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Pennsylvania Academy of the Fine Arts  
Morris Gallery, Historic Landmark Building  
October 9, 2015 – January 3, 2016



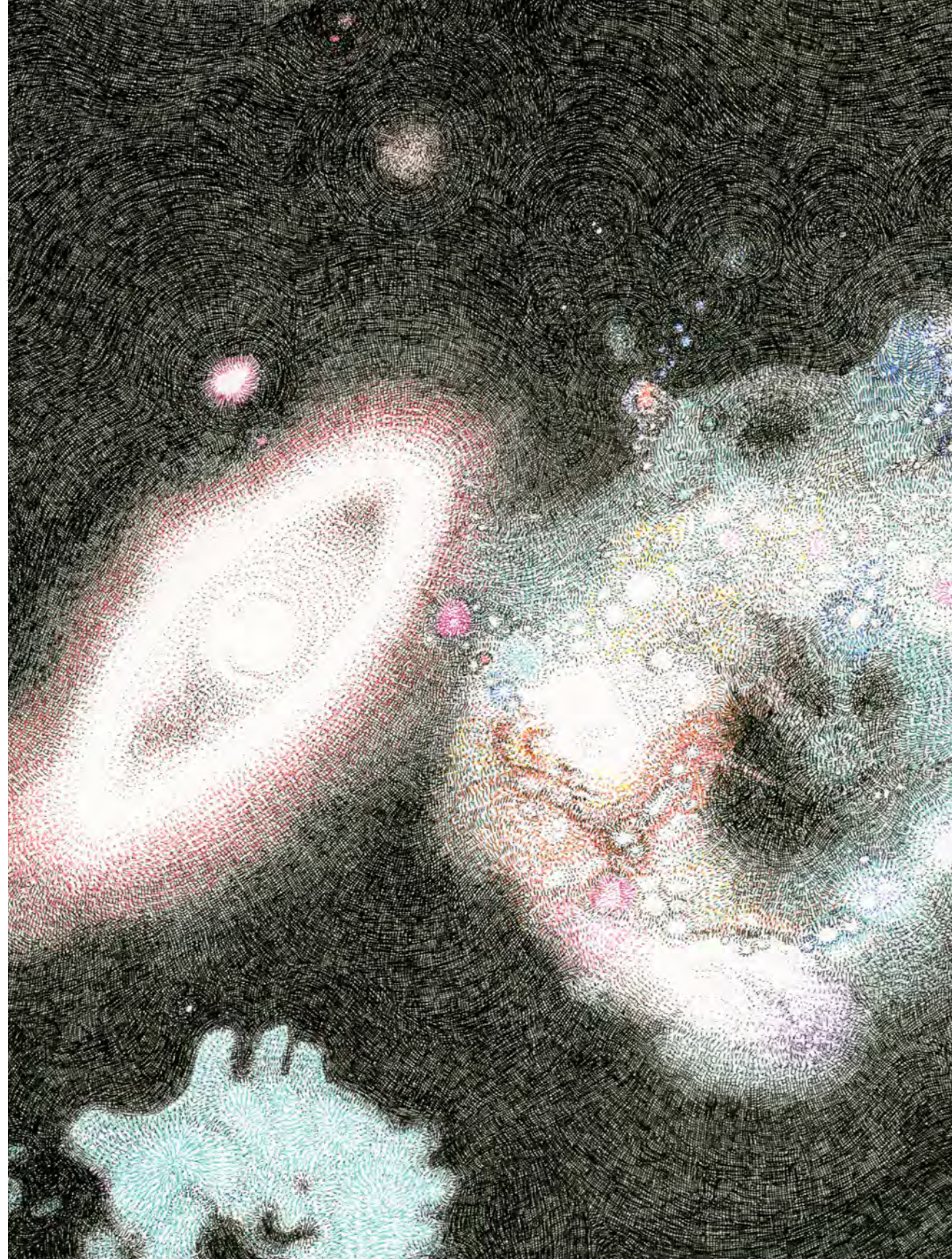
## SPECIAL THANKS

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In 2015–16, The Morris Gallery Exhibition Program is supported by The Armand G. Erpf Fund, Marsha and Jeffrey Perelman, and an Anonymous donor

Season Exhibition Sponsor: Jonathan L. Cohen

Travel and other support for the work in *Mia Rosenthal: Paper Lens* was provided to Mia Rosenthal by a grant from the Leonore Annenberg Fellowship Fund



## FOREWORD

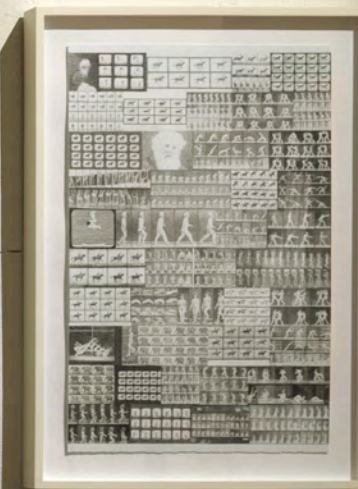
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### HARRY PHILBRICK

Edna S. Tuttleman Director of the Museum, Pennsylvania Academy of the Fine Arts

I am delighted that PAFA's Morris Gallery Program of contemporary projects has resumed with the exhibition *Mia Rosenthal: Paper Lens*. The Morris Gallery Program has been an integral part of PAFA's mission to support artists; by working with emerging and mid-career artists, both locally and nationally, PAFA has created an important roster of exhibitions over more than 30 years. Mia Rosenthal is a Philadelphia-based artist and an alumna of PAFA's MFA program, but her focus is wide-ranging, from the virtual universe of search to the actual cosmos of the universe we inhabit. By creating a site-specific wall drawing to accompany her beautifully rendered works on paper, Rosenthal has connected many levels of data and history on the walls of the Morris Gallery, providing a most auspicious start to our revived series of exhibitions.

MIA ROSENTHAL  
PAPER LENS



MIA ROSENTHAL  
PAPER LENS  
2011  
PAPER, GLASS, AND ACRYLIC  
18 x 24 INCHES  
GALLERIES 100 AND 101  
MUSEUM OF MODERN ART  
111 WEST 53RD STREET  
NEW YORK, NY 10019  
WWW.MOMA.ORG



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66



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EXIT



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## ESSAY BY

### JODI THROCKMORTON

Curator of Contemporary Art, Pennsylvania Academy of the Fine Arts

*Mont Blanc yet gleams on high:—the power is there,  
The still and solemn power of many sights,  
And many sounds, and much of life and death.  
In the calm darkness of the moonless nights,  
In the lone glare of day, the snows descend  
Upon that Mountain; none beholds them there,  
Nor when the flakes burn in the sinking sun,  
Or the star-beams dart through them. Winds contend  
Silently there, and heap the snow with breath  
Rapid and strong, but silently! Its home  
The voiceless lightning in these solitudes  
Keeps innocently, and like vapour broods  
Over the snow. The secret Strength of things  
Which governs thought, and to the infinite dome  
Of Heaven is as a law, inhabits thee!  
And what were thou, and earth, and stars, and sea,  
If to the human mind's imaginings  
Silence and solitude were vacancy?*

— Percy Blysshe Shelley,  
“Mont Blanc: Lines Written in the Vale of Chamouni,”  
1816. Section V.

Mia Rosenthal’s interest in particle physics and its study of the universe’s smallest components prompted her recent visit to the Large Hadron Collider at CERN in Switzerland and inspires new drawings made especially for *Paper Lens*. In these painstakingly crafted pieces, Rosenthal explores the incomprehensibility of both earthly and celestial experience: from the collision of subatomic particles far below the earth’s surface to deep fields of dark matter in outer space. Observational drawing has long been a way for Rosenthal to explore the world around her, questioning what she sees and seeking answers to what she does not understand. One of the most fascinating things about this body of work, however, is that Rosenthal’s chosen subject matter cannot be observed with the naked eye—she draws from scientific imagery and data visualizations that are hypotheses of what dark matter or specific galaxies, for example, may look like. Thus, Rosenthal makes observational drawings of the unobservable. In doing so, she grapples with one of the major contrasts of life in the 21st century: the tension between the seemingly boundless accessibility of knowledge through technology and the awareness that there is so much about our universe that we simply do not yet understand.

