

Light as Interface

Antiquous Tools to Contemporary Art Innovation

Arts and Technology, Dr. George Legrady, Fall 2024

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Throughout history, humanity has sought to understand light not just as a physical phenomenon, but as an interface between consciousness and cosmos. This presentation spans from medieval scholars studying celestial light with astrolabes, through Renaissance investigations of optics, to today's artists using technology to reveal light's continuing mysteries.

Through two transformative Los Angeles exhibitions, we explore this enduring relationship with light. At the Getty's PST Art & Science exhibition 'LUMEN,' we examine how light has been studied, revered, and manipulated from ancient times through the Middle Ages. This historical lineage flows into Olafur Eliasson's 'Open' exhibition at MOCA, where contemporary interpretations through prisms, kaleidoscopes, and immersive installations demonstrate how ancient fascination with light continues to evolve through modern technology and artistic vision.

Together, these exhibitions reveal light's dual nature as both scientific phenomenon and source of wonder, serving as a bridge between the observable and the ineffable.

LUMEN

The Art and Science of Light: Ancient Observations The Intersection of Perception, Physics, and Philosophy

From the original medieval text, what captivates me as a multimedia researcher and sound artist is the profound early understanding of how material properties could transform our perception of reality. During the "long Middle Ages" (800-1600 CE), scholars across Islamic, Jewish, and Christian traditions weren't just studying light - they were investigating the fundamental nature of human perception and consciousness through it.

Consider their methodology: they manipulated gold, crystal, and glass to create "dazzling light-filled environments" - essentially early immersive installations that explored how physical materials could alter consciousness and create experiences that transcended ordinary perception. What's particularly relevant to my research is how these medieval scholars understood light as both a physical phenomenon and a gateway to understanding consciousness - they were early investigators of what we now explore through neurobiology and psychophysiology. Their natural philosophy united diverse cultures in studying how human perception interfaces with physical phenomena, creating an early version of the empirically-validated experiential paradigms we develop today.

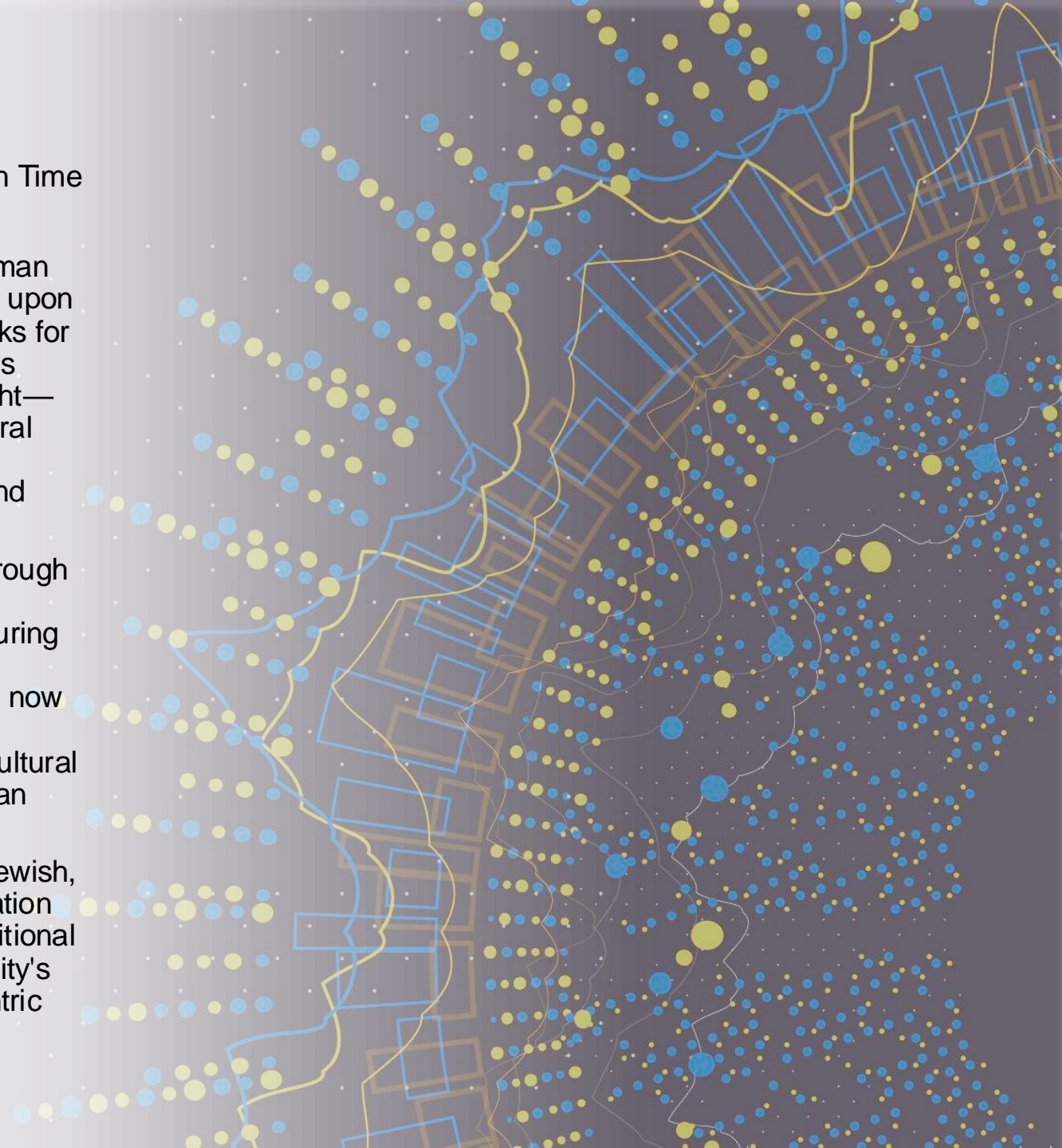
Just as they studied "the lights of the heavens and of the eye," investigating both cosmic and perceptual phenomena, we now explore self-similar geometric morphologies across quantum and cosmological scales. Their integration of science, poetics, and craft presaged our current synthesis of vibrational resonance theory, environmental frequencies, and neural oscillation patterns.

