Galactic Scale Inquiries into the Nature of the Cosmos

Robotics, Lasers, and Sensor-Based Systems

Kal Spelletich

November 4th, 2022 - January 28th, 2023

Opening Reception: Friday, November 4th, 6:00 - 9:00pm
Artist Talk: Saturday, December 10th, 2022, 3:00pm: In-conversation with Karen Marcelo, SRL artist and founding curator of Dorkbot San Francisco
Closing Reception: Saturday, January 28th, 2023, 3:00PM: Featuring a sound performance by the artist in collaboration w/ instrument-inventor Bryan Day

Gallery hours: Saturdays, 1:00 - 6:00pm
Or almost anytime, by appointment (just call ahead!): 415.336.2349
323 10th St. at Folsom (SoMA), SF, CA
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Telematic Media Arts is pleased to present *Galactic Scale Inquiries into the Nature of the Cosmos*, an exhibition of robotics, lasers, and sensor-based systems by San Francisco artist Kal Spelletich. In this body of work, Spelletich responds as an artist to science's extraordinary, transformative contributions to visual culture and knowledge. Reconstructing scientific tools and experiments with light, stones, sound, metal, video, and machines, his kinetic sculptures and installations explore the sublime dimensions and durations of astronomy, geology, and physics. He highlights their explosion of experience's everyday parameters, evoking wonder in the face of nature and raising the question of our place in the universe. At a time when the authority of science has been crudely dismissed, and critical thinking has given way to groundless conspiracy theories, Spelletich explores fundamental

scientific discoveries and the weight of their hold on the world.

The project is rooted in the history of science, drawing inspiration from the ancient figures of Pythagoras and Gan De; the early modern Leonardo, Newton, and Galileo; and the underappreciated heroes of 20th-Century astronomy and astrophysics, Jocelyn Burnell and Vera Rubin, among others. At the same time, Spelletich's work emphasizes the fact – revealed by the recent rise of misinformation — that the authority of science is not sustained by science itself, but rather depends upon a collective, social commitment to the pursuit of knowledge and the truth. His kinetic sculptures and installations are interactive. They respond to the physical presence of bodies in space, and they require the audience to engage them. In this way, the show is political, sparking minds and activating audiences by involving them in a reflective practice that bridges art, science, philosophy, and social consciousness in the pursuit of a shared understanding.

WORKS IN THE SHOW

In the bookstore

Laser-Cut Astrolabe

$300.00
(Limited Edition of 10)

In the Gallery (Counter Clockwise)

#1. Jocelyn Burnell Galactic Positioning System Valise
Press two buttons inside valise alternately while holding speaker on the left outside of valise to your chest. Please DO NOT TOUCH anything else inside valise.

$3,200

Remain in light
Hearing and feeling the speed of light.
Burnell discovered the Radio Pulsar. She is now recognized as the pioneer who made this breakthrough discovery.

Press right button: Laser bounces off mirror hitting light sensor. Light sensor is run through two amplifiers to speaker to hear speed of light.
While pressing first button press second to hear the sun. The sun's brightness is processed to send an electric signal that reflects it's brightness. That signal is sent to an amplifier to hear the sun.
Jocelyn Burnell, responsible for one of the most important astrophysics discoveries of the 20th century: the radio pulsar.
And
Fizeau's historic 173-year old experiment done in 1851, using an interfeometer to measure the speed of a light wave as a length of standard to determine the scale of the cosmos. He measured so accurately that the meter is defined by it. Before the 17th century, most scientists, including Johannes Kepler and Rene Descartes, considered the speed of light to be infinite, able to travel any distance instantaneously. Galileo Galilei was among the first to question this assumption and attempt to measure light experimentally.
His work with Foucault inspired Fizeau to attempt their own measurement. Fizeau calculated the speed of light, obtaining the value 313,300 kilometers per second (roughly 5% too high).
Foucault improved on Fizeau's apparatus.
Direct observation of deterministic macroscopic entanglement. Observation of quantum phenomena can change the measured results of the experiment.

#2. We Will Be Moving Mountains (California State rock, serpentine)

$3,700
Touch the two copper pads alternately.
When is a rock just a rock?
When it is the California state rock and possibly toxic.

#3. Moon in a Valise A portable moon

$2,400
Please Do Not Touch

#4. Pendulum Clock (with meteorite)
Please Do Not Touch
A meteorite is attracted and repelled to an electro magnet launching it back into space and time
Galileo observed the constancy of a pendulum via a swinging lamp in a cathedral to his heartbeat in 1656
Measuring and counting an isochronic event
Each swing converted to a time event

Referencing time division and space-time
Sound conveying useful data
Carlo Rovelli posits reality is a complex network of events onto which we project sequences of past, present, and future

It sonifies somewhat regularly, an auditory cue representing a piece of data
Time is Relative
Nothing Lasts Forever
Heartbeat
How is it experienced à la E+mc2
Does light experience time?
Fast = slower in time (special relativity)
Time Dilation
To reconfigure time
From the clock series.