Though discussions of the sublime have carved well-worn paths through the history of art, one cannot look at Rosenthal’s work without considering the awe-inspiring vastness of the universe, as well as the scattered sublimity of cyberspace. Part of her practice since 2012, Rosenthal’s “Google Portraits” provide fundamental clues to the way that she, like many of us, uses Google image search to understand unfamiliar subjects. A keyword search for “peculiar galaxies,” for example, gives one images from Halton Arp’s (1927–2013) most well known work, the *Atlas of Peculiar Galaxies*. Rosenthal assiduously draws the search results that pop up on her screen creating a lively tension between the form and content of her work. In capturing a digital moment with such analogue means, she honors the boundless possibilities of what can be found through the Internet; however, each of Rosenthal’s carefully placed marks seems to rub against

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the opposite of this vastness—the awareness of humankind’s own limits of understanding. The Google image search may be one of the ways in which we all face the sublime everyday—sitting at our desks or on our phones, the overwhelming grandeur of the world is always at our fingertips. Rosenthal’s drawings of her notes from readings on particle physics reveal how deeply she studies her subjects before she draws. They also illuminate the joy and terror that one feels when taking on a new subject (especially one as complicated as particle physics). As the title of the exhibition, *Paper Lens*, suggests, through the paper and the marks that she draws on it, Rosenthal humbly submits herself to a process of discovery through drawing.

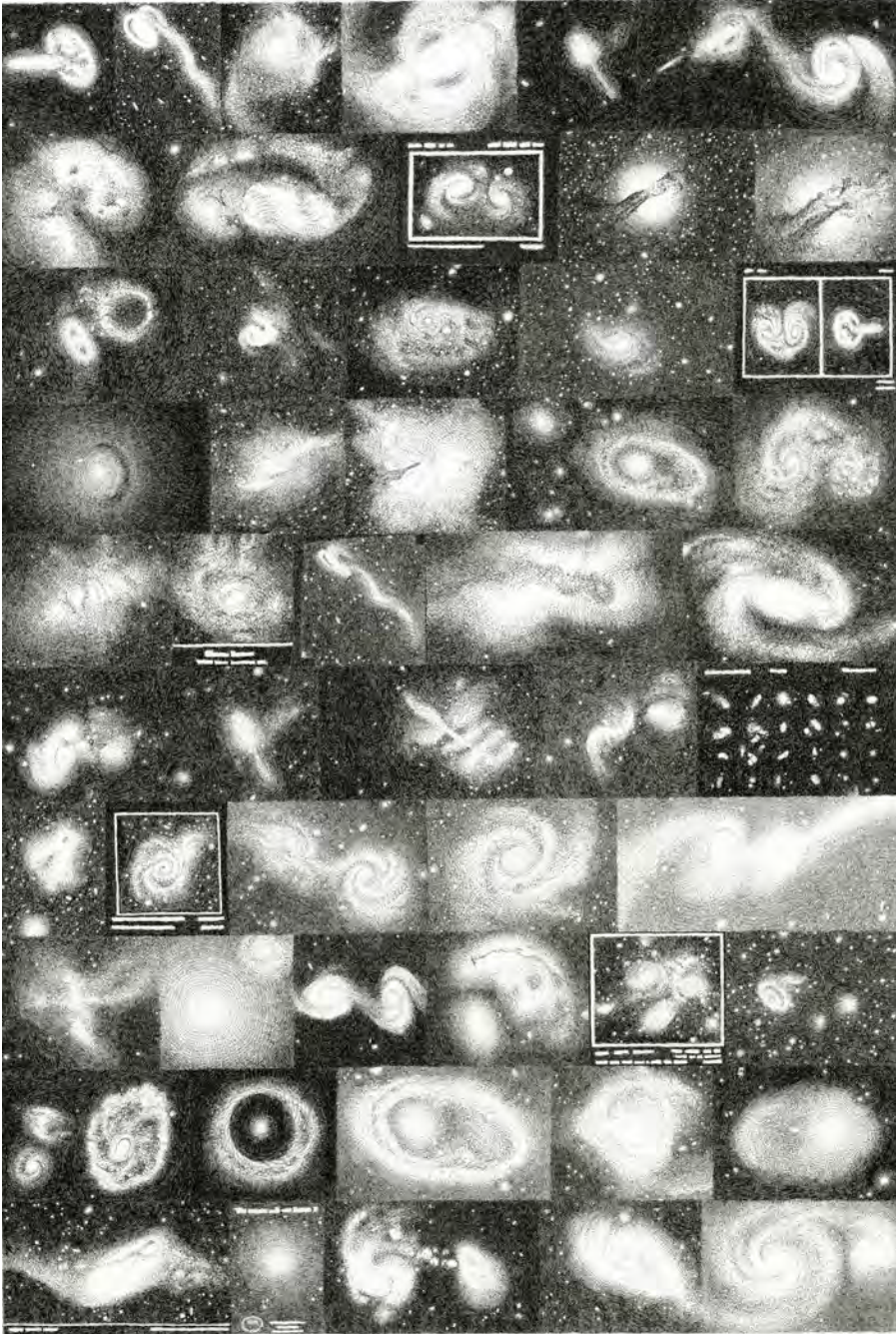
As the Internet has rapidly become a significant part of how one interprets and experiences the world, so have the ever-evolving images of our cosmos. Images from the Hubble Space Telescope, for example, are now pervasive in popular culture and the arts and fundamentally shape how we conceive of our place in the universe. In *Telescope*, Rosenthal traces an abridged history of the instrument and calls to mind the parallels between technological advancements in lenses and artistic thought. Starting with Galileo’s observation of the moon using a Galilean telescope in the center of the drawing and ending with a Hubble telescope image of the Ultra Deep Field in the outermost ring, Rosenthal takes us through almost 500 years of modern physics and astronomy. She also takes us through much larger fields of time: from the moon, a physical entity in the night sky (not significantly different now than when Galileo observed it), to the Hubble image that, while created at the beginning of the 21st century, marks a time approximately 13 billion years ago. Rosenthal takes on the fourth dimension of time in her drawings—her version of the sublime is multi-dimensional.

This is evident in the drawing titled *Mont Blanc*; perhaps her most important work in the exhibition. In the piece, Rosenthal explores one of the major unknowns in cosmology and particle physics—the existence and composition of dark matter. Grounded by the stunning view of Mont Blanc from the CERN facilities, the sky in Rosenthal’s landscape is taken from