Their meticulous observations and material experiments weren't just creating beauty - they were laying the foundational principles of how we understand light's behavior today, starting a scientific journey that extends from medieval manuscripts straight through to modern photonics.

Astral Light

Light as Cosmic Interface: Understanding Celestial Networks Through Time

- The quest to understand light as a bridge between cosmic and human consciousness spans millennia. Ancient Greek philosophers, building upon Babylonian and Egyptian wisdom, developed sophisticated frameworks for interpreting celestial illumination patterns. During the Middle Ages, this understanding evolved into a complex system where astronomical light—particularly from the 'luminaries' (sun and moon)—served as a temporal interface, marking not just physical time but weaving together human consciousness with cosmic rhythms through religious observances and cultural practices.
- This knowledge system underwent a fascinating transformation through Islamic natural philosophers, who created an extensive network of observatories from Baghdad to Damascus, Tabriz, and Samarkand during the eighth and ninth centuries. These centers functioned as early laboratories for light study, where scholars engaged in what we might now recognize as an early form of cross-cultural data sharing and pattern analysis. Through dynamic translation networks extending into multicultural Iberia, this knowledge catalyzed a profound paradigm shift in European scientific thought.
- What's particularly compelling is how medieval scientists across Jewish, Muslim, and Christian traditions functioned as active agents of innovation rather than passive knowledge inheritors. Their work challenging traditional models ultimately contributed to a fundamental reimagining of humanity's position in the cosmos—shifting from an Earth-centered to a heliocentric understanding, an early example of how light observation catalyzes paradigm shifts in human consciousness.





Light as Ancient Technology: The Medieval Astrolabe

Light as Ancient Technology: The Medieval Astrolabe

Harnessing Light: The astrolabe as one of humanity's first precision instruments for measuring and understanding celestial light
Used the position of stars and sunlight to measure time within one degree of accuracy

Reflected the curved nature of light's path through the heavens

Cultural Significance: Light as a bridge between the scientific and the sacred

Celestial light serving as both timekeeper and spiritual guide

Golden materials chosen to reflect and honor the light they measured

Legacy: Represents one of humanity's first attempts to precisely measure and understand light from the heavens

Potential foundation for future light-based technologies and measurements

Tapestry of the Astrolabe:

Visualizing Medieval Cosmological Networks

Tournai, Flanders Belgium, about 1400-1450 CE

Wool and Silk

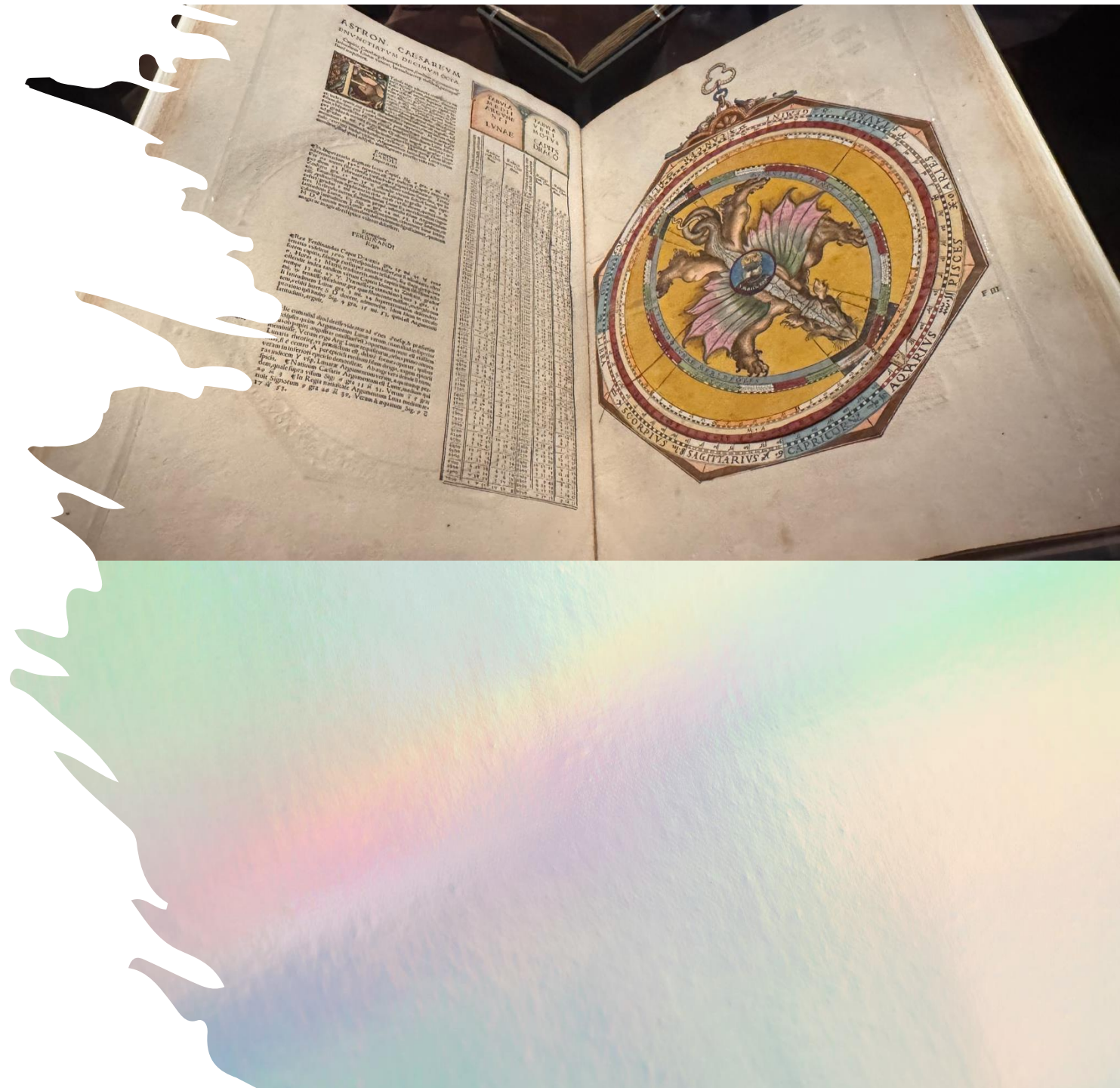
- This 15th-century tapestry from Flanders represents an early visualization of interconnected cosmic consciousness. The piece illustrates a fascinating convergence of divine and scientific understanding, where God appears as the 'prime mover'—an original source of light and cosmic motion—interfacing with the mechanical precision of the astrolabe's star mapping system.
- The composition creates a hierarchical network linking celestial mechanics with human knowledge systems: Philosophy sits centrally enthroned, surrounded by Geometry, Arithmetic, and Astronomy (Astrologia), while figures like Virgil and Hipparchus represent the bridging of poetic and scientific understanding. The astrolabe's rete (pierced movable plate) becomes a metaphorical interface between divine illumination and human comprehension.
- By 1500, this tapestry adorned Toledo's cathedral—a nexus of scientific and spiritual inquiry known for astrolabe craftsmanship. The presence of multiple such tapestries in this space suggests an early understanding of how scientific instrumentation could serve as a powerful metaphor for cosmic interconnectedness, bridging divine architecture with human observation systems.



[Link to this video](#)

Astronomicum Caesareum: A Renaissance Light Computer

- Peter Apian's 1540 masterwork synthesized Arabic astronomical precision with European mechanical innovation through an intricate computational system. The Dragon Volvelle—an analog calculator featuring interchangeable golden discs—transformed abstract celestial mathematics into manipulable data, achieving accuracy within one degree for lunar calculations and eclipse predictions.
- This precision instrument merged artistic and scientific paradigms: microscopic gear mechanisms layered beneath detailed illuminations, while mathematical tables interfaced with mythological symbolism. The dragon motif, derived from lunar node calculations, encoded complex orbital mechanics into visual algorithms.
- Commissioned for Emperor Charles V's court, the device served multiple functions across disciplines. Its capacity to predict celestial phenomena informed medical chronobiology, military strategy, and astronomical research. The computational tables automated calculations previously requiring hours of mathematical work, while maintaining unprecedented precision.
- The manuscript represents an early emergence of human-machine interfaces for processing celestial data. Its legacy connects to modern scientific visualization technologies, demonstrating a consistent thread in humanity's development of tools to comprehend cosmic mechanics



On the Construction of the World

From *Book of Divine Works (Liber divinorum operum)*

Hildegard of Bingen 1210-40 CE

Tempera, gold, and ink on parchment

- The text we're looking at is from "Book of Divine Works (Liber divinorum operum)" and there are two key dates to distinguish:
 - Hildegard of Bingen's lifetime: 1098-1179 CE
 - This particular manuscript: "about 1210-40 CE"
- This timing tells us something important: while Hildegard was the original author of the work, this specific manuscript was created approximately 30-60 years after her death. It's from Rupertsberg, Rhineland, Germany, and is a copy of her original work, made using tempera, gold, and ink on parchment.
- The museum label specifies this is from the Biblioteca Statale di Lucca, Ministero della Cultura, BS-Lu. Ms. 1942, fol. 9.
- What's particularly interesting is that while this is a later copy, it still maintains Hildegard's unique fusion of scientific and spiritual understanding. The label emphasizes how she communed with the "living light" (*lux vivens*) while using the language of science and cosmology. This manuscript demonstrates how her work continued to be studied and copied due to its importance in understanding both divine and natural phenomena



