Quantum brushstrokes

Quantum brushstrokes Malcolm Koch

Abstract

The following are notes from my recent exhibition called *Visual entanglement* on at the Royal Institution of Australia's (RiAus) FutureSpace Gallery in Adelaide, South Australia.

It is an attempt to express a classical interpretation of how fundamental particles may have evolved. Also it tries to address some of the principle questions about why certain particles and initial conditions have been favourable for life to evolve while others have not.

I must emphasise that this aesthetic interpretation has not been tested or verified in any way, shape or form (it's a 'fruitloopery' interpretation from a fringe dweller). Nevertheless it is an invitation to think about what fundamentally cannot be actually directly observed - a quantum particle (not yet anyhow). Therefore the aim is to provide a platform for a visual dialogue that postulates current particle physicists theories, so that we may then have a tactile understanding of their thinking and subsequent discoveries. Afterall, developing bite-size visual queues is a particularly humanistic quality beneficial for understanding our world and each other. Without that, the practical implications may not be as readily realised.

At the same time, this is an extension into the art practice I call, Membrane Art — that is, how geometric curves provide the framework for events to manifest and evolve, yet the flat picture plan is an agent of how we observe them — necessary to help us analyse and contemplate what has happened.

I trust that with further understandings this aesthetic practice will evolve and be enhanced.

Background

In 2004 I had an aesthetic thought – if I could take a pristine canvas and fold it in some way, it would allow the surface geometry to play a part in creating an authentic interpretation of our natural world. Following these interactions the canvas is returned to the flat picture plane — creating a metaphor for how we observe. Since then, the discovery of this working practice has lead to a distinctive visual language and body of work I call Membrane Art.

Theoretical physics has been a long-term interest on mine. And based on ideas developed in my previous work – I could see that there is a way of expressing ideas developed in theoretical physics in a visual form. Until now I have mainly been focussing on the play of surface geometry and conditions that lead to certain kinds of events being created on it, rather than relating it to the fundamental workings of the cosmos.

However, this exhibition is different in the sense that it tries to bring all my ideas and thoughts together. Creating what I think is a happy synergy between science and art.

Short video produced by RiAus TV about the exhibition:
http://malcolmkoch.com/wp/archives/1654

Quantum brushstrokes

Notes from the
Visual entanglement exhibition

Visual entanglement
Exhibition

21 March - 9 June 2016

FutureSpace Gallery
RiAus, 55 Exchange Place
Adelaide, South Australia
5000

RiAus

Opening hours:
Mon–Fri 10am–5pm

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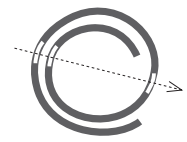
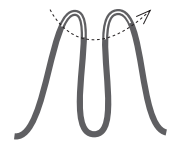
Building brushstrokes

The building blocks of matter are made up of two kinds of brushstroke expressions:

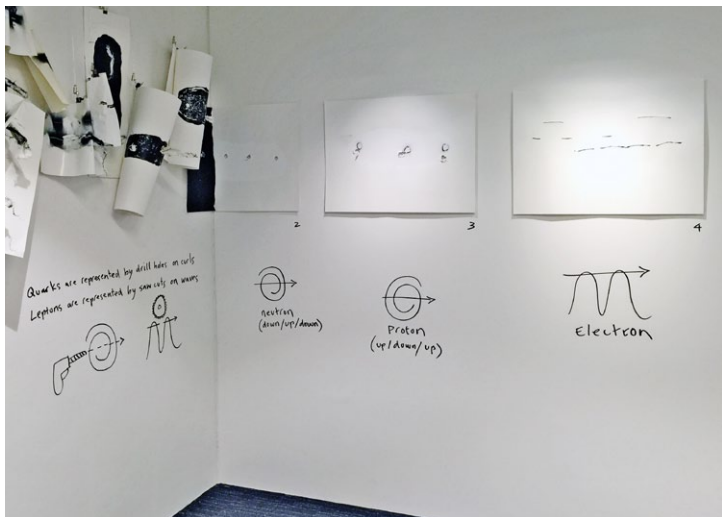
- **Quark brushstrokes**
  Quarks are represented by drill holes created on a particular kind of curl (strong interactions) …