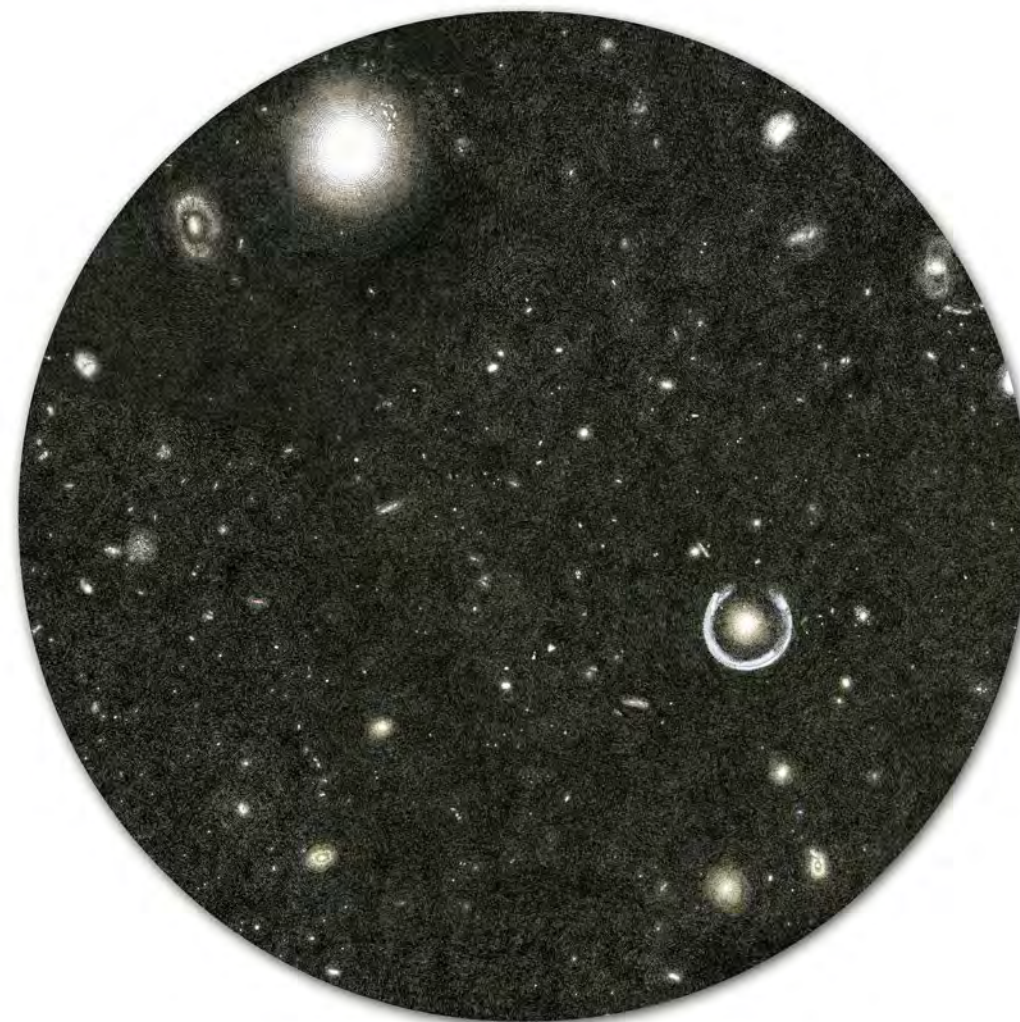
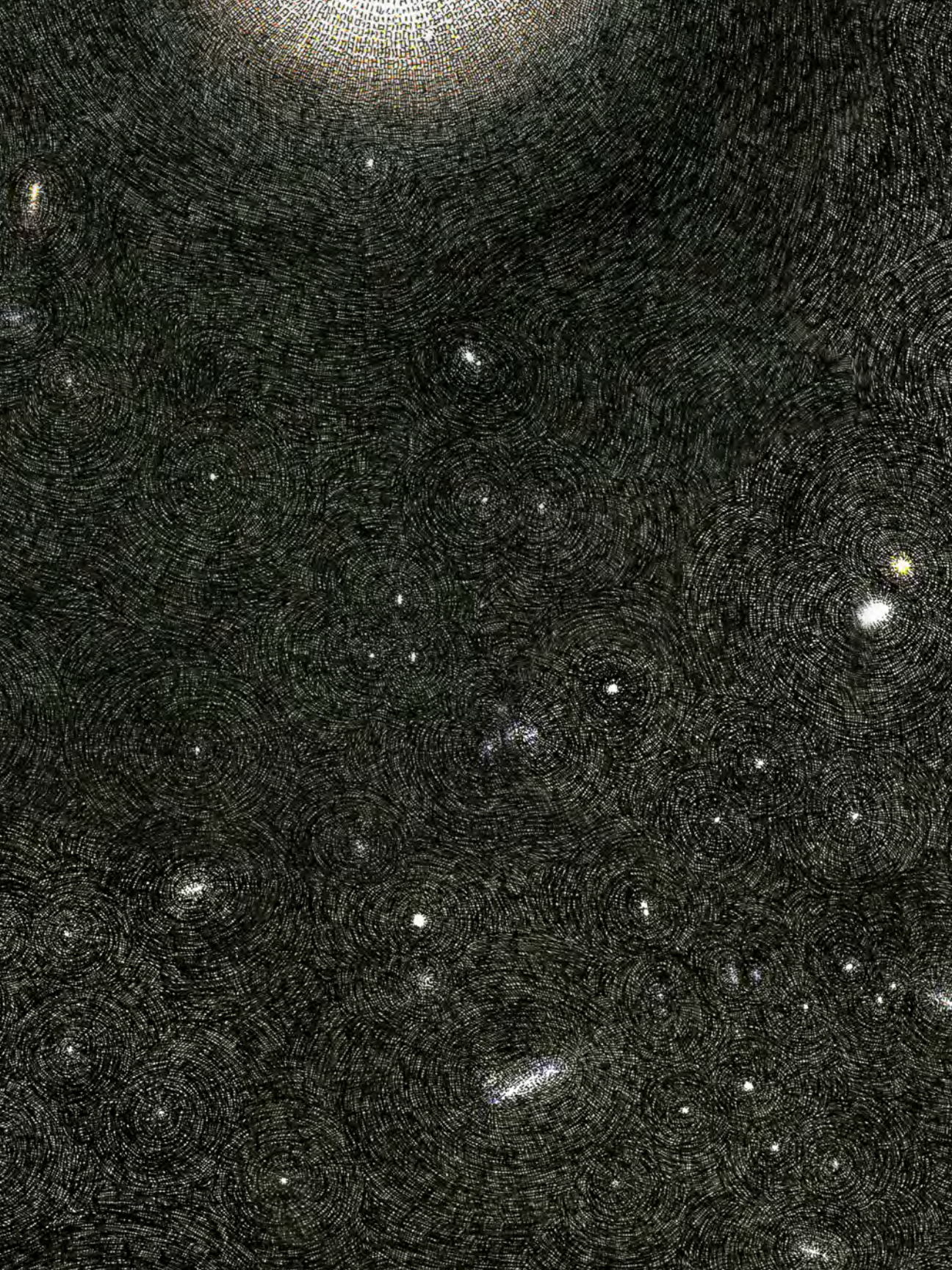
an image (sourced from the Hubble Telescope) that indicates the presence of this mysterious matter. Below ground, in the ring of the Large Hadron Collider, the collision of subatomic particles is shown in red. These experiments at the Collider seek evidence of dark matter (among other things), which has never been directly observed, yet likely makes up a great deal of the universe. Rosenthal’s landscape connects our visible, physical world with all that we cannot see and do not yet know about the universe. Though she eagerly takes her viewers to space, she always brings them back to earth by connecting terrestrial matter with extraterrestrial phenomena.

The vision of the world that Percy Blysshe Shelley puts forth in his poem on Mont Blanc resonates with Rosenthal’s drawing of the same mountain and the larger body of work featured in *Paper Lens*. Though Rosenthal’s drawing was not directly inspired by the poem, both works of art speak to a core human impulse to make connections that emanate from our isolated existence to other elements of the universe. It represents an awareness of the world outside of our physical understanding and a desire to experience life as part of a greater connected series of events. Perhaps most importantly and as is most clearly deduced from Rosenthal’s intricate drawings, this impulse is related to how one contemplates his or her own place in the ever-expanding notion of the universe and how one reconciles all that is to be learned and all that is yet to be understood. In *Paper Lens*, Rosenthal proves that, even though drawing may not be able to give full answers to the universe’s mysteries, the meditative nature of this centuries old practice helps artist and viewer to more fully understand and experience its wonders. Answers to the fundamental questions about our universe do not come easy—as Rosenthal notes in one of her drawings in big, block letters in the parlance of Facebook relationship statuses (and her characteristic humor), “It’s complicated.”