Text from “The Construction of the World”

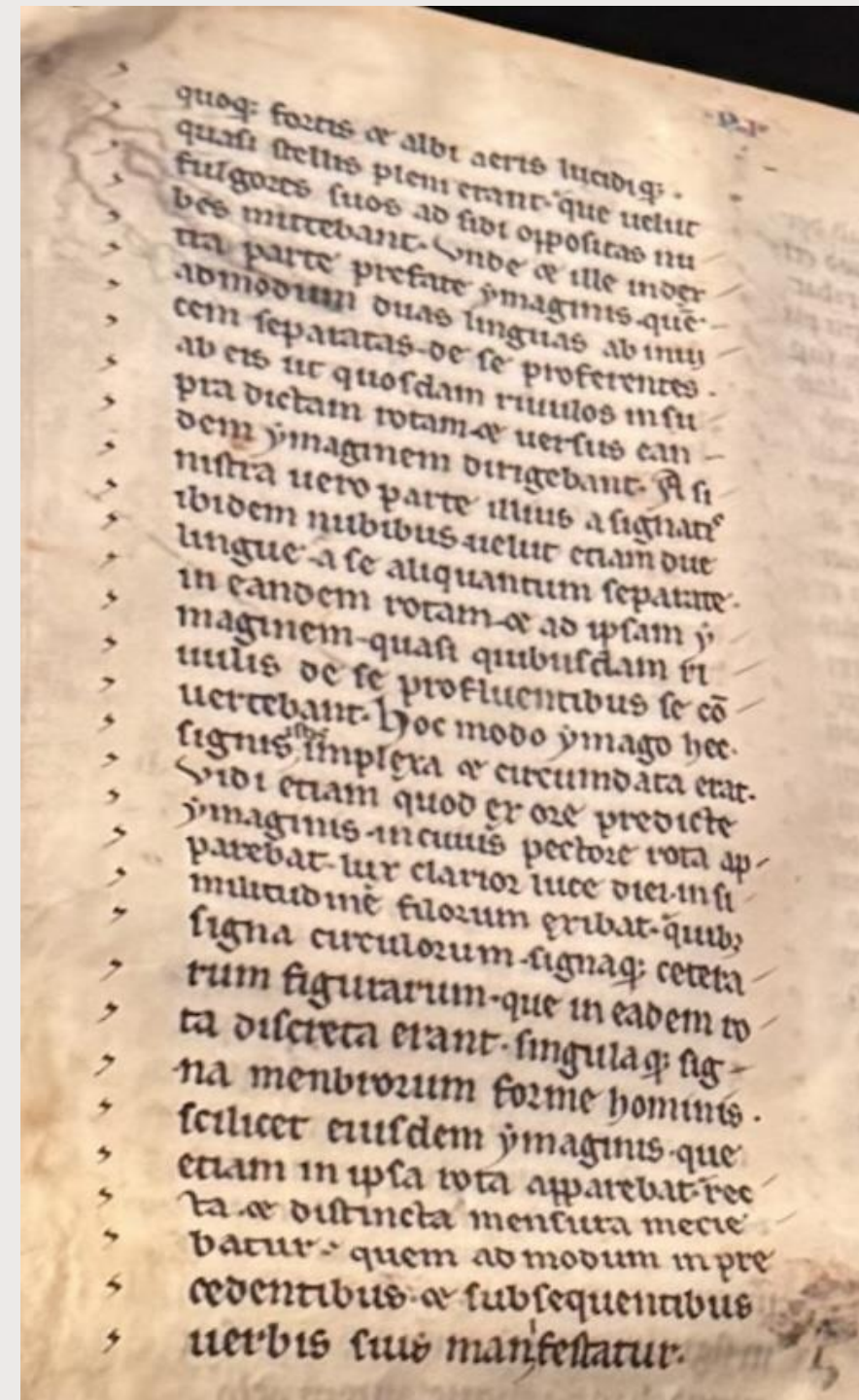
from *Book of Divine Works (Liber divinorum operum)*

