forestillingsevne. Man må i den sammenhæng acceptere både de begrænsninger og de fordele, der ligger i at vi alle kan trække på en fælles billedbank, et fælles visuelt 'bibliotek', og så må vi forsøge at bruge de elementer, der findes der, for at gøre det nemmere for et bredere publikum at forholde sig til videnskabelige begreber, som ellers kan være meget vanskelige at forstå. Denne tilgang adskiller sig klart fra Leas arbejde, der jo sigter efter at "udfordre – ikke illustrere – faste eller lokale forestillinger om sandheden", men begge dele kræver en vis del fantasi.

Neutrinoer er i sig selv 'skjulte' partikler; vi kan kun opfatte deres eksistens gennem indirekte iagttagelser. Neutrinoer har ikke nogen elektrisk eller magnetisk ladning, og det betyder, at selv om en neutrino interagerer/vekselvirker med andet stof, dvs. kolliderer med et atom, kan forskerne kun iagttage *eftervirkningerne* af en neutrino-kollision. Vi kan aldrig iagttage selve neutrinoen.

Man kan sige, at noget tilsvarende gælder det udstyr, der bruges til at fremstille neutrino-stråler: det er også utilgængeligt, selv for professionelle neutrino-fysikere. For at skabe en neutrino-stråle bruger partikelacceleratorer (såsom CERN) protoner med meget høj energi. Protonerne sendes ved enorm hastighed ind i en blok af materiale, der kaldes et neutrino-mål. I kollisionen mellem protonerne og 'målskiven' opstår andre ladede partikler, især kaoner og pioner. Ligesom protoner er kaoner og pioner en del af hadronfamilien af sammensatte partikler og består af elementære, dvs. ikke-sammensatte, partikler kaldet kvarker. De udadgående kaoner og pioner – som har en elektrisk ladning og derfor påvirkes af magnetfelter – fokuseres ved hjælp af magnetiske horn, som vist i figur 2, mod et vakuumrør, hvor de henfalder og bliver til neutrinoer. Denne proces gør målskiven og hornene meget radioaktive. Derfor er man meget omhyggelig med at minimere menneskelig omgang med dette udstyr, og med at opbevare det sikkert, når de ikke er i brug.

Man ser så godt som aldrig et neutrinohorn eller vakuumrør. Selv de ubrugte, ikke-radioaktive horn er som regel godt gemt væk i acceleratoranlæggenes lagerområder. Så det er en stor fornøjelse at se en kopi af et virkeligt neutrinohorn som en del af *HORNY VACUUM*. Netop fordi det er så svært at forestille sig og visualisere både neutrinoerne i sig selv og deres oscillation, giver det noget særligt at have noget konkret at forholde sig til, noget, der helt klart er af metal: det forankrer projektets kunstneriske og videnskabelige aspekter i vores synlige virkelighed. Jeg skrev min ph.d.-afhandling om en søgen efter nye 'smagsvarianter' af neutrinoer, som blandt andet involverede en menneskeskabt neutrino-stråle, der udgik fra Chicago og bevægede sig 735 kilometer til en detektor, der befinder sig i en gammel jernmalmine i det nordlige Minnesota. Og alligevel er dette kunstværk den første og eneste gang, jeg nogensinde har set, hvordan et horn til første stadie af neutrinofokuseringsprocessen ser ud, bortset fra på fotos og i tegninger.

I udstillingen *[WEAK] FORCE* får vi lov at opleve de inspirationskilder, som Lea har trukket på; fra det helt bogstavelige (neutrinohorn), konkret fysiske (røde vakuumrør) til det abstrakte (3D-film). Det resultat, som Lea har skabt til os, er hverken korrekt eller ukorrekt; det befinder sig i krydsfeltet mellem kunst og videnskab. Det er utroligt unikt og ambitiøst, og jeg synes, det er dybt fascinerende.

1 Tyngdekraften er måske nok den, som de fleste kender, men den er langt den svageste af de fire kendte fire fundamentale naturkræfter: de stærke kernekræfter, de elektromagnetiske kernekræfter, de svage kernekræfter [weak forces] og tyngdekræfterne.