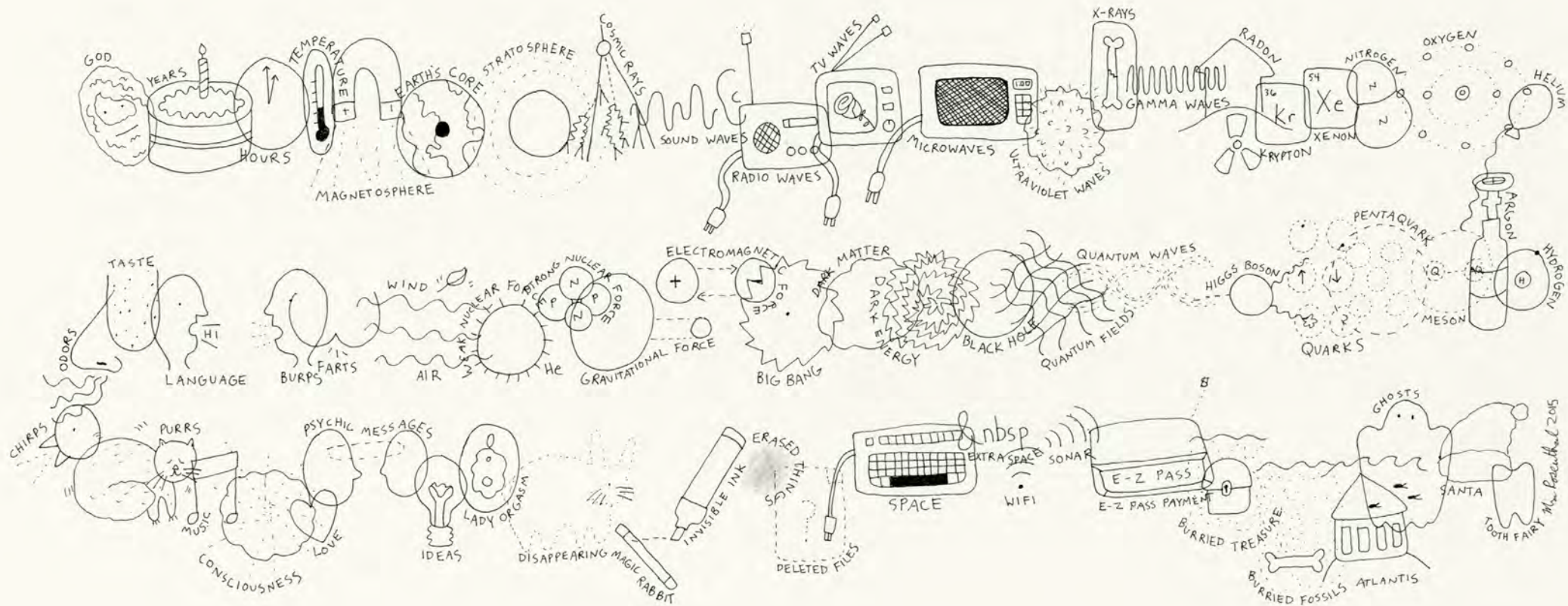




Google Portrait of Halton Arp (Peculiar Galaxies), 2015



*After Hubble Telescope: Einstein Ring, 2015  
< detail*



NOTES FROM THE PARTICLE AT THE END OF THE UNIVERSE BY SEAN CARROLL

1. PARTICLE PHYSICS HAS BECOME INSEPARABLE FROM COSMOLOGY AS AN INTELLECTUAL DISCIPLINE

PARTICLES: MATTER - ELECTRONS, QUARKS, MAKE UP ATOMS / FORCE - GRAVITY, ELECTROMAGNETISM, STRONG NUCLEAR FORCE, WEAK NUCLEAR FORCE / HIGGS

QUARKS → MAKE PROTONS + NEUTRONS → UP + DOWN QUARKS MAKE PROTONS AND NEUTRONS / ATOM

PHOTONS → PARTICLES OF LIGHT WITHOUT THE HIGGS BOSON PARTICLES SUCH AS THE ELECTRON WOULD HAVE 0 MASS AND MOVE AT THE SPEED OF LIGHT AND MANY ELEMENTARY PARTICLES WOULD APPEAR IDENTICAL TO EACH OTHER.

GRAVITONS → WHEN THE MOON FEELS THE GRAVITATIONAL PULL OF THE EARTH, WE CAN THINK OF GRAVITONS PASSING BACK AND FORTH BETWEEN THE 2 BODIES. / WHEN AN ELECTRON IS TRAPPED BY AN ATOMIC NUCLEUS, ITS BECAUSE PHOTONS ARE EXCHANGED BETWEEN THEM.

4 KINDS OF FORCES: GRAVITY - GRAVITON - EVERY PARTICLE ATTRACTS EVERY OTHER PARTICLE / ELECTROMAGNETISM - PHOTONS PARTICLES INTERACTING ARE CHARGED, EITHER + OR -, LIKE CHARGES REPEL, OPPOSITES ATTRACT, NEUTRAL CHARGES DON'T INTERACT. IF ELECTROMAGNETISM WERE UNIVERSALLY ATTRACTIVE, EVERY PARTICLE WOULD SIMPLY ATTRACT EVERY OTHER PARTICLE AND ALL THE MATTER IN THE UNIVERSE WOULD DO ITS BEST TO COLLAPSE INTO ONE GIANT BLACK HOLE / STRONG NUCLEAR FORCE - HOLDS QUARKS TOGETHER INSIDE PROTONS + NEUTRONS "GLUONS"

GLUONS ARE MASSLESS ATTRACTION BETWEEN 2 QUARKS, GROWS IN STRENGTH AS THEY ARE MOVED APART / WEAK NUCLEAR FORCE - SUCH AS SOLAR ENERGY, PROTONS CONVERT TO HELIUM, REQUIRES SOME PROTONS TURNING INTO NEUTRONS. 3 KINDS OF BOSONS CARRY WEAK FORCE: Z, W+, W-

QUANTUM FIELD THEORY - EVERYTHING IS MADE OF A COMBINATION OF FIELDS. PARTICLES ARE TINY VIBRATIONS IN THESE FIELDS. EVERY PARTICLE IN THE STANDARD MODEL IS A VIBRATING WAVE IN A PARTICULAR FIELD. PHOTONS THAT CARRY ELECTROMAGNETISM ARE VIBRATIONS IN THE ELECTROMAGNETIC FIELD / GRAVITONS ARE VIBRATIONS IN THE GRAVITATIONAL FIELD / GLUONS ARE VIBRATIONS IN THE GLUON FIELD / FERMIONS (MATTER PARTICLES) ARE VIBRATIONS IN AN UNDERLYING FIELD. ELECTRON FIELD → QUARK FIELD → FIELD FOR EVERY KIND OF PARTICLE, JUST LIKE SOUND WAVES PROPAGATE THROUGH AIR, VIBRATIONS PROPAGATE THROUGH QUANTUM FIELDS AND WE OBSERVE THEM AS PARTICLES. PARTICLES AREN'T LITTLE BALLS WITH UNIFORM DENSITY, THEY'RE QUANTUM WAVES

FIELD - HAS SOME VALUE AT EVERY POINT IN SPACE / PARTICLES ARE TINY VIBRATIONS IN THESE FIELDS / HIGGS FIELD - CONSTANT FIELD QUIETLY IN THE BACKGROUND, PROVIDING A MEDIUM THROUGH WHICH OTHER PARTICLES MOVE.

