What if we could look at the Sun with x-ray vision

Alistair McClymont

As a conceptual artist, I am concerned with the sublime and the workings of the world around me. My work is a journey of discovery, learning about and often recreating phenomena: increasingly, I am interested in the relationship between what I do and natural/scientific processes.

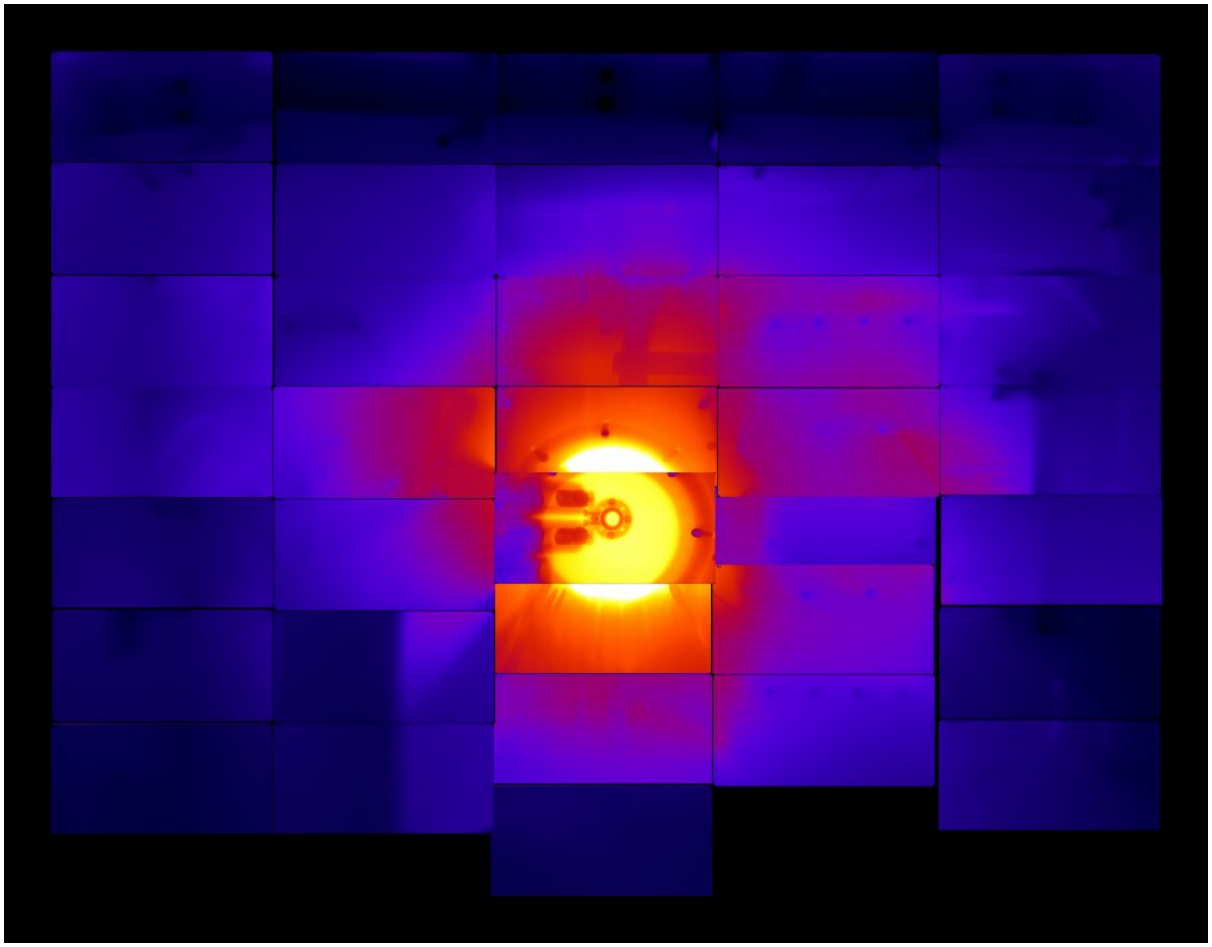


Figure 1
Alistair McClymont, *What if we could look at the sun with x-ray vision (contact x-ray plates on the Vulcan Target Area West vacuum chamber, 36 separate shots),* 2017

Over the last ten years, much of my work has focused on generative processes. The media and outputs of my work vary hugely from installations to drawings; however, the impetus is the same—a desire to understand something about a process and to communicate that understanding in the most appropriate medium. The final work should be a condensed embodiment of the forces at play.