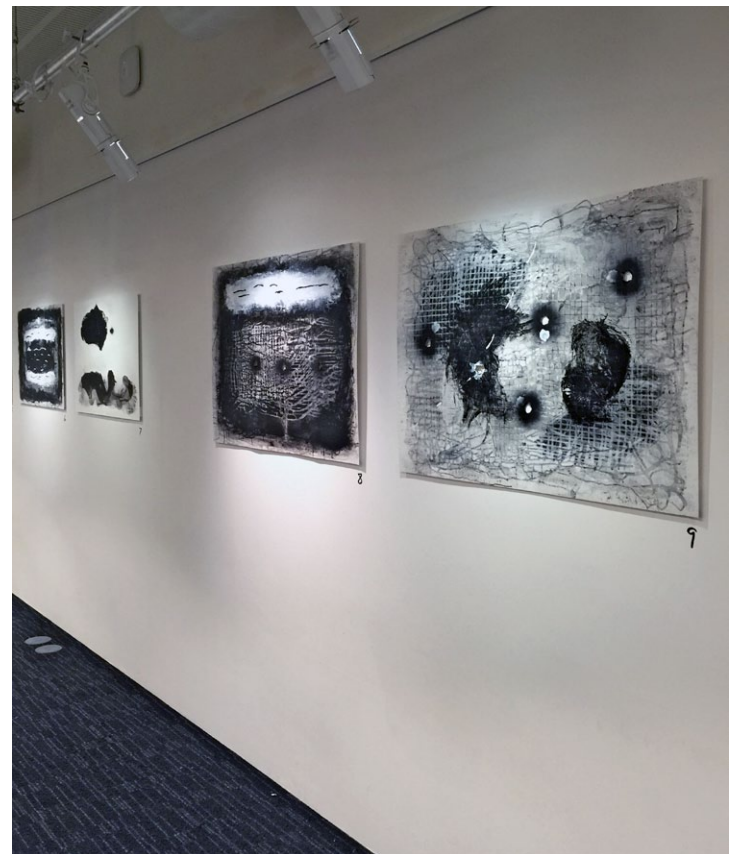


- **Electron brushstrokes**
  Electrons (leptons) are represented by saw cuts created on a wavy surface (electromagnetic interactions) …



Whichever brushstroke expression is used the similarities to the way a brushstroke mark is made on a flat plane remains the same — there is initial contact, movement across and then an exit off the surface.





The Visual entanglement exhibition showing the aesthetic idea. The left images show the curls and waves (preliminary work) as it then progresses to the final flattened out pieces on display (above).

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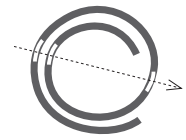
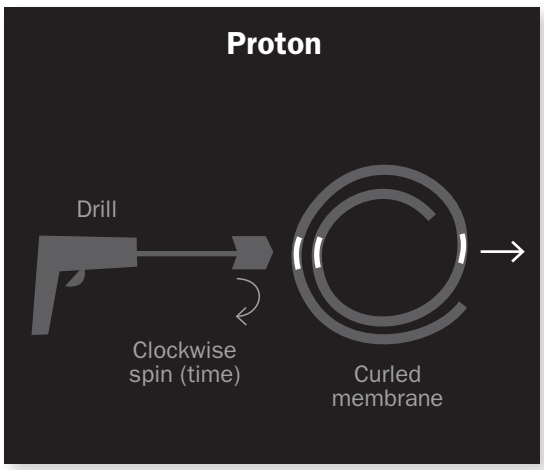
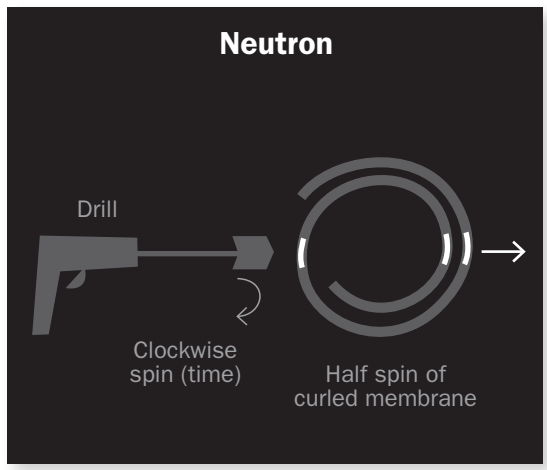


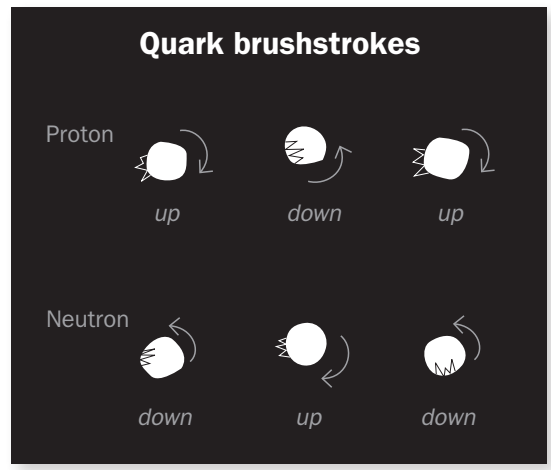
Quark brushstroke



This side view of a curled membrane represents how strong interactions are created. One drill hole can express a multiple flavours of quarks. When entry occurs at the point where two convex surfaces are close together and the exited point is a concave structure - a proton is created (two up / one down).



If the curl is spun 180° (half spin) then a different set of events occur. When entry occurs at one convex structure and the exit point is at two concave structures that are close together - a neutron is created (two down / one up).



Flat view: The aesthetic is realised when the membrane is opened out and the depth is compressed. Nothing disappears, it just changes form. This generates the human visual experience, a metaphor for how we perceive.