4 FORCES ARISE FROM SYMMETRIES. SYMMETRIES ARE SOMETIMES INVISIBLE TO US. 3 NIELS BOHR BOHR MODEL REFINED ERNST RUTHERFORD'S ATOMIC MODEL. BOHR SAID ELECTRONS ORBIT A NUCLEUS AT PARTICULAR DISTANCES, CAPTION HELIUM ATOM. DIRAC EQUATION - CONSEQUENCE WAS THAT EVERY PARTICLE HAS AN OPPOSITE, CALLED ITS ANTI-PARTICLE. ANDERSON DISCOVERED THE POSITRON, THE ANTI-PARTICLE OF THE ELECTRON. HE WAS STUDYING COSMIC RAYS, HIGH ENERGY PARTICLES THAT CRASH INTO EARTH'S ATMOSPHERE FROM SPACE + PRODUCE OTHER PARTICLES THAT EVENTUALLY REACH THE GROUND. ANDERSON MADE A CLOUD CHAMBER FILLED WITH GAS SUPER-SATURATED WITH WATER VAPOR. HE PUT THE CLOUD CHAMBER IN A POWERFUL MAGNET ON THE ROOF OF CALTECH. ANDERSON STUDIED PHOTOS OF THE ION TRACKS TRAVELING THROUGH LEAD AND DISCOVERED THE POSITRON.

6 FERMIONS: PROTON, NEUTRON, ELECTRON, ANTI-PROTON, ANTI-NEUTRON, POSITRON, WHEN NEUTRONS DECAY, THEY TURN INTO PROTONS, GLUONS AND WIZ BOSONS HAVE SPIN = 1 THE HIGGS IS A HEAVY PARTICLE AND HAVN'T BEEN SEEN DIRECTLY AS IT VERY RAPIDLY DECAYS INTO OTHER PARTICLES. MUON WHILE STUDYING COSMIC RAYS. MUON IS A NEGATIVELY CHARGED PARTICLE THAT IS HEAVIER THAN AN ELECTRON. IN THE 70S THE TAU PARTICLE WAS DISCOVERED, BUT EVEN HEAVIER. STANDARD MODEL LEPTONS → CHARGE: ELECTRON ○ MUON ○ TAU

QUANTUM MECHANICS SAYS ELECTRONS PERSIST IN CLOUDS OF PROBABILITY KNOWN AS WAVE FUNCTIONS IN AN ATOM. THE ELECTRONS ARE ATTRACTED TO THE NUCLEUS BY THE ELECTRO-MAGNETIC FORCE. ELECTONS ATTRACTED TO PROTONS + NEUTRONS "GLUONS"

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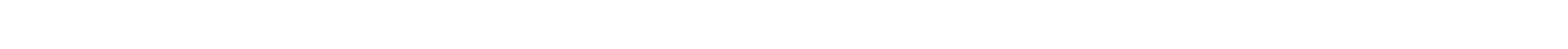
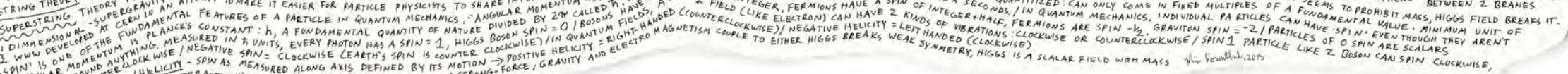
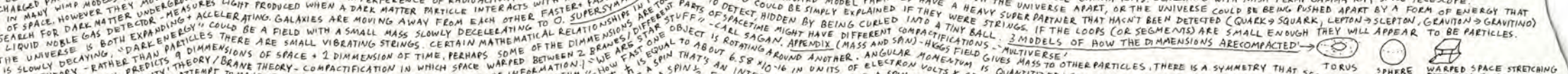
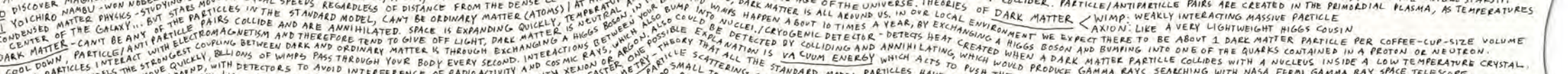
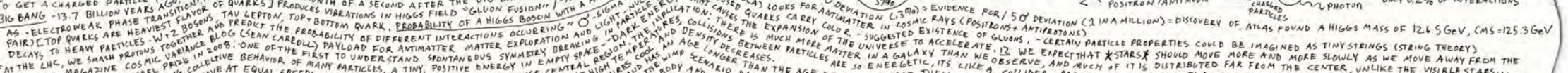
QUANTUM MECHANICS SAYS ELECTRONS PERSIST IN CLOUDS OF PROBABILITY KNOWN AS WAVE FUNCTIONS IN AN ATOM. THE ELECTRONS ARE ATTRACTED TO THE NUCLEUS BY THE ELECTRO-MAGNETIC FORCE. ELECTONS ATTRACTED TO PROTONS + NEUTRONS "GLUONS"