In 2008 I first exhibited a version of *The Limitations of Logic and the Absence of Absolute Certainty*, a tornado produced by a combination of cloud- and wind-

generating machines. This work, which continues to evolve, was the first time I recreated a natural phenomenon as an artwork.

Figure 2
Alistair McClymont, *The Limitations of Logic and the Absence of Absolute Certainty,* CA2M, Madrid, 2011.
Photographer: Alistair McClymont.

By placing a humidifier between a scaffolding of three fans, I established the conditions necessary to sustain a vortex, namely low pressure and spinning air. Every aspect of the machine is reduced to the absolute minimum needed to create an artificial tornado (figure 2). It is vitally important to me that the artwork should demonstrate the phenomenon and communicate information about the underlying processes with no addition, distraction, or illusion.

According to the phenomenological philosopher Maurice Merleau-Ponty:

> “To see is to have colours or lights, to hear is to have sounds, to sense (*sentir*) is to have qualities. To know what sense experience is, then, is it not enough to have seen a red or to have heard an A? But red and green are not sensations, they are the sensed (*sensibles*), and quality is not an element of consciousness, but a property of the object. Instead of providing a simple

> means of delimiting sensations, if we consider it in the experience itself which evinces it, the quality is as rich and mysterious as the object, or indeed the whole spectacle, perceived."[1]

Aesthetics and art theorist Zhuofei Wang writes: "Merleau-Ponty emphasises that an elementary prerequisite for understanding the nature of perception is that we should try to transform the perception into the object of consciousness."[2]

In my own practice, it is a priority that the structure of the work is clear and simple. The phenomenological nature of the work may have a complex explanation in scientific terms, but I look for a way of making the scientific account more comprehensible. The physical structure of the work and its processes need to act as a conduit for knowledge contained in, as well as knowledge about, the system: the artwork should physically embody and communicate the nature of the phenomena.

Sometimes I work completely alone, experimenting and researching in my studio, while more recently I have begun to collaborate with scientists. The artwork *Raindrop* (figure 3) was the outcome of the first such collaboration, consisting of a drop of water in free fall in a vertical wind tunnel.

Figure 3

[1] (Merleau-Ponty, 1962).
[2] (Wang, 2018)

Alistair McClymont, *Raindrop,* The Art House Foundation, London, 2012.
Photographer: Alistair McClymont.

This project was sparked by hearing about an experiment that levitated water. One of the scientists involved, Clive Saunders, kindly sent me a copy of the research paper, *Vibrational frequencies of freely falling charged water drops*.[3] After studying a diagram in the paper and seeing the machine in person at Manchester University, I embarked on a mission to create a new version of the original experiment (not having much to go on, it took me two years).

The artwork exists somewhere between art and science, conceived as a continuation of the original experiment from the 1970s, but with quite different intentions and contextual positioning. Placed in a museum or gallery, the purpose of the artwork has more to do with awe, beauty and the sublime. At the same time, the installation retains a link with the original experiment and its authors. CPR Saunders and BS Wong are cited in descriptions of the work, and sometimes the original paper is presented as part of the installation. Though my practice has long held an interest in science, this artwork was my first direct effort to tie together the two paradigms. I see a compatibility that is not always represented in traditional theories of the two fields.