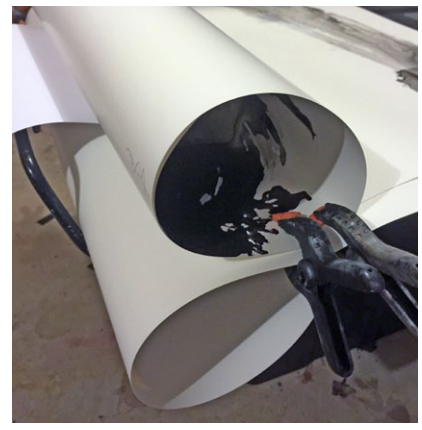
Favourable curled structures

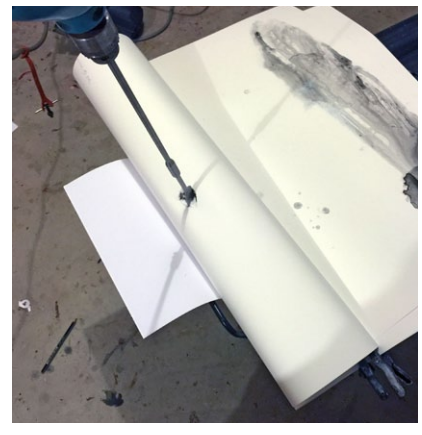
The curled membrane represents the geometry of the strong field needed to create the particles that interact with it. The drill holes produced on this curvature structure is similar to the way a brushstroke mark is made on a flat plane – there is initial contact, movement across and then an exit off the surface.

Working hypothesis

Quarks eventuate out of the six different spacial geometries as shown above (3 proton-style quarks, 3 neutron-style quarks). In practice, however, the vectors created that may then ‘hold’ a network of quarks are often malformed at the time of creation. It doesn’t matter if the same drill-bit size was used to cut through all the various curvature constructs, you can expect variations to size and shape (including, up and down, and both up and down qualities) to occur. Whether or not this is due to the condition of the tool used, extra debris or other surface conditions, a multitude of variations happen to manifest. If quarks eventuate from such structures, then you can expect that given time (billions of years or so) decay or other high entropy processes may then ‘clean up’ the vectors to allow for a more full-bodied type to evolve and become favourable for atom formation.

If we see quarks decaying to the larger quark, maybe it was always an up or down quark, it just needs time to correct its vector within the field it occupies.





Curled membranes: This is a classical mechanics interpretating how a fundamental particle with strong interactions may have evolved and be entangled. The drill hole will go through many layers (including hidden curls inside it) to create one expression.

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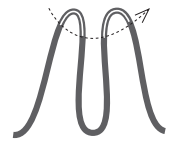
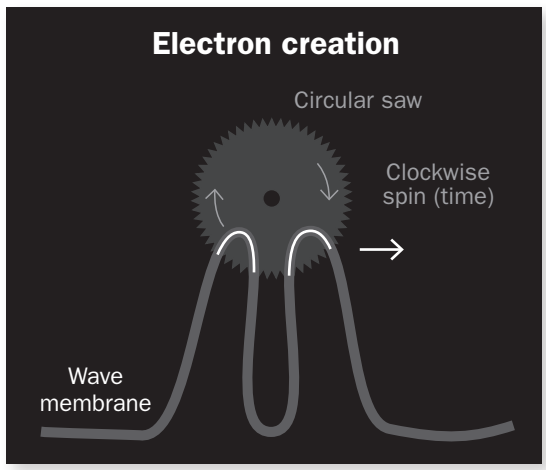
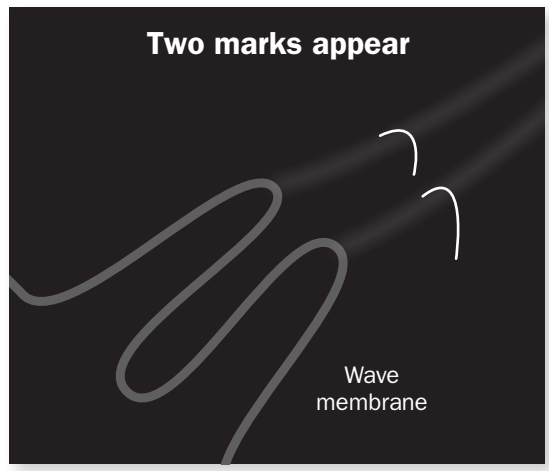


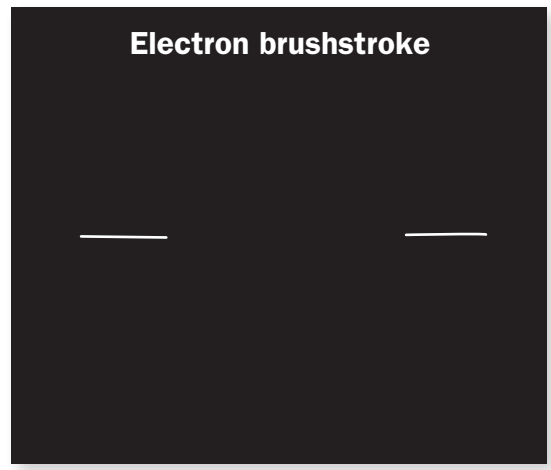
Electron brushstroke



This side view of the wave membrane represents the geometry of the electromagnetic field. It creates a ‘hidden’ structure for the work.