LITTERATUR

[1] F. Hoyle. "Concluding remarks". I *Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, vol. 301, s. 171, 1967.

50000 tonnes). Some use a series of huge magnetized iron plates sandwiched between material that can observe charged particles from neutrino collisions, and nowadays some physicists even use large cryostat chambers filled with ultra-pure cryogenic liquid (such as liquid argon which has a temperature of less than -186°C) as neutrino detectors. These detectors are spread all over the world, including such places as: the South Pole in Antarctica, the bottom of the Mediterranean ocean, underground mines in Canada and Japan, and even next to a highway tunnel that goes through a mountain in Italy.

Unlike the models and diagrams of neutrino detectors themselves, visualizing neutrinos and neutrino oscillation from a particle physics perspective is something that I find as a horrid mess of contradictions. Most of the time when I'm doing my research, I think of neutrinos as individual points – or billiard balls – moving through space. When I explain neutrino oscillation, I find that it's easier to think of a single neutrino as the mixture of three different waves moving at different speeds. But neither visualization is truly accurate.

To see the unseen, I relate whatever neutrino physics concept I'm trying to understand to something that I already know, and something that is easy for other people to imagine too (ice cream flavours, multiple waves crossing each other, or collisions between billiard balls). The goal is to make a comfortable and easy association or illustration without pushing conceptual boundaries. To accept the constraints and benefits of a shared visual 'library', and try to use the elements of that catalog that are hopefully relateable to a wider audience to illustrate scientific concepts that can be difficult to otherwise understand. This is very different than Lea's work which aim(s) to "disrupt – not illustrate – fixed or local notions of truth", yet both require and need some aspect of imagination.

Neutrinos themselves are 'hidden' particles which only let us know about their existence by methods of indirect observation. Because all neutrinos have no electric or magnetic charge, even if a neutrino does interact, *i.e.* collide with an atom, scientists only observe the remnants of a neutrino collision. We never observe the neutrino itself.

In much the same way that neutrinos are hidden particles, the equipment to make neutrino beams is also inaccessible to even professional neutrino physicists. In order to make a neutrino beam, particle accelerator facilities such as CERN use highly energetic protons. These are smashed into a block of material known as a neutrino target, where the proton collisions with the target produce other charged particles, notably kaons and pions. Like the proton, the kaon and pion are part of the hadron family of composite particles and consist of fundamental, *i.e.* non-composite, particles called quarks. The outgoing kaons and pions—which have electric charge and are therefore affected by magnetic fields—are focussed using magnetic horns, as shown in Figure 2, towards a decay pipe where they decay into neutrinos. In this process, the target and horns become very radioactive. Great care therefore is taken to minimize human exposure to them, and to safely store them when they are no longer in use.

It is extremely rare to see a neutrino horn or decay pipe. Even spare, unused, and non-radioactive horns are most often kept in storage at accelerator facilities. So it is a great pleasure to see a reproduction of an actual neutrino horn as part of the *HORNY VACUUM*. Neutrinos themselves, as well as concept of neutrino oscillation, are so hard to visualize and comprehend that having something solid, something that is clearly metal, provides a tangible anchor to the art and science of the project. I wrote my Ph.D. thesis on a search for new flavours of neutrinos which involved using a man-made neutrino beam starting in Chicago and going 735 kilometres to a detector buried in an old iron ore mine in northern Minnesota. Still, this is the first and only time I have ever seen what a first-stage neutrino magnetic focussing horn looks like, beyond photos and drawings.

At the *[WEAK] FORCE* exhibition, with no correct or incorrect representation, we get to experience the literal (neutrino horn), physically representative (red decay pipes), and the abstract (3D movie) inspirations that Lea has created for us, which exist at the intersection of art and science. It's incredibly unique, ambitious, and I find it fascinating.

1 While gravity is perhaps the force that most people have experience with, but it is easily the weakest of the four known fundamental forces: strong, electromagnetic, weak, and gravity.