#5. Hearing Moon

$3,900
Please Do Not Touch

Listening to the moon
Seeing sound
Capturing Light
Hearing Light and Terrain
Time as dimension traveling across it
Deciphering the nature and condition of our origins
Sonified Moon
We are a way For The Cosmos to Know itself
In 1676 the Danish astronomer Ole Rømer (1644-1710) had used GALILEO's 1610 discovery of the four largest moons of Jupiter to describe the way of measuring the speed of light by measuring the times at which the moons were eclipsed by Jupiter itself.

#6. Light, Space, Time #2 (Frankel Entangled Particles)

$2,600 (framed)

#7. Light, Space, Time #1 (Jocelyn Burnell Galactic Positioning System)

$2,600 (framed)

#8. Meditative Centrifuge Device (Rolling Ball)

$4,300
Please Do Not Touch (activated by proximity sensor)
Here I reference *Sir Isaac Newton 1642-1727*
An object at rest remains at rest, and an object in motion remains in motion at constant speed and in a straight line unless acted on by an unbalanced force.
The audiences motion activates the device via a proximity sensor.
The acceleration of an object depends on the mass of the object and the amount of force applied.
Whenever one object exerts a force on another object, the second object exerts an equal and opposite on the first.
The relationship between a physical object and the forces acting upon it.
Descarte said:
Every simple thing remains in its same state and never changes except through external causes.
Gravity Always Wins
Time dilation timekeeper
We are not the center of the universe
Having said that, the truth is agreed to be an agreed upon framework and advocating for the truth through documented experiments, peer reviewed, is a right we should all agree upon for critical and reflective society.

#9. The Burnell Galactic Positioning System (Overhead)

$4,700

Jocelyn Burnell, responsible for one of the most important astrophysics discoveries of the 20th century: the radio pulsar. She made the discovery as a graduate student, earning a Nobel Prize in 1974. And it could one day form the basis of a "galactic positioning system" for navigating outside our solar system. But Bell Burnell didn't collect the Nobel. Instead, to her supervisor at the University of Cambridge, Antony Hewish. She is now recognized for making the discovery.
A laser beam (split by 2-way film) is pointed at two-sided spinning variable speed concave mirror. Each side of mirror produces different sounds due to each mirrors unique characteristics. Laser hits light sensor, amplified to produc sound with each passing light wave.

An experiment with:
The speed of light and sound
Hearing the speed of Light

Seeing the speed of Sound
Reactive technology
Sonification; the use of non-speech audio to convey information or perceptualize data.
Auditory perception in temporal, spatial, amplitude, and frequency resolution, opening possibilities as an alternative or complement to visualization techniques.
Hearing Light, giving voice to light, if you will.
Synesthesia, neurological condition in which information meant to stimulate one sense stimulates several senses.
Light waves triggering sound waves. A hybrid wave transference system.

Foucalt: Since both the speed of rotation and the distance to the mirror were well established, it was possible to measure the difference between the angle of the light as it entered the apparatus and when it exited the setup, and calculate the speed of light from that. Foucault concluded in 1862 that the speed of light was 299,796 kilometers per second.
Fizeau's experiment to measure the speed of light in Paris, 1849 – a distance of 8.67 kilometres.
A rotating toothed wheel with 720 gaps at Montmartre and a mirror at Suresnes. Therefore the time required by light to travel a distance of 8.67 × 2 kilometres was 1/25 × 1/720 of a second. This gave a speed of 312,320 kilometres per second (the correct value is 299,792 kilometres per second).
And Fizeau, always Fizeau.

#10. Bronze Cast Moon
Heavier than moondust

$3,700

#11. Quantum Fankle Entanglement Observer Effect Nightclub
Hold phone flashlight up to sensors at the top of sculpture.
A system activated by light (most likely from your phone)
$5,000

This is a body of work I have been doing for well over 15 years. Imagine my surprise when a Nobel prize(1) was given out **this week** for these same mind boggling experiments I am extrapolating on (entangled particles).
What we have here are:
6 lasers whose light particles are sonified in a complex reflective medium.
The amplification of a mirror drive system.
A looping timer.
2 light wave sensors.
6 amplifiers.

A complex medium machine.
Mist/fog
Lasers over lapping and doubling their sonification.
Six levels of operation to experiment with the Entanglement.