Richard Dawkins begins his book *Unweaving the Rainbow* by explaining the title, taken from *Lamia* by Keats. Dawkins suggests that Keats believed Newton had destroyed all the poetry of the rainbow by reducing it to the prismatic colours, inferring an incompatibility between the arts and science. Dawkins argues the opposite and talks of the beauty in the scientific process:

> “The feeling of awed wonder that science can give us is one of the highest experiences of which the human psyche is capable. It is a deep aesthetic passion to rank with the finest that music and poetry can deliver.”[4]

In an interview with the BBC in 1981, Richard Feynman speaks of a conversation he had with an artist:

> “I have a friend who's an artist and has sometimes taken a view which I don't agree with very well. He'll hold up a flower and say "look how beautiful it is," and I'll agree. Then he says "I as an artist can see how beautiful this is but you as a scientist take this all apart and it becomes a dull thing," and I think that he's kind of nutty. First of all, the beauty that he sees is available to other people and to me too, I believe. Although I may not be quite as refined aesthetically as he is ... I can appreciate the beauty of a flower. At the same time, I see much more

[3] (Saunders, C. Wong, B.S. 1973)
[4] (Dawkins, 1998).

> about the flower than he sees. I could imagine the cells in there, the complicated actions inside, which also have a beauty. I mean it's not just beauty at this dimension, at one centimetre; there's also beauty at smaller dimensions, the inner structure, also the processes. The fact that the colours in the flower evolved in order to attract insects to pollinate it is interesting; it means that insects can see the colour. It adds a question: does this aesthetic sense also exist in the lower forms? Why is it aesthetic? All kinds of interesting questions which the science knowledge only adds to the excitement, the mystery and the awe of a flower. It only adds. I don't understand how it subtracts."[5]

Art and science are two things which occupy me. The objects in art and the physical manifestations of knowledge in science—research papers, books, videos, lectures—are both reflections of nature. The format of science prioritises clarity, precision, and practicality, but it can also be said to come from a similar place to art—a creative instinct and a yearning for truth.

What if we could look at the sun with x-ray vision (contact x-ray plates on the Vulcan Target Area West vacuum chamber, 36 separate shots) is a collaborative artwork created with scientists at the Central Laser Facility in Oxfordshire, England. I was invited to be part of their experiment as an artist as well as an active scientific participant, their aim was to demonstrate the effectiveness of laser technology to see through layers of material using x-rays and neutron beams. My goal was to investigate the strong similarity I see between scientists and artists. My hypothesis is that both ultimately search for truth and both see beauty in that truth.