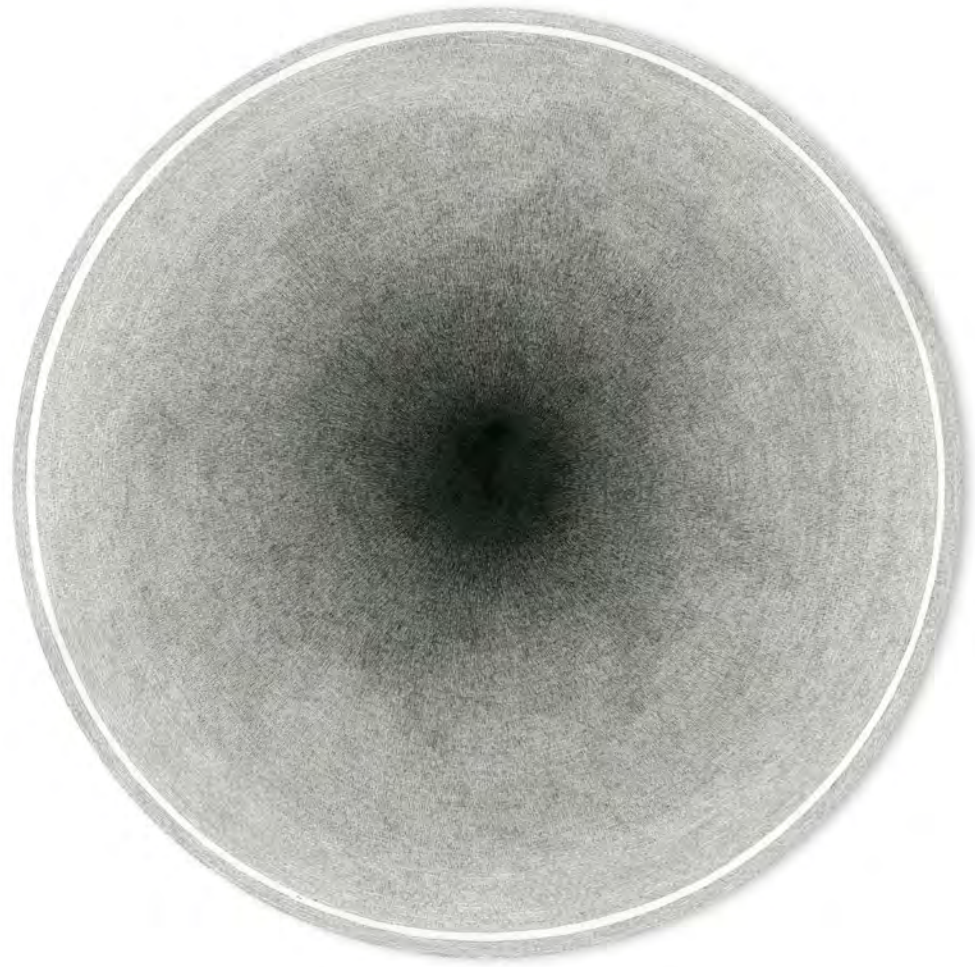
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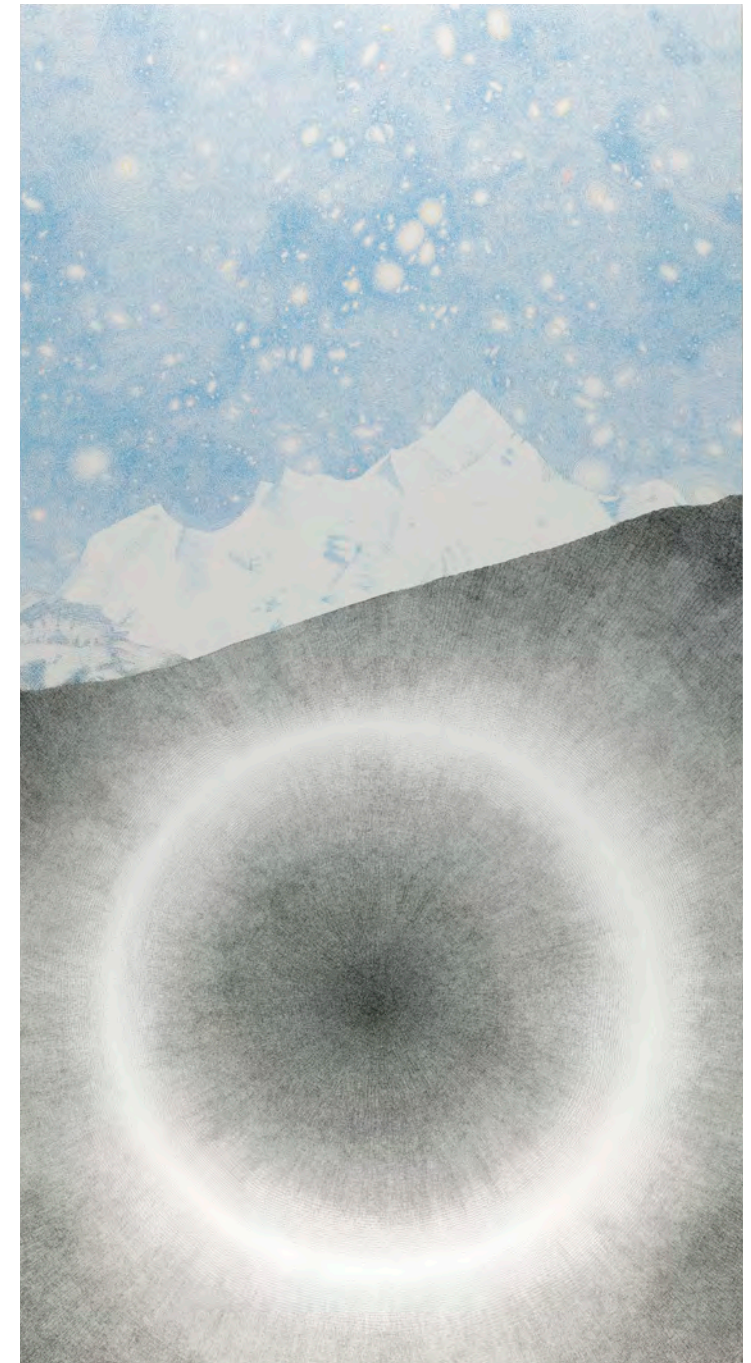
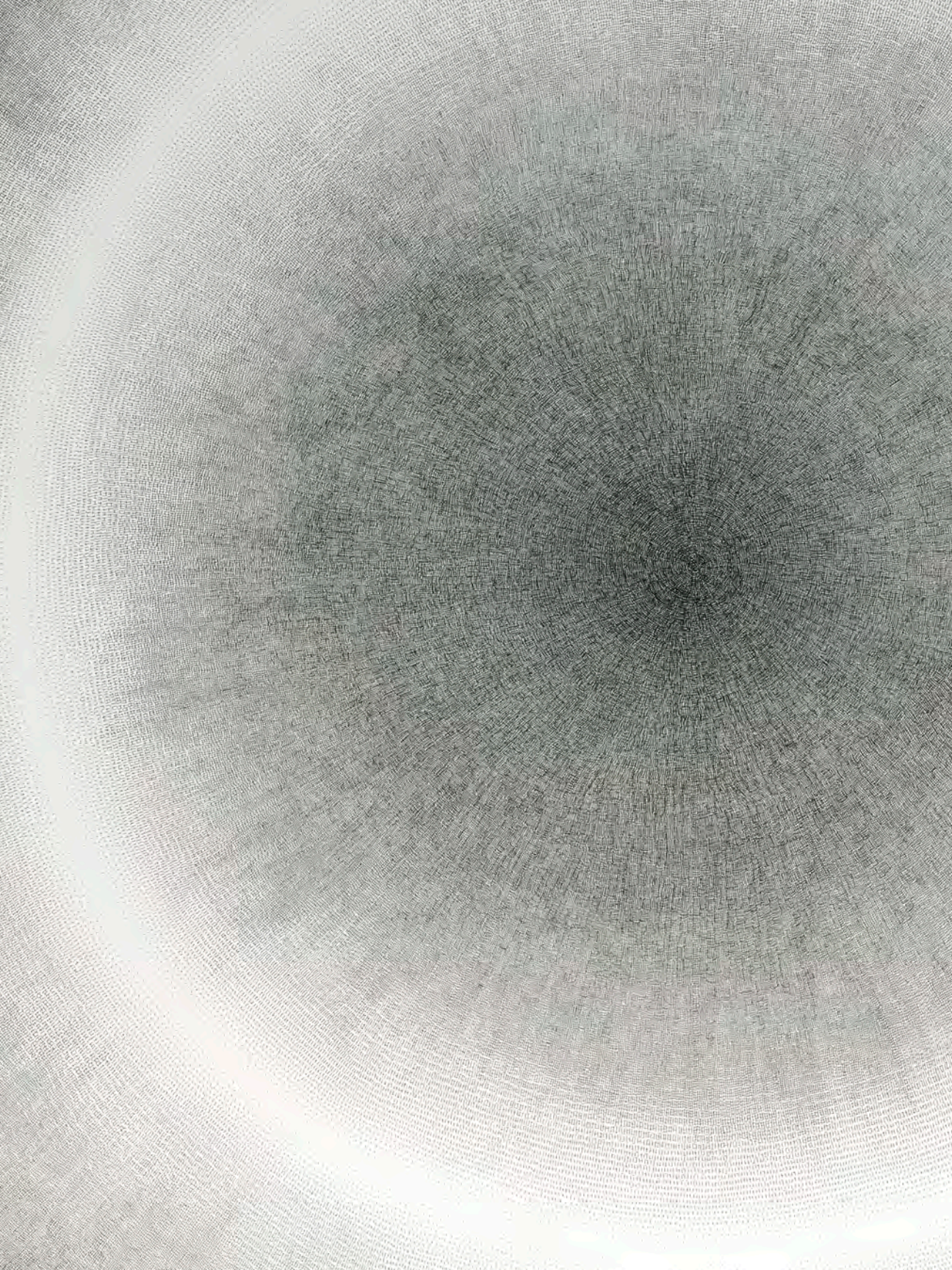
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*Accelerator, 2015*