This shows how one expression (a cut made by the circular saw) can appear to be in two places at the same time, like a brushstroke - initial contact, movement across and then off the surface.



Flat view: The aesthetic is realised when the membrane is opened out and the depth is compressed. Nothing disappears, it just changes form. This generates the human visual experience, a metaphor for how we perceive.

Favourable wave structures

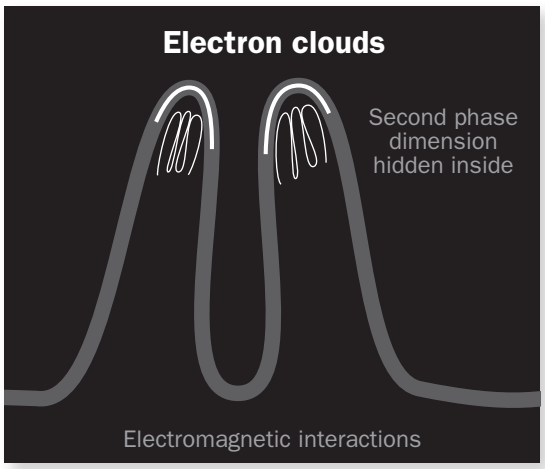
The wave membrane represents the geometry of the electromagnetic field needed to create the particles that interact with it. The saw cuts on this curvature structure is similar to the way a brushstroke mark is made on a flat plane – there is initial contact, movement across and then an exit off the surface.

Working hypothesis
The saw cuts and drill holes are vectors created within the field and don’t necessarily represent the particles themselves. Smaller sedimentary-style matter (strings) may fill the void left behind to create the so-called elementary particle.
In practice, for entangled (networks) to occur, electron brushstrokes by default might contain more parts or substructures then the ones we know. For example, the bottom fold which contains no cut, is still a part of the overall structure. It creates the visual connection (distance) between two saw cut expressions when we observe them on the flat plane.

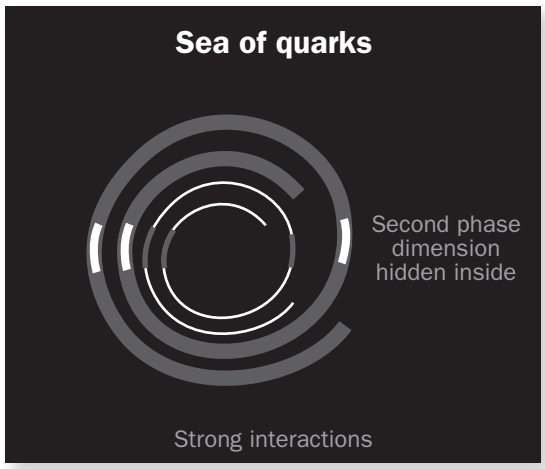
I have not considered the scale differences between leptons and quarks in the development of this work. Curled structures might have eventuated before wave structures. They may simply be a by-product of curled up ones.

Wave membrane: This is a classical mechanics interpreting how fundamental particles with electromagnetic interactions may have evolved and be entangled. Note the bottom fold could be seen as part of the structure.

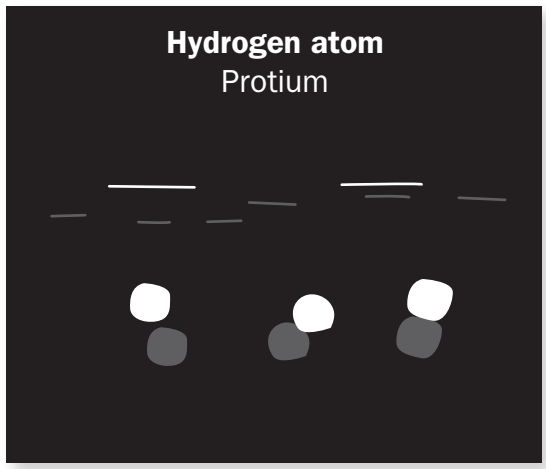
Creating atoms

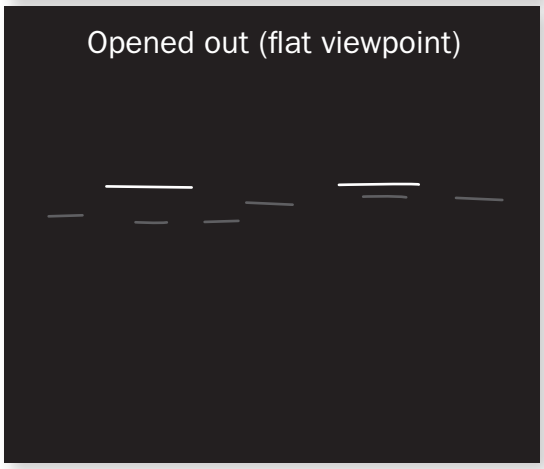


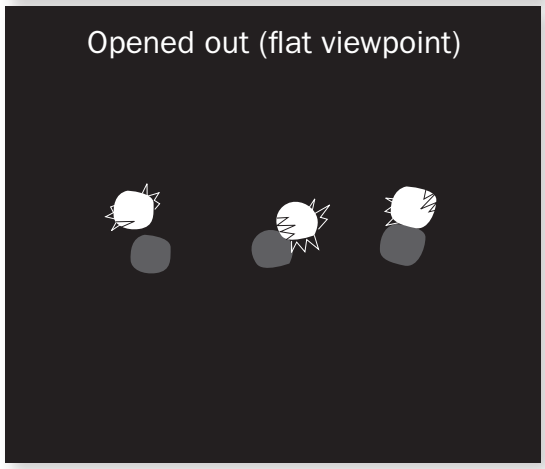
This electron was created with additional hidden structures (phase dimension) to express a ‘cloud of electrons’ that are entangled as one expression as seen on the opened out perspective.