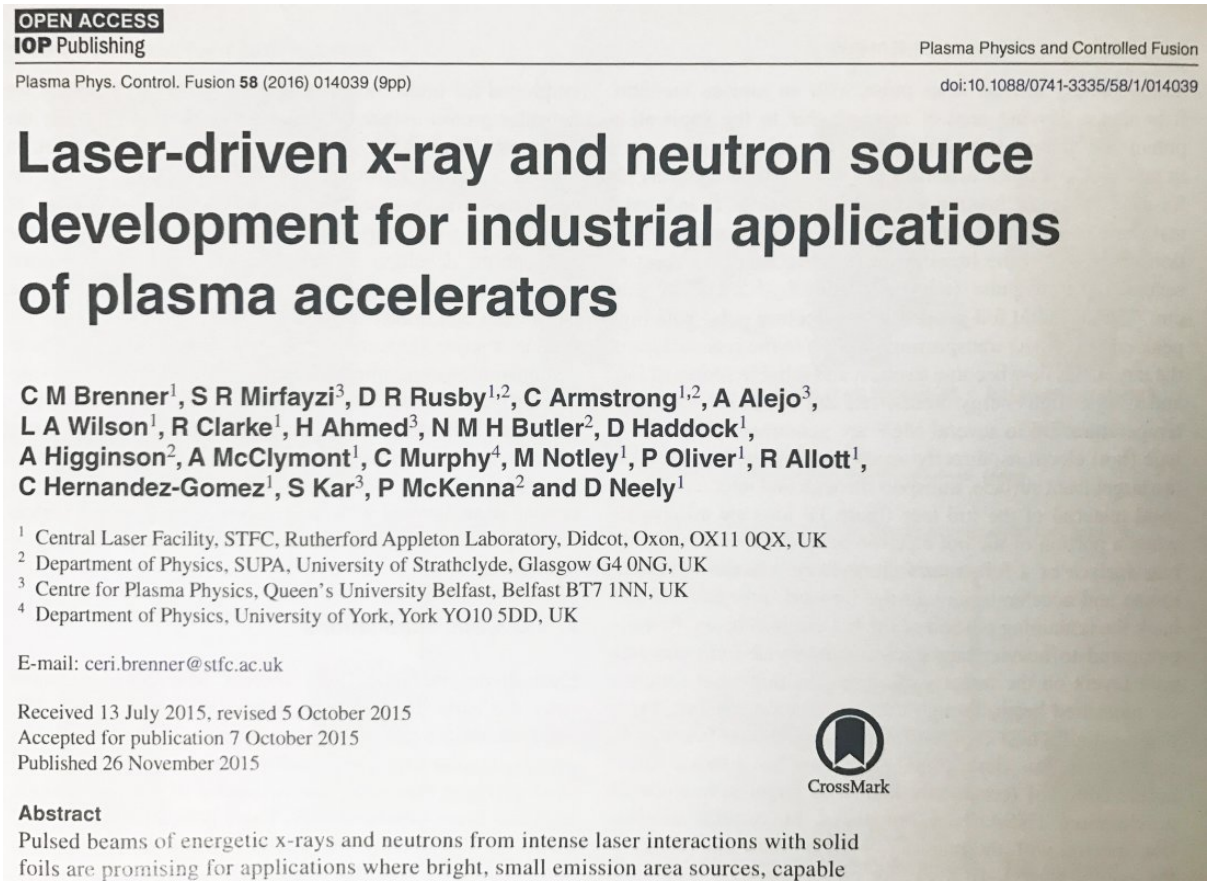
During the experiment I performed a number of actions that were important to the experimental process. I created test objects to be blasted by x-rays and imaged by the team. I also set up my own diagnostic equipment that was able to image the plasma formed by the laser in much greater detail than any of the scientists' equipment, which detected data that proved crucial to the experiment. This resulted in my inclusion as an author on the research paper, published in Plasma Physics and Controlled Fusion. The paper included the x-ray images of my test object and a photograph of the plasma from the equipment mentioned above.

I created another image during the experiment using digital radiography plates sensitive to x-rays (figure 1). The central image is a plate created by the scientists to calibrate the experiment. Using the same method, I attached plates onto the outside of the chamber in a different place every time they took a new shot (fired the laser and created plasma). The result is a two-metre-by-three-metre image of the vacuum chamber bathed in x-rays. The experimental equipment, nuts, bolts and the chamber itself casts an image in the x-ray light. The x-rays themselves were created, alongside huge amounts of other radiation by a laser driven plasma in the centre of

[5] (Feynman, 1981).

the chamber. This plasma was as hot as the sun, with pressures similar to the centre of the earth.

This image was credited to all of the authors of the research paper, which included myself.[6] These artefacts—the x-ray photograph (figure 1), the research paper (figure 4), and the test object—become a single artwork. They are an attempt to conceptually unite the endeavours of art and science. I became a scientist and the scientists became artists in quite a literal way, while the art and science became inseparable.



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Laser-driven x-ray and neutron source development for industrial applications of plasma accelerators

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Abstract

Pulsed beams of energetic x-rays and neutrons from intense laser interactions with solid foils are promising for applications where bright, small emission area sources, capable

Figure 4
Alistair McClymont, *What if we could look at the sun with x-ray vision (contact x-ray plates on the Vulcan Target Area West vacuum chamber, 36 separate shots),* 2017
Photographer: Alistair McClymont.

[6] (Brenner, C M et al, 2016)

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