Sculpture Design Sketch

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March 8, 2017

https://youtu.be/VoIgIyAKaXo

This is a sketch of a sculpture design for Queens University. It is inspired by work at the Sudbury Neutrino Observatory (SNO), for which Prof. Art McDonald recently won a Nobel Prize. He and his team showed that neutrinos generated in the sun can change flavor while traveling to the earth, which is important because it implies that neutrinos have nonzero mass. Not being a physicist, I don't understand the details, but many aspects of the engineering and the geometry of the experiment have inspired me to create this sculptural design.

Because neutrinos rarely interact with matter, the detector needed to be huge and well shielded from stray radiation. In an amazing engineering effort, McDonald's team created a giant sphere of heavy water, held in a 12-meter diameter clear acrylic sphere which sits inside a larger, water-filled geodesic sphere holding the detectors. This all sits in a clean-room in a mine more than a mile below the surface of the Earth.

I should say first of all that the sculpture is not intended to be representational of anything; it is purely an abstract form intended to be visually engaging and structurally interesting on its own. But aspects of the design came together metaphorically in my mind over the past couple of months as I have been reading about this neutrino research.

I see a certain visual symmetry between the start and the end of these solar neutrino's lives. They are created in the core of the sun. As an artist, if I wanted to make a quick visual sketch of the process, I would draw a circle for the sun, an inner circle for the core and a radial line indicating a neutrino's outward path. And to sketch the detector operation, I would again draw a circle in a circle and a radial line indicating a neutrino's inward path. This geometric parallelism between the two endpoints of the neutrino's existence is fascinating to me.

The sculpture is planned to be generally spherical, about 1.5 meters in diameter, made of thirty identical, planar, laser-cut, wood components, plus six brass rods. The initial impression is one of dynamic complexity, drawing in onlookers to examine it more deeply and ask questions. Perhaps the curious viewer making sense of the sculpture goes through a mental process somewhat analogous to a scientist's process of analysis. Just as symmetry is central to the work of particle physicists, so the different symmetries of the sculpture are foundational in its organization.

While creating this design, I was struck by the fact that both the mass of the sun and the mass of water in the SNO detector are balls of fluids. So the body of the sculpture conveys a sense of fluidity with its swirling 5-fold vortices. A mathematician would characterize the sculpture's symmetry as icosahedral, meaning it has the same set of rotational symmetries as the geodesic framework in the neutrino detector. But the six radial lines of the sculpture show a different symmetry: cubical. Has something changed flavor? The lines are ambiguously evocative of either inward or outward motion. Each passes through two layers of wood, suggestive of a sphere in a sphere. And they allude vaguely to an armillary sphere, making another connection to the astronomical context of the neutrino research.

I haven't yet decided about the colors except that the inside and outside surfaces of the wood should be two different colors with the inner one brighter. This improves the lucidity of the design and is

metaphoric for concentric spherical regions in both the sun and the detector. I am still experimenting with different stains to decide what is most suitable.

Just as the research at SNO was the collaborative effort of a great many people, I plan to assemble the sculpture as a group project on campus. I will bring the pre-cut components and will lead a group of students, faculty, and staff in connecting them with cable ties. Assembling the parts is a challenging puzzle requiring logic, persistence, and careful thought, all skills that will be useful for anyone there aiming someday for their own Nobel Prize.