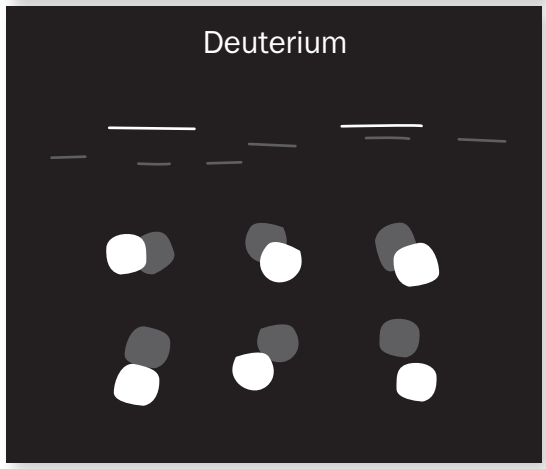


Multiple quarks can be created with additional hidden structures (phase dimension) to express a ‘sea of quarks’ that are entangled (networked) as one expression as shown on the opened out perspective.









Flat viewpoint - all sorts of expressive combinations can be created with ‘quantum brushstrokes’ that relate to fundamental particle formations. Yet the flat picture plane is necessary to help us analyse and contemplate what has happened.

Favourable particles

We can now use both drill holes and saw cuts to create vectors and other interactions on the surface of the membranes. To create entangled (networks) a second phase dimension is hidden within the geometry of the curvature constructs at the time of creation. In practice, this second phase dimension must be large enough so that it can be held in place by the outer dimension at the time of creation — too small, it misses, rolls around inside and remains unconnected.

Working hypothesis

If the same size drill-bit and saw blade is used to cut through all phase dimensions then it could be that the hidden dimensions is as large (possibly tighter and more fragile) then the dimensions we know. For entanglement to occur, particles by default must clump together to form stable groups. So when smaller sedimentary-style matter (strings) fill the space left behind they may be networked with all phase dimensions as one expression.

Hydrogen atom (Protium): This is a classical mechanics interpreting how fundamental particles maybe entangled. Here we see a drill hole and a saw cut expression. These were bound together by paint pourings on multiple directional waves before it was flattened out for observation.

Visual entanglement - exhibits on the gallery floor

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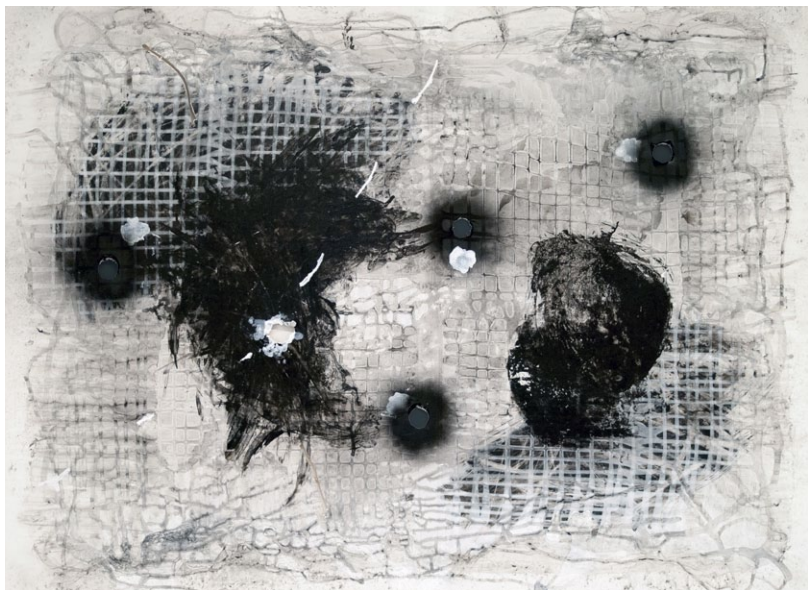