- Hildegard of Bingen 1210-40 CE

Latin | English Translation

- | quae fontis et alius aeris lucidus | which [comes from] the source and other luminous air |
- | quae deitis plenitudine que reuerti | which returns with divine fullness |
- | fulcores suos ad sibi oppositas nu | their brightness towards the opposing clouds |
- | bes mittebant unde in ille moti | clouds sent forth, from where in that motion |
- | tri parte preter ymaginis omnis | three parts beyond all images |
- | cemmodum duas linguas ab inui | perceiving[?] two tongues from mutual |
- | cem separatas de te proferentes | separate parts speaking of you |
- | ab eis ut quosdam puncta insi | from these as certain points [?] |
- | pia dictam totam et uersus ean | speaking the whole and towards the same |
- | dem ymaginem dirigebant A si | image they directed. From the left |
- | nistra uero parte unius a signis | truly from one part by signs |
- | inde nubibus similar etiam duc | thence from clouds similarly also led |
- | tum que a se aliquantum separate | and somewhat separated from itself |
- | in eandem totam et ad ipsam y | into the same whole and towards the image |
- | maginem quasi quibusdam fi | image as if by certain [?] |
- | tulis de se profluentibus se co | tubes[?] flowing forth from itself |
- | uertebant hec quoque ymago hec | this image also turned itself, this |
- | signis impleta et circumdata erat | was filled with signs and surrounded |
- | uidi etiam quod ex ore predictae | I saw also that from the mentioned mouth |
- | ymago manus per die tota ap | the image of hands through the day completely |
- | parebat tur uario luce uidi infi | appeared varied by light, I saw infinite[?] |
- | multitudine filorum expube quib | multitude of threads[?] [?] |
- | signa circulorum imag certia | signs of circles, certain images |
- | tum figurarum que in eadem to | and of figures which in the same whole |
- | ta distincta erant singulas sig | were distinct individual signs |
- | na membrorum forme hominis | signs of the form of human members |
- | scilicet eiusdem ymaginis que | namely of the same image which |
- | etiam in ipsa tota appareba | also in itself wholly appeared |
- | ta et distincta mensura mete | measured by distinct measure |
- | batur quem ad modum in pre | as in the manner of those |
- | cedentibus et subsequentibus | preceding and following |
- | uerbis tuis manifestatur | is manifested in your words |

Note: [?] indicates uncertain translation
(translation attempt by Claude.ai)



Key Themes in Hildegard's Light Studies:

- Pioneered the concept of "living light" (lux vivens) as both divine manifestation and natural phenomenon
- Developed systematic observations of light's interaction with natural elements (clouds, air, celestial bodies)
- Created detailed documentation of how light manifests in geometric patterns and forms
- Established connections between cosmic light and earthly phenomena through careful observation
- Influenced medieval understanding of light's dual nature as both physical and metaphysical
- Historical Significance for Light Studies:
 - Manuscript's preservation and copying shows enduring importance of her light theories
 - Use of tempera, gold, and ink demonstrates medieval techniques for representing light in manuscripts
 - Text reveals sophisticated 12th-century understanding of light's properties and behaviors
 - Shows early attempts to reconcile observable light phenomena with theoretical frameworks
 - Documents transition from purely religious to proto-scientific understanding of light
- Modern Relevance:
 - Bridges gap between ancient celestial observation and modern light studies
 - Demonstrates early understanding of light as both wave and particle-like phenomena
 - Shows historical roots of interdisciplinary approaches to studying light
 - Provides foundation for understanding how light observation evolved into modern scientific inquiry

Armillary Sphere with a Handle (c. 1500 CE):

Early Three-Dimensional Light Studies

Wood and brass construction

Unknown place of origin, circa 1500 CE

Historical Context: This medieval instrument represents one of humanity's earliest attempts to model celestial light movements through three-dimensional geometric forms. The concentric rings depict planetary paths, demonstrating how medieval scholars translated astronomical observations into physical models.

Technical Significance:

- Demonstrates early understanding of spherical geometry in astronomical observation
- Uses concentric rings to map celestial bodies' movements
- Prefigures modern geometric approaches to light study and visualization

This context provides a historical foundation for understanding later light installations like Eliasson's geometric works, showing how artists and scientists have long used three-dimensional forms to understand and represent light's behavior.



[Link to a short video to see this from different angles](#)

"The Author, Holding an Armillary Sphere, Dictates to a Scribe"

From *The Image of the World* (*L'image du monde*)

Manuscript Details:

Created in Paris, circa 1320 CE

Author: Gossuin de Metz (French, active 1200s)

Medium: Tempera, gold, and ink on parchment

Source: Bibliothèque nationale de France, Département des Manuscrits, Paris

Ms. Fr. 574, fol. 1

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The manuscript presents a remarkable fusion of roles: its author, though primarily a French priest and poet, is depicted as an astronomer and educator. The illumination shows him wielding an armillary sphere—a three-dimensional model representing the cosmos—while gesturing toward astronomical instruments (an astrolabe and quadrant) placed before him. This scene captures the moment of dictation of his encyclopedic poem, which ambitiously encompasses:

- The nature of God
- The seven liberal arts
- Geographic knowledge
- Medieval cosmology



Algamest: Mathematical Foundations of Light and Motion

Claudius Ptolemy (Alexandrian, about 100-170 CE)



Almagest: Mapping Celestial Light Through Geometry

Claudius Ptolemy (Alexandrian, about 100-170 CE)

Historical Development and Context:

Originally "Mathematike Syntaxis" in Greek (Alexandria, Egypt)

This version: Paris scientific miscellany (1309-16 CE)

Artwork: Meliacin Master (French, d. 1312)

Medium: Tempera, gold, and ink on parchment

Technical Mathematical Foundation:

- First comprehensive mathematical model of celestial movement
- Introduced revolutionary "chord function" (precursor to sine)
- Advanced Aristotle's spherical universe concept
- Created mathematical tables for planetary positions
- Developed spherical trigonometry for astronomical calculations
- Established coordinate systems for mapping celestial bodies
- Invented eccentric deferent and epicycle system

The Nested Spheres of the Cosmos: Visualizing Medieval Light Theory

From Aristotle's "On the Heavens,"
translated by Nicole Oresme, 1410 CE



Analysis of The Nested Spheres of the Cosmos

From Aristotle's "On the Heavens," translated by Nicole Oresme, 1410 CE

Revolutionary Visual Theory:

- First French translation that challenged traditional celestial mechanics
- Innovative use of blue pigment and gold leaf to represent light's movement
- Depicts spheres curving upward toward divine light source
- Shows early understanding of light's geometric propagation

Technical Advancement:

- Seven planetary spheres precisely labeled in ascending order
- Demonstrates medieval understanding of celestial light diffusion
- Combines astronomical observation with geometric representation
- Uses concentric circles to show light's graduated transmission
- Integrates Islamic astronomical knowledge with European traditions

Historical Bridge:

- Links Greek philosophical concepts to medieval scientific observation
- Connects to earlier armillary sphere models and astrolabes
- Prefigures later Renaissance understanding of optics
- Shows evolution from abstract theory to mathematical modeling

Significance for Light Studies:

- Represents early attempt to map light's celestial pathways
- Shows understanding of light as both physical and divine phenomenon
- Demonstrates geometric approach to understanding light's behavior
- Creates foundation for later scientific light theory
- Combines observational data with theoretical models

Light and Vision

Ancient Debates to Modern Understanding



THE LATIN WORD 'LUMEN' CARRIES MULTIPLE MEANINGS - FROM PHYSICAL LIGHT EMANATING FROM THE SUN OR LAMP, TO THE SUBSTANCE OF LIGHT ITSELF, INCLUDING ITS COLOR, TO THE "LIGHT OF THE EYE" - THE POWER OF SIGHT. IN THE ANCIENT WORLD, ILLUMINATION CAME FROM LAMPS, FIRE, AND CELESTIAL BODIES LIKE THE SUN AND MOON, LEADING TO COMPETING THEORIES ABOUT LIGHT AND VISION INHERITED FROM GREECE AND ROME.



MECHANICS AND METAPHOR OF VISION: IN THE MEDIEVAL WORLD, UNDERSTANDING VISION MERGED PHYSICAL STUDY WITH DIAGRAMMATIC MODELING OF LIGHT'S BEHAVIOR. DEBATES CENTERED ON WHETHER LIGHT WAS PRODUCED THROUGH EXTRAMISSIION OR INTROMISSION. THESE STUDIES OF NATURAL PHENOMENA LED TO PRACTICAL INNOVATIONS LIKE READING SPECTACLES, WHILE OPTICAL SCIENCE INFORMED THEOLOGICAL CONCEPTS ACROSS JEWISH, MUSLIM, AND CHRISTIAN TRADITIONS.



FOR MEDIEVAL VIEWERS, SIGHT WAS FUNDAMENTAL TO KNOWLEDGE AND COGNITION. VISION REQUIRED PROLONGED MEDITATION AND "ATTENTIVE EYES." THROUGH STUDYING RELIEF SCULPTURES, ROCK-CRYSTAL RELIQUARIES, PAINTINGS, AND GLASS, VIEWERS COULD TRANSCEND NORMAL SIGHT TO ACHIEVE A SECOND ORDER OF INNER, SPIRITUAL "VISION."



COMPETING THEORIES: TWO MAIN THEORIES DOMINATED ANCIENT AND MEDIEVAL UNDERSTANDING



EXTRAMISSIION: PROPOSED BY PLATO, SUGGESTING THAT RAYS RADIATED FROM THE EYE TOWARD OBJECTS
INTROMISSION: FIRST POSED BY EMPEDOCLES, ARGUING THAT FORMS MOVED FROM OBJECTS THROUGH THE AIR INTO THE EYE



THESE COMPETING THEORIES SHAPED UNDERSTANDING OF LIGHT'S PROPERTIES FOR CENTURIES, LAYING GROUNDWORK FOR MODERN OPTICAL SCIENCE

Horologium Nocturnum:

Measuring Sacred Time Through Starlight

Circa 1175-1200 CE, Northern France/England

On this richly illuminated page from an astronomical compendium, a monk demonstrates the use of Pacificus's Horologium Nocturnum, or "night clock" - an ingenious instrument that merged celestial observation with timekeeping. This device represents a fascinating intersection of medieval astronomy, religious devotion, and maritime navigation.

The instrument consisted of a sighting tube with concentric, movable plates that tracked the polestar's position relative to the "guard stars" (circumpolar stars that never set below the horizon). By measuring these celestial angles after sunset, users could determine nighttime hours with remarkable precision.

