

# Strange Matter

## by Anthony Byrt

In January 2016, Stephen Hawking, Malcolm Perry and Andrew Strominger published a paper that claimed they had found a partial solution to the Black Hole Information Paradox.

The paradox itself had been caused by Hawking's breakthroughs in the 1970s. Hawking had shown that black holes have a temperature, which means they release radiation, and that as they emit that radiation, they shrink over time. So, the paradox is this: if, as is well established, a black hole sucks in and devours any and all information that comes into its gravitational pull, what happens to that information (think of "information" here as the particles that make up the universe) when the black hole itself disappears? Quantum physics tells us that everything is reversible. But if everything is reversible, information can't disappear. Even though the black hole isn't there anymore, the information it consumed has to be somewhere. So where does it go?

Hawking and his co-authors have proposed a novel, if partial, solution. Every black hole has an event horizon: the point at which escape from the hole's pull becomes impossible. Hawking and his co-authors argue that event horizons are covered in "soft electric hairs" made up of escaping radiation. And these hairs hold a "holographic plate" – a two-dimensional image – of all the information that passes through it on the way in. It's via these hairs, and this radiation, that information, albeit completely scrambled, slowly seeps back out into the universe.

Hawking's discoveries, along with the recent work of the Large Hadron Collider at CERN in Switzerland, have brought us to the cusp of understanding how the universe was created

and what it's made of. The fact we're so close to understanding this is the pinnacle of our animal intelligence, and an elegant conclusion to the period of time during which humans have been the dominant force on the planet. That's because Hawking's latest theory also coincides with our human event horizon, as we approach the point of no return where quantum computing and the birth of artificial intelligence will supersede us.

Shane Cotton has long been fascinated with theories about black holes, event horizons, and the formation of the universe. This was implicit in his "sky" paintings, in which all manner of birds, severed heads, abstract forms and gothic texts were warped and stretched across the unlocatable time-space of his spraypainted skylines. In his latest work, he makes this fascination with even clearer. Viewers familiar with Cotton's work over the past ten years will recognise the outline. It is the silhouette of a Toi Moko (also known as mokomokai); preserved, tattooed Maori heads, which were traded extensively in the first part of the nineteenth century and ended up in museum collections around the world.

New Zealand's national museum, Te Papa, has a dedicated Repatriations team that has negotiated the return of Maori remains from around the world. The most significant example of this came in late 2014, when the American Museum of Natural History returned dozens of Toi Moko that had been acquired by the New York institution from Horatio Gordon Robley in the early twentieth century. Robley is a significant reference point for Cotton, not just because of his commitment to collecting Toi Moko, but because of the way he enabled them to enter an international discourse as image: both through a

famous book he wrote on the art of moko (Maori tattoo) and through an image of Robley himself sitting with his collection, which was actually a sales technique: a way to show prospective purchasers his collection.

Cotton has done more than any other artist or academic to understand that moment of transformation, when the heads shifted from physical relics tied to a specific time and place, to images, ever-present and accessible in our culture (just type "Robley and heads" into Google images and see what comes up). And in his latest work, Cotton is very deliberately inviting us to see his heads as black holes: infinite, dark voids at the hearts of his paintings. Most of them leak scrambled information - confusing lines and pathways evocative of warped moko patterns; floating blue dots; interlocking pieces that threaten to conjoin into a demented Guy Fawkes mask. They're also ringed with their own event horizons, replete with tendril-like "hairs", which are the silhouettes of the dreadlocks many Toi Moko have.

Cotton's heads also seem to hold all the "information" floating around them in their gravitational pull. But for a few random words like "Outsiders" that information is difficult to decipher. All we can really do is approximate in language what is seen: wavy lines like braided rivers, or totems that look part spectral keepsake, and part reference to the late Maori modernist Arnold Manaaki Wilson - one of Cotton's heroes. Because the head/holes seem to bend and hold these information fragments, the white spaces between them becomes charged with structural energy, just like the dark matter that exists between celestial bodies. This can also be read as a reference to the structural importance of negative space in Maori pattern-making and design, and to the Maori belief in the complementary generative capabilities of Te Ao (the light) and Te Po (the darkness).

When the Large Hadron Collider was finally completed, doomsdayers decried it, suggesting that it could have the capacity to destroy the planet, by opening a black hole that consumes us all. Though this is scientifically impossible,

there is, on the LHC's website, a backgrounder on safety, which addresses concerns about various hypothetical entities that could be produced when the machine smashes particles together at extreme speed. Microscopic black holes are on there. So are vacuum bubbles, and magnetic monopoles. But most intriguing of all are "strangelets," which are described as "hypothetical microscopic lump[s] of 'strange matter' containing almost equal numbers of particles called up, down and strange quarks." One theory is that if strange matter does exist, it could consume ordinary matter, thus turning it into strange matter too. A single strangelet, then, could grow to be the ultimate coloniser. Strange matter is also one of the theoretical candidates for dark matter - that stuff that fills the universe that we still don't understand.

Cotton's new head paintings are filled with unexplainable particles and fragments of information, held in a twisted concentricity by object-images that are themselves like colonial black holes. Toi Moko were, and are, strange things of trade and violence: residual traces of the traumas of colonisation and some of the most troubling things created in that moment when two opposite forces crashed into each other. That he uses them to bend colonial time-space makes a kind of theoretical sense, even if we don't yet fully understand how or why it works, or what it might say about where we came from.