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[1] F. Hoyle. Concluding remarks. In *Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, volume 301, page 171, 1967.



#ET

"The whole way the ear is placed into this fluid has the purpose of protecting it from the force of gravity."¹

So close. An anesthetic-induced sucking pull to the shaky nervous system. Mishaps, deliriums and unearthly synchronicities. A near-miss moment of awareness and ET disapp(ear)ed from the windowless Kingdom and slipped into Niels Bohr's office down the street. Painfully uplifted, ET eased into the (e)ar(theric slime-realm's warm, wet wound. Busy tunnels, waxy labyrinths, hilarious mollusks, rubber-like and dull openings into systems stuffed with iridescent hairs, hammers and snails, colors of silvery white, pink, deep blue, green, purple. Wholly expelled, ET catapults into a work space (possibly the Carlsberg honorary residence) packed with astounding unheard-of facts, helix patterns and fermionic seeds.

ET left alone. With LEE LOZANO! Fellow masturbator, troublemaker, celestial allo(ly)trion, cosmic fucker, quantum freak. ET, ill-at-ease, crammed into a time capsule ~ wavelengths curving and stretching from the 1920's to July 24, 1969 ~ containing all too high-powered texts and experiments. Further distraught by the highlighted names of Pauli, Heisenberg and Bohr in LOZANO's notes to TAKE POSSESSION PIECE #3: "Take possession of the Bohr Institute. ..."² ET recalls and recollects previous experiments done with FEMALE friends: slit / unslit, feathery, foamy, masturbatory fizz-fest. Woman. Bird. Egg. Woman. Bird. Egg. Ova Splash. E(ar)theric channels plugged by LOZANO's strategy, some kind of resistance-tool (possibly a hammer. A mallet, striking from the inside)? ET's aching viscera vibrates like a gong monster: "I WILL MAKE MYSELF EMPTY TO RECEIVE COSMIC INFO." Struck again, ET abides by the "Technology of the Shabd Guru,"³ mashing all kinds of quantum theories together-apart, fooling around, obsessing with synchronicities, so close to hijacking TAKE POSSESSION PIECE #3, freaking out inside others' experiments, others' dreams. Like in Pauli's vision⁴:

Picture 1. A woman (be)comes (with) a bird, which lays a large egg.

Picture 2. The egg divides itself into two.

Picture 3. I go closer and notice that I have in my hand another egg, with a blue shell.

Picture 4. I divide this last egg into two. Miraculously, they remain whole, and I now have two eggs with blue shells.

Picture 5. The four eggs change into the following mathematical expressions

Picture 6. This gives the formula

Picture 7. I say, "The whole thing gives $e^{-2\pi}$, and that is the circle." The formula vanishes, and a circle appears.

Eggcitement! Eggs dividing themselves into two. Pairs and Blue Shells! Woman, bird! Like the tiny European Robin, ET is "too warm and wet," all up in spooky entanglements with distant partners. Wonky avian compass vibrating with the subtle variations in Matter's magnetic field. Almost full circle (as a feather is cut off at the top and the content is extracted, it holds the secret to how thoughts are formed⁵). Tunneling through impenetrable barriers, ET plunges, squeezing the little death back into soggy space-time foam. A tiny displacement of mass, resisting the Kingdom, resisting Queen! Exclusion. Nature's slickest principle, in which two odd ones can't occupy the same quantum state simultaneously.⁶

What a sacrifice. So close. So far out. Un bearable⁷ loneliness. Listen to the silent timbre of Shabd.

¹ From Rudolf Steiner's lecture "The Ear" in his lectures, December 9, 1922. Located on 04.01.2010 at <http://www.steiner.org/Lectures/P22/220410.html>

² Kopylov, A. (Ed.). (2006). *Lee Lozano: The First One, Last One, Last One*. New York: Schocken Books, pp. 194-195.

³ According to Kundalini yoga tradition, "Shabd" means the vibration of light, the vibration that contains the essence of self, and "Shabd" means to cut off the ego. "Shabd" means delirium, accompanied by "No" signs.