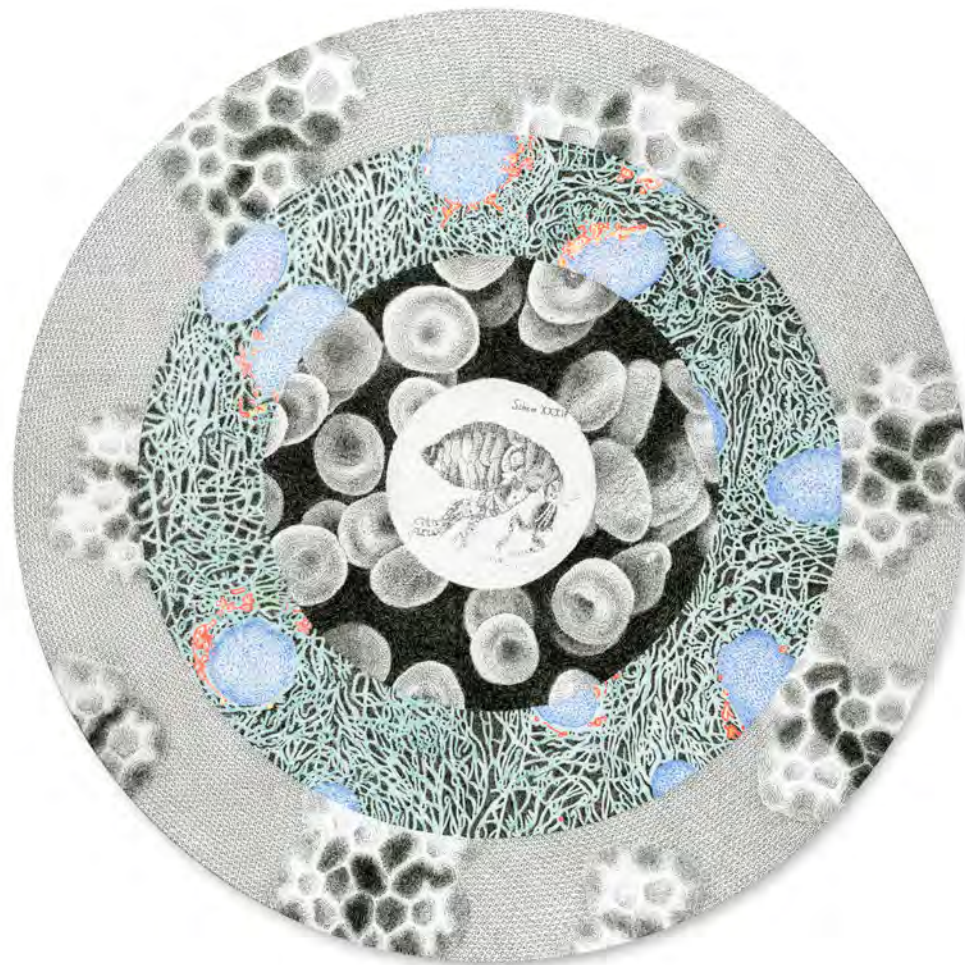
*Collider, 2015*



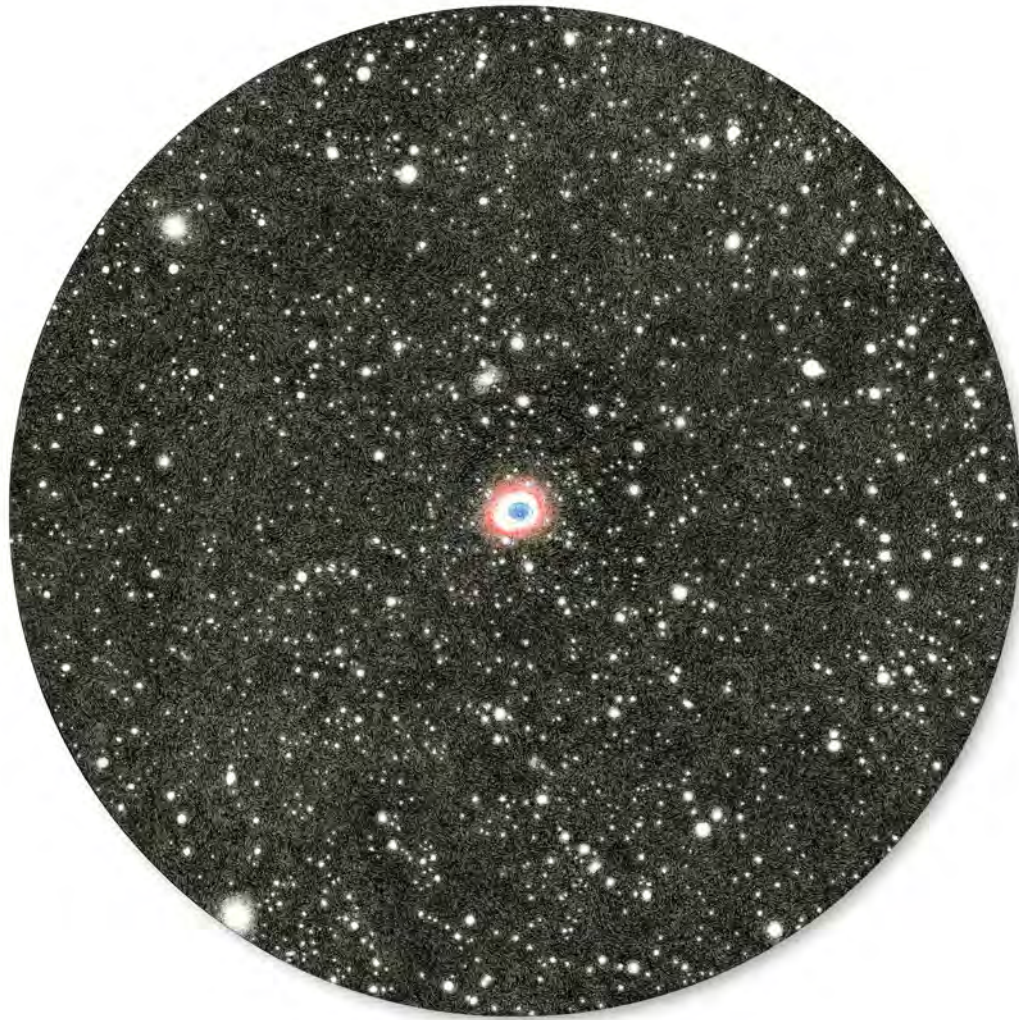
Mont Blanc, 2015  
< detail



Telescope, 2015



Microscope, 2015



*Helix Nebula*, 2015



*After Hubble Telescope: Tadpole Galaxy*, 2015

Next Page:  
*Azalea (Dark Matter)* [detail], 2015

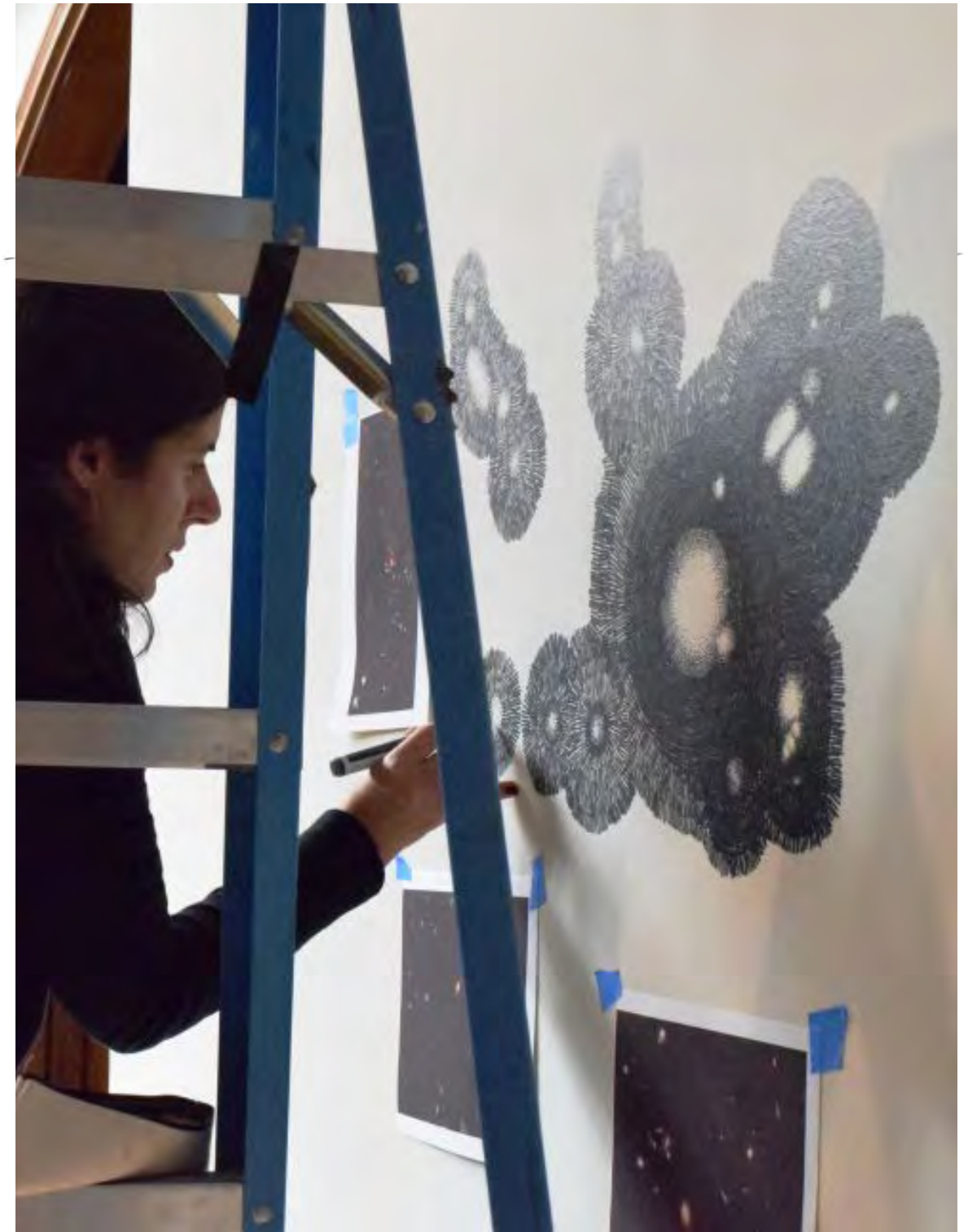




## WALL DRAWING

### *EXPANDING UNIVERSE*

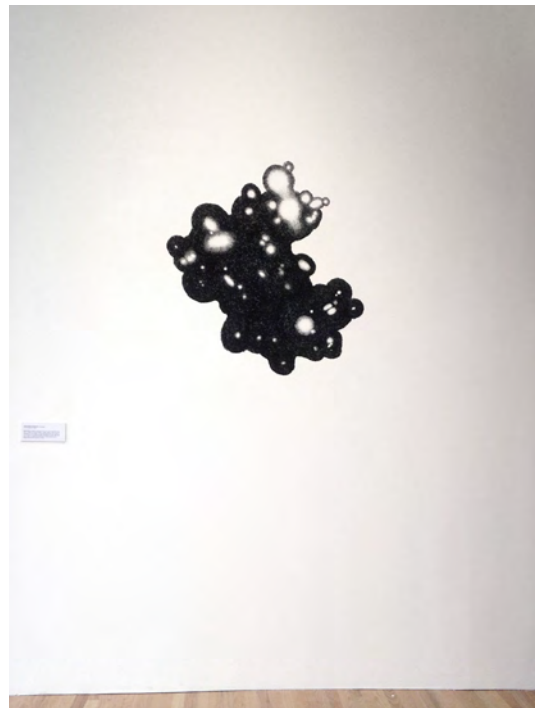
Over a period of five weeks, Rosenthal created a drawing directly on one of the walls in the Morris Gallery. The work was a continued meditation on the universe as observed by the Hubble Space Telescope. The process of making this drawing echoed the creation of the universe as put forth in the Big Bang Theory: from one single mark the drawing expanded exponentially over time.



*Expanding Universe* (day one)



*Expanding Universe (day two)*



*Expanding Universe (day three)*



*Expanding Universe (day six)*



*Expanding Universe (day nine)*



*Expanding Universe (day 11, complete)*

## LIST OF WORKS

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### Title Wall

*Google Portrait of Winslow Homer*, 2015

Ink on paper, 26 x 17 inches

Courtesy of the artist and Gallery Joe, Philadelphia

*Google Portrait of Eadweard Muybridge*, 2013

Ink on paper, 26 x 17 inches

Collection of John B. Pastore

### Morris Gallery

*Ultra Deep Field (Dark Matter)*, 2014

Ink on paper, 38 ½ x 38 ½ inches

Courtesy of the artist and Gallery Joe, Philadelphia

*Azalea (Dark Matter)*, 2015

Ink on paper, 39 x 39 inches

Collection of James E. O'Neill and David A. Rubin

*After Hubble Telescope: Einstein Ring*, 2015

Ink on paper mounted to panel, 24 inch diameter circle

Collection of Anne E. McCollum

*Nothing to See Here*, 2015

Ink on paper, 8 x 17 ¾ inches

Courtesy of the artist and Gallery Joe, Philadelphia

*Accelerator*, 2015

Ink on paper mounted to panel, 16 inch diameter circle

Collection of Joseph and Pamela Yohlin

*Collider*, 2015

Ink on paper mounted to panel, 16 inch diameter circle

Collection of James E. O'Neill and David A. Rubin

*Arp 147*, 2015

Ink on paper, 22 ¾ x 29 inches

Courtesy of the artist and Gallery Joe, Philadelphia

*Google Portrait of Halton Arp (Peculiar Galaxies)*, 2015

Ink on paper, 26 x 17 inches

Courtesy of the artist and Gallery Joe, Philadelphia