The Horologium Nocturnum's innovative fusion of celestial observation and timekeeping foreshadows many of our modern technologies. Just as medieval monks used this instrument to read starlight for temporal guidance, today's GPS satellites and atomic clocks continue this tradition of celestial navigation and precise timekeeping. The instrument's fundamental concept – measuring light to track time and position – resonates in contemporary light-based art installations, particularly in works like those featured in Olafur Eliasson's immersive environments at MOCA. These modern artists, like their medieval predecessors, transform light into a tool for measuring and understanding our place in the cosmos, though now through digital sensors, LED arrays, and sophisticated optical systems rather than simple sighting tubes. The Horologium Nocturnum thus stands as an early example of humanity's enduring drive to harness light as both a practical tool and a medium for understanding our relationship with the universe.



The Visual Pyramid:

Ancient Understanding of Sight and Measurement

From Vitruvius's "Ten Books on Architecture"

(De architectura libri dece), 1521 CE

Translated by Cesare Cesariano (Italian, 1475-1543 CE)

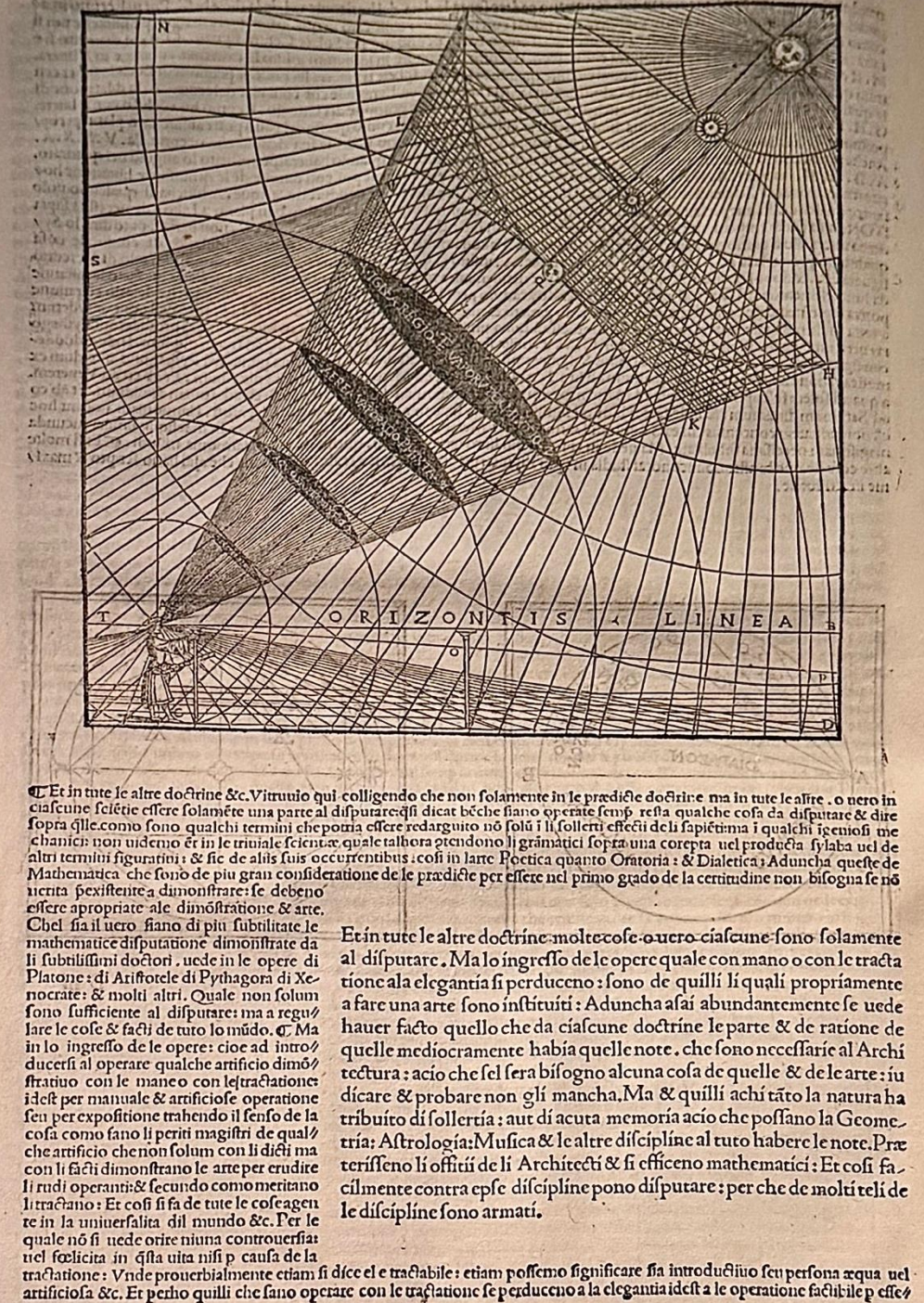
This diagram illustrates one of antiquity's most influential theories about the nature of vision and its practical applications in architecture. The image shows an intricate geometric construction demonstrating how light rays converge in the human eye, forming what Euclid described as a "cone" or "pyramid" of vision. Using a geographer's cross-staff, architects could apply this understanding to measure distances through mathematical calculations.