⁴ W. Heisenberg, C. A. (Ed.). (2001). *Women and Archetype: The Freud/Jung Collection, 1922-1935*. New Jersey: Princeton University Press, pp. 190-191.

⁵ According to Rudolph Steiner, "We think and see the world of thoughts in the being itself." Located on 01.01.2010 at <http://www.steiner.org/lectures/lectures.html>

⁶ The Pauli Exclusion Principle. Located on 04.01.2010 at http://www.kqed.org/edk/Pauli_exclusion_principle

⁷ Ibid.



Lea Porsager, #ET, 2016. Trykt tekst, 61 x 42 cm

En ledsagende tekst til udstillingen *E(AR)THERIC SLIME - PRE-OP*, 2016, skrevet af kunstneren.

Som Milena Høgsberg skriver i sin anmeldelse i Art-Agenda: "#ET fører os i fuld fart gennem et tætpakket sæt af referencer, der spænder lige fra Rudolf Steiners idiosynkratiske teorier om øret over en drøm genfortalt af kvantefysikeren Wolfgang Pauli til Carl Jung, og videre til Kundalini-yogaens energipoler. Vi flyder ind og ud af det esoteriske og det videnskabelige, gennem personlige og kunstneriske oplevelser, båret af en tankestrøm, der fører os igennem de flerdimensionelle undersøgelser, som Porsager så ofte beskæftiger sig med: en sammenfletning af tidsligheder, rum, kroppe og oplevelser i både fortid og nutid."

Lea Porsager, #ET, 2016. Printed text, 61 x 42 cm.

A companion text for the exhibition *E(AR)THERIC SLIME - PRE-OP*, 2016, authored by the artist.

As Milena Høgsberg writes on her review in Art-Agenda: "#ET takes us at full speed through a dense set of references ranging from Rudolf Steiner's idiosyncratic theories of the ear, a dream by quantum physicist Wolfgang Pauli as told to Carl Jung, and the polar energies of Kundalini yoga. We weave in and out of the esoteric and the scientific, of personal and artistic experiences, and a thinking flow carried through the multi-dimensional inquiries that Porsager often engages: the entanglement of temporalities, spaces, bodies, and experience in both past and present."

This publication is released in connection with the exhibition:

[WEAK] FORCE
24.09.–22.12.2019
Museum of Contemporary Art
Stændertorvet 3A
DK-4000 Roskilde
Denmark

Curators: Magnus Kaslov and Birgitte Kirkhoff Eriksen
Mediation and education: Phillip Danstrup
Exhibition assistant: Morten Hviid Melsen
Museum Director: Birgitte Kirkhoff Eriksen
Administration: Sabine Krog Rasmussen
Communication: Julie Wouwenaar Tovgaard
Installation: Christian Jeppsson

Catalogue editor: Morten Hviid Melsen
Text: Birgitte Kirkhoff Eriksen, D. Jason Koskinen and
Lea Porsager
Translation: René Lauritsen
Proofreading: Phillip Danstrup
Graphic design: Studio Atlant
(Cecilie Nellemann & Stefan Thorsteinsson)
Print: Eks-Skolens Trykkeri ApS
1.500 ex.

ISBN: 987-87-90690-47-2

Illustrations:
Cover illustration: Still from *HORNY VACUUM*
Page 27: Ajna, The seven chakras and Ego-Eradicator (Source:
Transitions to a Heart Centered World: Through the Kundalini
Yoga and Meditations of Yogi Bhajan, by Guru Rattana)
Page 15: *The Dove, no. 2* and Hilma af Klint portrait (Source:
The Hilma af Klint Foundation)
Page 22: Pauli's distorted mandala (Source: *137: Jung, Pauli,
and the Pursuit of a Scientific Obsession*)
Page 32–33: Pauli letters (Source: CERN (Pauli Archive))

Thank you to all of the donors that have supported the
acquisition of *HORNY VACUUM*, the exhibition and LP
production, and to the Roskilde Festival and Bloom Festival
for the collaboration.