*Helix Nebula*, 2015

Ink on paper mounted to panel, 16 inch diameter circle

Collection of The Todd R. Paulson Family

*After Hubble Telescope: Omega Centauri*, 2015,

Ink on paper mounted to panel, 16 inch diameter circle

Private collection

*After Hubble Telescope: Tadpole Galaxy*, 2015

Ink on paper mounted to panel, 16 inch diameter circle

Collection of John B. Pastore

*Notes*, 2015

Ink on paper, 10 ¾ x 17 ¾ inches

Courtesy of the artist and Gallery Joe, Philadelphia

*Mont Blanc*, 2015

Ink on paper, 60 x 32 inches

Pennsylvania Academy of the Fine Arts, Philadelphia. Museum purchase, 2015.36.1

*Telescope*, 2015

Ink and gouache on paper mounted to panel, 16 inch diameter circle

Pennsylvania Academy of the Fine Arts, Philadelphia. Museum purchase, 2015.36.1

Artist's notes on *Telescope*:

Center image: Galileo's observation of the moon using a Galilean telescope.

First ring: photographic plate from the work of the "Harvard Observatory computers," a group of women who worked in the early 20th century to painstakingly record star brightness in the photographic slides at the Harvard Observatory.

Second ring: images from the discovery of Pluto as the 9th planet (downgraded to a dwarf planet in 2006).

Outer ring: Hubble Telescope image of the Ultra Deep Field.

*Microscope*, 2015

Ink on paper mounted to panel, 16 inch diameter circle

Courtesy of the artist and Gallery Joe, Philadelphia

Artist's notes on *Microscope*:

Center image: a flea from Robert Hooke's 1665 publication *Micrographia*.

First ring: blood cells taken with a scanning electron microscope.

Second ring: HeLa cells imaged using fluorescence microscopy (DNA appears as blue).

Outer ring: hydrogen bonds, captured with atomic force microscopy.

*Expanding Universe*, 2015

Acrylic on wall, 109 x 82 inches

Mia Rosenthal: Paper Lens

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Pennsylvania Academy of the Fine Arts  
Morris Gallery, Historic Landmark Building  
October 9, 2015 – January 3, 2016



PENNSYLVANIA ACADEMY  
OF THE FINE ARTS

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All artwork: © Mia Rosenthal

Front cover: *After Hubble Telescope: Omega Centauri*, 2015 (detail); Page 3: *Arp 147*, 2015 (detail); Back cover: *Accelerator*, 2015 (detail)