Multiple particles are inextricably linked and replicate each other's every move - even if they are far apart. Entanglement: If you observe a particle in one place, another particle light-years away will instantly change its properties. In tiny objects, atoms and electrons and in devices nearly visible to the naked eye.
Things at an atomic scale - and approaching the speed of light - behave quite differently and counterintuitively.
Again, particles are inextricably linked and replicate each other's move.

The disturbance of an observed system by the act of observation, the result of instruments that, by necessity, alter the state of what they measure.
The solution to a quantum fankle is to transport "entangled" particles of light through a complex medium. 2 points in space can communicate, there is no space anymore, all is connected.

The work celebrates the scientific method and references foundational scientific discoveries.

"It is spooky action at a distance." -Albert Einstein

1. https://www.nobelprize.org/prizes/physics/2022/press-release/
On Oct. 4, the Royal Swedish Academy of Sciences announced that Alain Aspect, John Clauser, and Anton Zeilinger had won for “groundbreaking experiments using quantum states, where two particles behave like a single unit even when they are separated.” The academy noted that these experiments, which built upon the 1960s research of John Stewart Bell, cleared the way for new technology such as quantum computers. Two days later, Scientific American published an in-depth article that explained how these quantum experiments proved “the universe is not locally real.”

2. Burnell Is responsible for one of the most important astrophysics discoveries of the 20th century: the radio pulsar. The discovery, which she made as graduate student, earned a Nobel Prize in 1974. And it could one day form the basis of a "galactic positioning system" for navigating outside our solar system. But Bell Burnell didn't collect the Nobel. Instead, the award went to her supervisor at the University of Cambridge, Antony Hewish. She is now recognized as the pioneer who made this breakthrough discovery.

#10. Large Crystal

(Center of the Room)
$4,300

In bathroom. Hold hand in front of proximity sensor
Sound and feel of the Crystal World.
Stones as a cyclical clocks.
A suspended state of existence to stop time and life.
Each orbit converted to a time event
Crystals, or crystalline solids, are often used in psuedoscientific practices such as crystal therapy, and, along with gemstones, are sometimes associated with spellwork in Wiccan beliefs and related religious movements. Every crystal has an orderly, internal pattern of atoms, with a distinctive way of locking new atoms into that pattern to repeat it again and again. The shape of the resulting crystal-such as a cube (like salt) or a six-sided form (like a snowflake)-mirrors the internal arrangement of the atoms. As crystals grow, differences in temperature and chemical composition cause variations. They are often described as "growing," even though they are not alive. Their repeated patterns occur within the basic atomic structure and reflect the pattern of faces of the crystal.
"Look at the viruses, Doctor, with their crystalline structure, neither animate nor inanimate, and their immunity to time!" -J.G. Ballard
From the clock series.

#11 – 14. FOUR DRAWINGS

$1,400 each (framed)

#15 Ai Birumi's Lunar Eclipse
In Bathroom
$1,800

#16 Kepler's Elliptical Orbit Etched in Marble
In Bathroom
Orbital Mechanics
Kepler's Laws of Planetary Motion

$2,700 – SOLD!

Copernicus rightly observed that the planets revolve around the Sun, Kepler correctly defined their orbits. At the age of 27, Kepler became the assistant of a wealthy astronomer, Tycho Brahe, who asked him to define the orbit of Mars. Brahe had collected a lifetime of astronomical observations, which, on his death, passed into Kepler's hands. (Brahe, who had his own Earth-centered model of the Universe, withheld the bulk of his observations from Kepler at least in part because he did not

want Kepler to use them to prove Copernican theory correct.) Using these observations, Kepler found that the orbits of the planets followed three laws.

Like many philosophers of his era, Kepler had a mystical belief that the circle was the Universe's perfect shape, and that as a manifestation of Divine order, the planets' orbits must be circular. For many years, he struggled to make Brahe's observations of the motions of Mars match up with a circular orbit.

Eventually, however, Kepler noticed that an imaginary line drawn from a planet to the Sun swept out an equal area of space in equal times, regardless of where the planet was in its orbit. If you draw a triangle out from the Sun to a planet's position at one point in time and its position at a fixed time later—say, 5 hours, or 2 days—the area of that triangle is always the same, anywhere in the orbit. For all these triangles to have the same area, the planet must move more quickly when it is near the Sun, but more slowly when it is farthest from the Sun.

This discovery (which became Kepler's second law of orbital motion) led to the realization of what became Kepler's first law: that the planets move in an ellipse (a squashed circle) with the Sun at one focus point, offset from the center.
Kepler's third law shows that there is a precise mathematical relationship between a planet's distance from the Sun and the amount of time it takes revolve around the Sun. It was this law that inspired Newton, who came up with three laws of his own to explain why the planets move as they do.