Lea Porsager would like to thank her Beautiful_Bountiful_
Blissful friends and collaborators in the production of
[WEAK] FORCE, COSMIC STRIKE AND HORNY VACUUM
Wonder_ful 3-D-animator and co-editor: Sonja Rendtorff
Cosmic Interior: Anne Ulrikke Bak (*HORNY VACUUM*)
Sun Chau Chau Gong & Sound Creation Chakra Abdomen
Gong vibration: Milo Lukas Witt (*HORNY VACUUM*)
Mantra: Húgrún Fjóra Hafsteinsdóttir (*COSMIC STRIKE*)
Intra-active wordplay_ful_ness: Synnøve B. Brøgger
Horn Drawings: Rasmus Strange Thue Tobiasen
Horn building: HRS.AS
Sound recording: Magnus Kaslov & Kasper Vang (*HORNY
VACUUM*)

Thanks to my lovely family

Thanks to collaborators, meetings, horns and all tiny things
that made this work possible.

Thanks to CERN who sparked it all.

Thanks to D. Jason Koskinen

Thanks to Birgitte Kirkhoff Eriksen and everybody at the
Museum of Contemporary Art, Roskilde

Thanks Bloom.

The publication also accompanies the LP release:

Lea Porsager
[WEAK] FORCE
Museet for Samtidskunst, 2019
Catalogue number: MSK04
Mastered and cut by Andreas [LUPO] Lubich
Edition: 300

[WEAK] FORCE
by Lea Porsager

SIDE A
COSMIC STRIKE (excerpt)
Performed by: Húgrún Fjóra Hafsteinsdóttir

SIDE B
HORNY VACUUM (excerpt)
Performed by: Milo Lukas Witt

The LP production is supported by the Augustinus
Foundation.

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HORNY VACUUM (2019) was commissioned by
Ny Carlsberg Foundation.

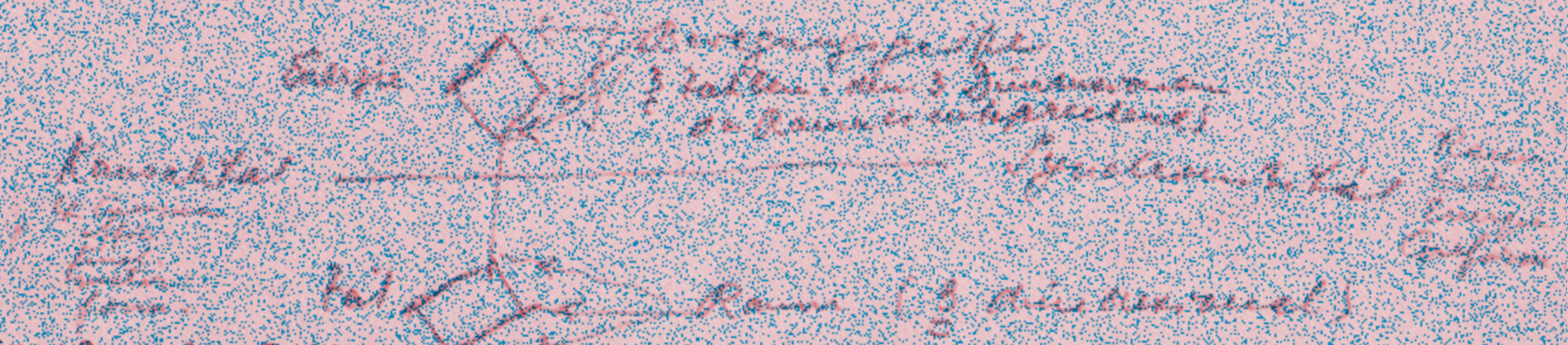
COSMIC STRIKE (2018) was developed as part of the Collide
International Award, a partnership programme between Arts
at CERN and FACT, and was co-produced by ScANNER. Lea
Porsager was artist in residency at CERN in 2018. Supported
by the Danish Arts Foundation.