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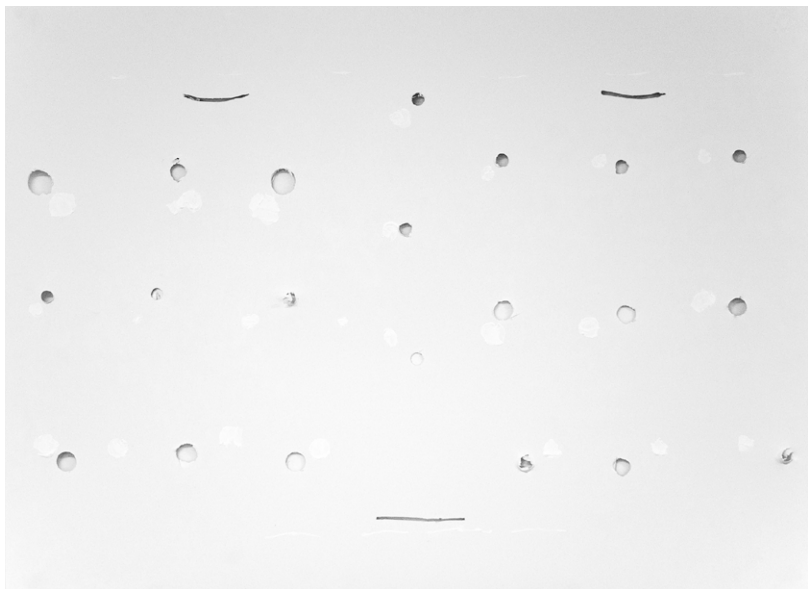

10

Top: This hydrogen isotope is Protium. The quarks are surrounded by a network of gluons. This was created with many different directional waves (undulations) to represent the electromagnetic force holding it in place.

Top right: A proton and an anti-proton at the point of annihilation (anti-proton is created the same way but in reverse). Electrons, positrons, gluons (glueball) break away from the ‘scene’. The electromagnetic field sits between them.

Bottom: Two mesons (quark and anti-quark) breaking apart - unstable.

Bottom right: This lithium-7 atom was expressed with 7 drill-holes and 2 saw cuts as one entangled expression. Interesting but maybe not strange that carbon 12 took less production effort even though its a ‘larger’ element. *See following.*

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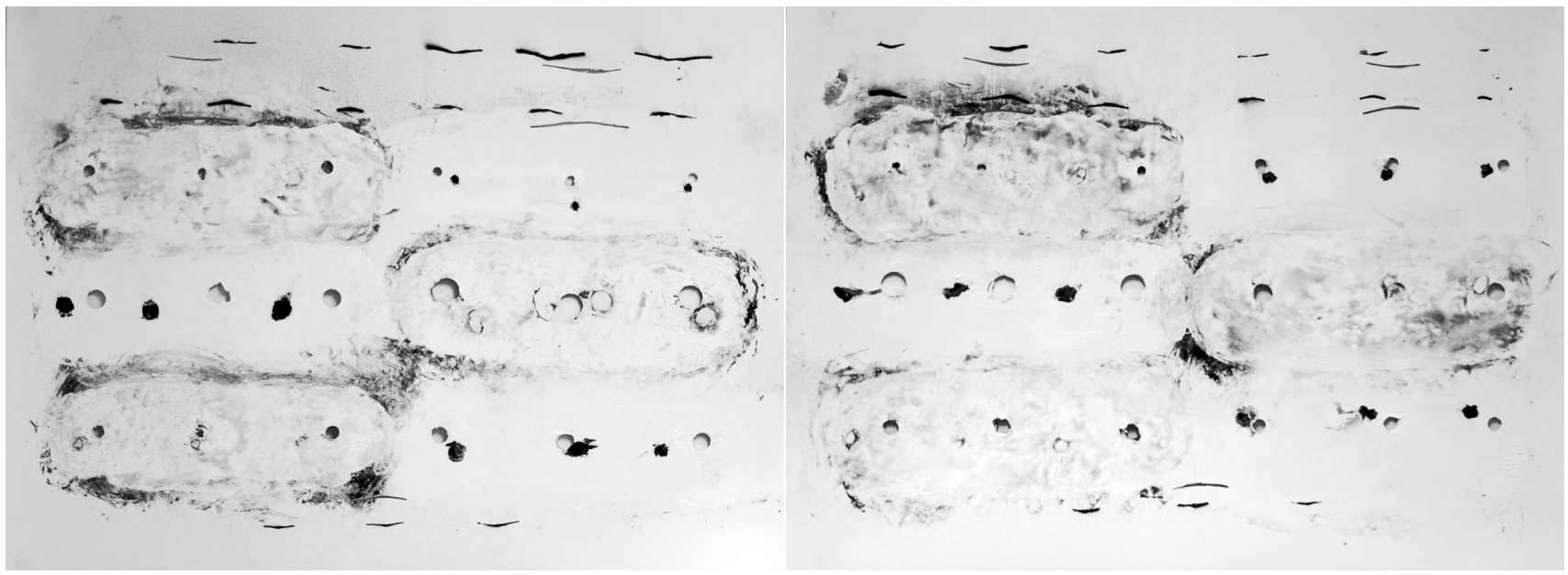
Visual entanglement - exhibits on the gallery floor



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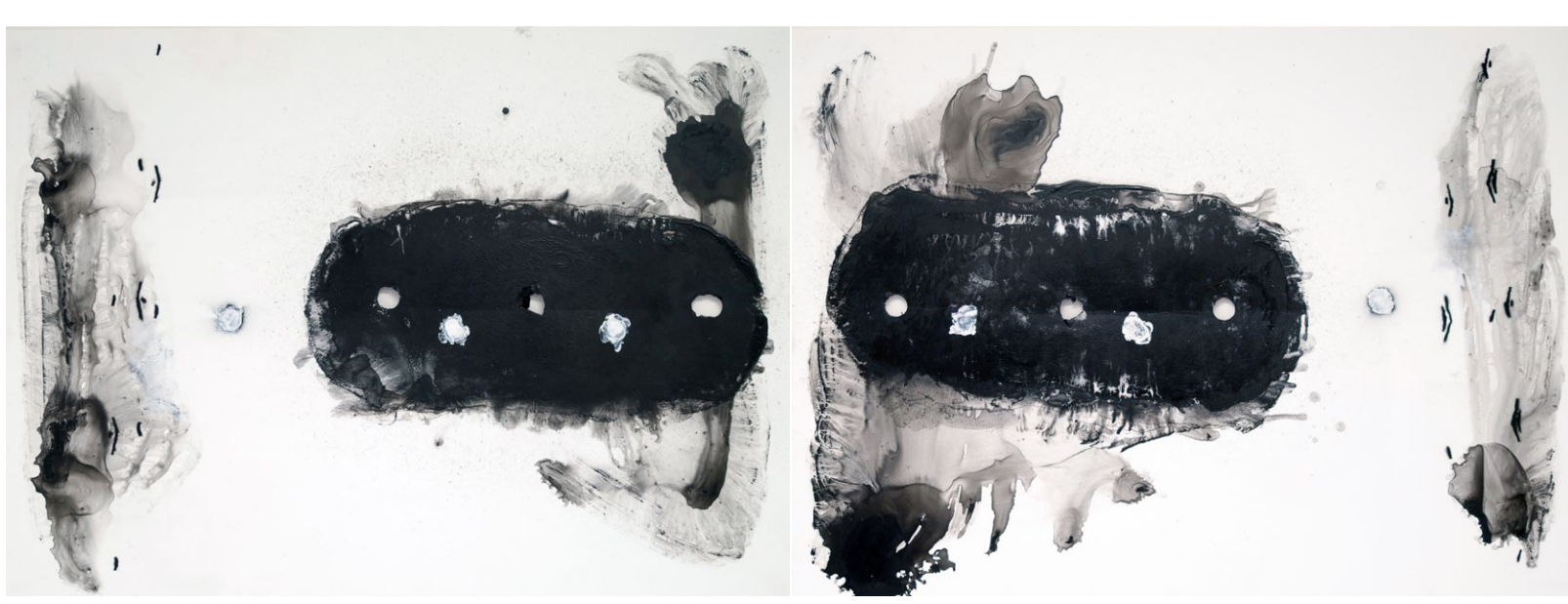

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Top: The efficiency of creating this diptych (Carbon 12) seems to be a clue as to why all life forms are carbon-based. This was completed with only 6 drill holes and 3 saw cuts as one entangled expression, yet we can observe — a sea of 72 quarks (holes) and a cloud of 39 electrons (cuts).

Bottom: This is an interpretation of the hydrogen isotope Deuterium (Quantum kiss). Note that the proton is slightly smaller in mass than the neutron. This diptych was completed with one drill hole and one saw cut as one entangled expression.

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Visual entanglement - Gallery floor sheet

1 **From curls and waves**
Installation of Railway traffic signal (found object), linen, Canson Montval water colour paper, JPP synthetic, synthetic polymer.

2 **Turn the corner**
Synthetic polymer on Canson Montval water colour paper, 300 gsm
750 x 500 mm (unframed)

3 **Quantum brushstroke of quarks**
Synthetic polymer on Canson Montval water colour paper, 300 gsm
750 x 500 mm (unframed)

4 **Quantum brushstroke of electrons**
Synthetic polymer on Canson Montval water colour paper, 300 gsm
750 x 500 mm (unframed)

5 **Sea of quarks**
Synthetic polymer on JPP Synthetic (C Class), 178 gsm
910 x 650 mm (unframed)

6 **Electron clouds**
Synthetic polymer on JPP Synthetic (C Class), 178 gsm
910 x 650 mm (unframed)

7 **Short and sweet**
Synthetic polymer on JPP Synthetic (C Class), 178 gsm
910 x 650 mm (unframed)

8 **Atomic face**
Synthetic polymer on JPP Synthetic (H Class), 566 gsm
1020 x 760 mm (unframed)

9 **Annihilation point**
Synthetic polymer on JPP Synthetic (H Class), 566 gsm
1020 x 760 mm (unframed)

10 **Lithium mesh**
Synthetic polymer on JPP Synthetic (H Class), 566 gsm
1020 x 760 mm (not-for-sale)

11 **Quantum kiss (diptych)**
Synthetic polymer on JPP Synthetic (C Class), 178 gsm
1820 x 650 mm (total unframed size)

12 **Carbon 12 (diptych)**
Synthetic polymer on JPP Synthetic (H Class), 566 gsm
2040 x 760 mm (unframed)

13 **Ellipsis**
Metal, Canson Montval water colour paper, JPP synthetic (C and H Class), synthetic polymer.