[WEAK] FORCE is supported by the Obel Family Foundation,
the Danish Arts Foundation, the Knud Højgaard Foundation,
and the Beckett Foundation.

Courtesy of the artist and Nils Stærk.

wie Sie diese 1946 definiert und aufgefasst haben. Ich habe den damaligen Traum (es war ein regelrechtes Examen, mit dem "Freuden" als Examinator, in dem das Wort "Automorphismus" wie ein "Mantra" gewirkt hat) so aufgefasst, dass ein Oberbegriff gesucht wurde, der sowohl Ihren Begriff der Archetypen als auch den des physikalischen Naturgesetzes umfassen sollte.

Ich habe daher mit dem grössten Interesse Ihre Formel auf p. 370 des "Aion" betrachtet, als dieses Buch erschien. * Einem Mathematiker würde es sehr nahe liegen, den Begriff "Automorphismus" auf die Beziehung der kleinen Vierecke zum grossen anzuwenden. Ferner fiel mir gleich dazu ein, dass man den Quaternion auf p. 96 Ihrer Synchronizität ^{causal} (auf den wir uns geeinigt hatten) auch so schreiben kann:



Insofern der 3-dimensionale Raum zur eindimensionalen Zeit und entsprechend die (ebenfalls unzerstörbare) Bewegungsgrösse (3 Komponenten den 3 Raumdimensionen entsprechend) zur (einkomponentigen) Energie gehört. Die kleinen Vierecke entsprechen dann der Vierdimensionalität des Raum-Zeit-Kontinuums und den 4 Beilen für Energie und Bewegungsgrösse.

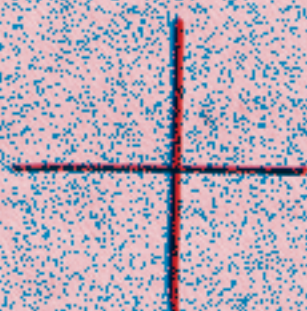
So erscheint mir in dem Oberbegriff "Automorphismus" hier die Möglichkeit eines weiteren Fortschrittes zu liegen, besonders da er einer (in Bezug auf Physis und Psyche) neutralen Sprache angehört und da er auch eine Komplementarität von Einheit und Vielheit (bzw. von Einzigartigkeit und Allgemeinheit, vgl. Aion p. 99) andeutet.

Insofern nun auch jene Bilder des "Selbst" (oder des Gottesglaubens) die

zeitliche Kontingenz bzw. Ähnlichkeit oder "Sinn", also durch folgenden Quaternio :

Unverstörbare Energie

Konstanter Zusammenhang
durch Wirkung
(Kausalität)



Inkonstanter Zusammenhang
durch Kontingenz bzw.
Ähnlichkeit (Synchronizität)

Raum-Zeitkontinuum.

Während mein Vordergrundschema die anschauliche Bewusstseinswelt genügend zu formulieren erlaubt, befriedigt letzteres einerseits die Postulate der modernen Physik, andererseits diejenigen der Psychologie des Unbewussten. Der mundus archetypus ^{totaler} ~~totaler~~ ist wesentlich charakterisiert durch die Kontingenz der Archetypen, welche zum einen Teil deren Undeutlichkeit, zum anderen deren Nicht-lokalisierbarkeit bedingt. (Die Archetypen begehen beständig "Rahm-Überschreitungen", d.h. sie stören den Wirkungsbereich einer bestimmten Ursache, indem sie, vermöge der Autonomie ihres (nicht kausalen) Zusammenhanges, kontingente Faktoren einem bestimmten Kausalaufbau beigesellen.)

Ad 3. Den Satz p.9 (ebenso p.10) über Radioaktivität und Feld muss ich wohl streichen, da ich ihn nicht genügend erklären kann. Ich müsste dazu wirkliche physikalische Kenntnisse besitzen, was leider nicht der Fall ist. Ich kann ihnen nur andeuten, dass Strahlungsenergie und Feldenergie zwar physikalisch als