Malcolm Koch, highly commended at the 2014 Waterhouse Natural Science Art Prize, and is a current 2016 finalist, explores the unseen physiology of our world using his unique style of working with curved surfaces. This allows the surface geometry to play a part in creating an authentic interpretation of our natural world. Following these interactions the ‘membrane’ is returned to the flat picture plane — creating a metaphor for how we observe. The discovery of this working practice has lead to a distinctive visual language and body of work he calls Membrane Art. An aesthetic thought that has largely been overlooked.

Malcolm grew up and was educated in South Australia. He had five years of formal art training prior to entering University. He graduated from UniSA in 1989, and began work in 1990 as a sole trader in the graphic design industry. Since 2006 he has exhibited throughout South Australia. His work is held in numerous private and corporate collections worldwide. For more visit: www.membraneart.com

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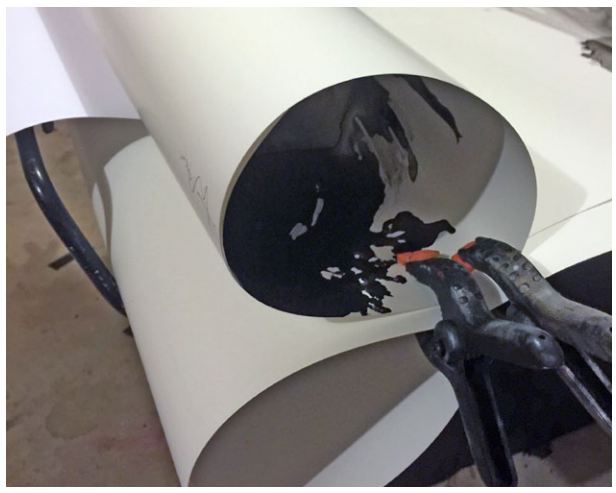
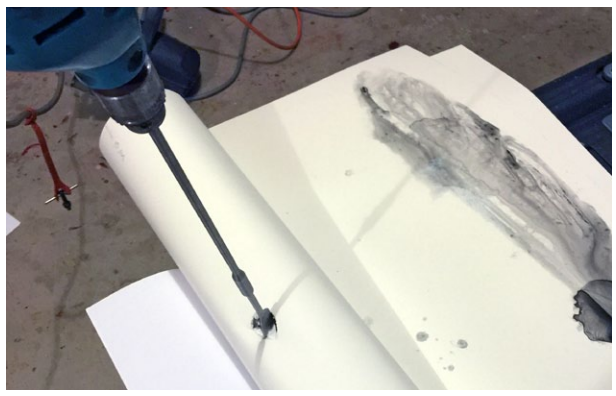
About Membrane Art

Curve the surface and create an event –
ultimately returning to the flat picture plane.
A metaphor for how we observe.



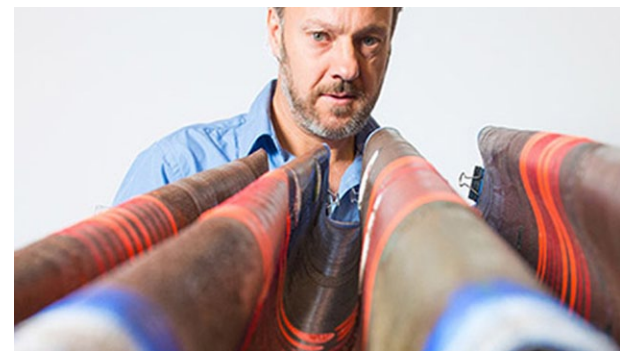


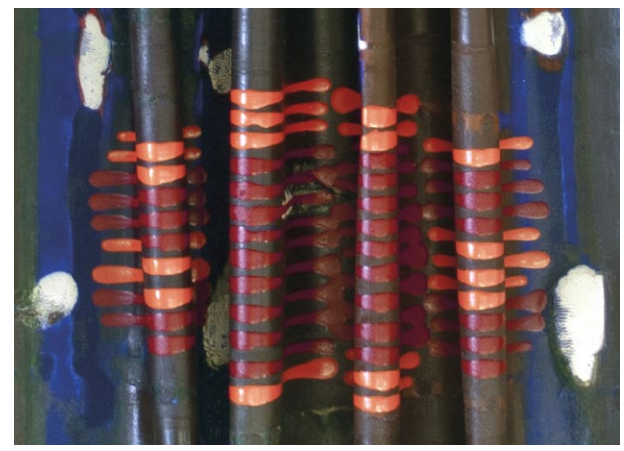
Example of events made on a curled surface: The making of Quantum kiss (11) - proton/neutron style quarks.

Top: Side view of two curled membranes in a fixed position ready for drilling.

Middle: The quantum brushstroke. A drill hole entry point.

Bottom: The unfolded state (flat plane) after all drill holes (quantum brushstrokes) have been made. This reveals hidden structures that were also drilled at the same time. These will be used to complete the work.





Example of events made on a wavy surface: Paint pourings

Top: The side view of a curved membrane in a fixed position. Paint is poured from the top to allow the paint to flow and be controlled by the form (gravity at work).

Middle: The top view, looking down.

Bottom: Once dry, the unfolded state (flat plane) is opened out. Illustrating the compression of depth before it is fully stretched to a frame.

For more information go to: www.membraneart.com