The diagram features:

- Precise linear rays emanating from a central point
- A complex grid system showing the geometric relationship between eye and object
- The "HORIZONTIS LINEA" (horizon line) marking the boundary of vision
- Careful integration of mathematical principles with practical measurement

Contemporary Resonance

This ancient understanding of visual rays and geometric perspective continues to influence modern optical science and architectural practice. The concept of the visual pyramid laid the groundwork for Renaissance perspective drawing and remains relevant in today's computational modeling and digital imaging technologies. Its principles echo in contemporary light art installations, where artists such as Olafur Eliasson manipulate similar concepts of converging light rays and viewer perspective to create immersive experiences.



The Medieval Eye: A Microcosm of the Universe

Diagram of the Seven Tunics and Three Humors of the Eye and the Skull

From *The Book of Macharia on the Eye Called Salaracer* (1375-1425 CE)

This manuscript presents a sophisticated understanding of ocular anatomy through a cosmological lens. The diagram depicts the eye as a series of concentric spheres, mirroring medieval beliefs about the structure of the universe itself.

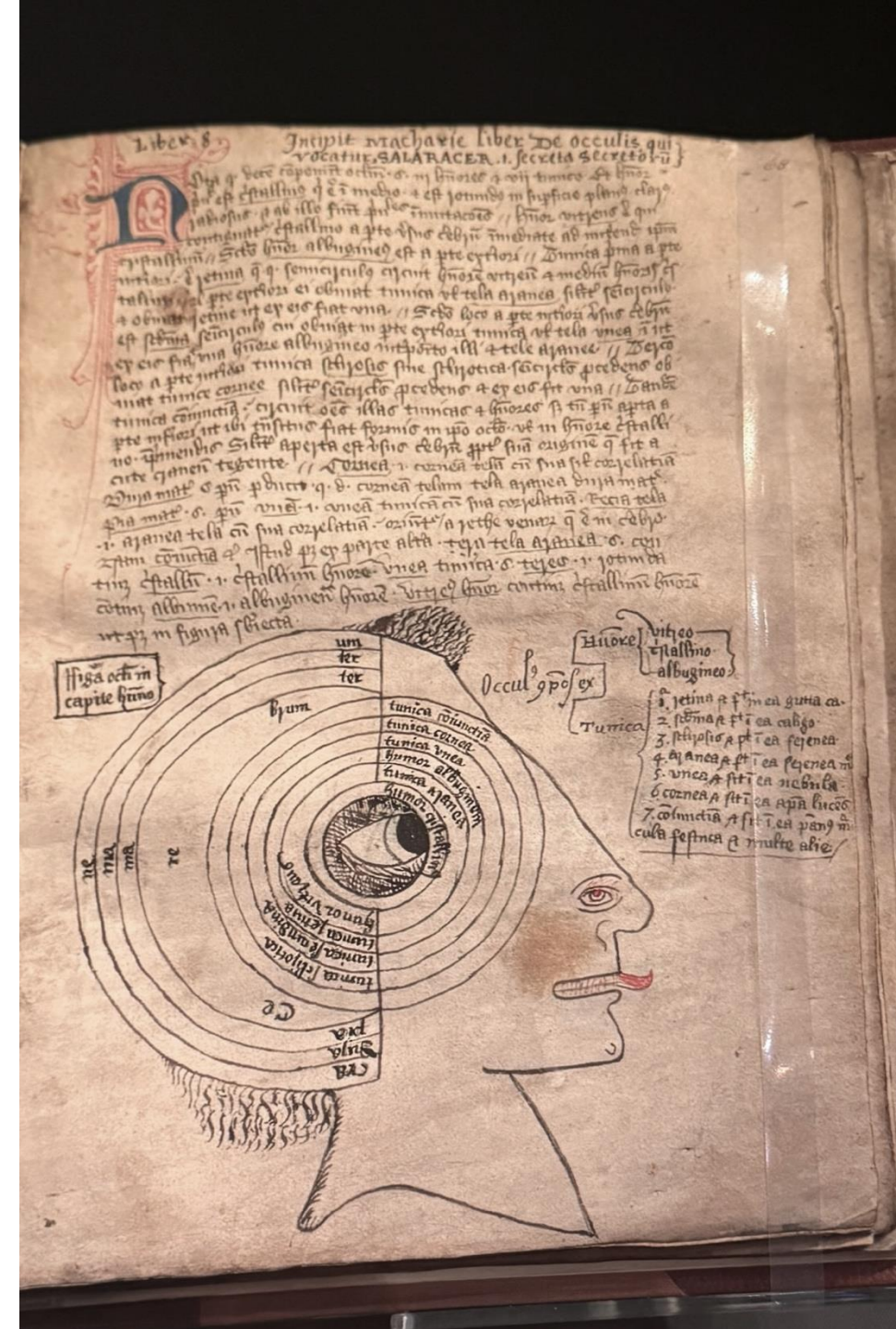
- Seven "tunics" (layers) of the eye arranged in concentric circles
- Three "humors" surrounding the lens, considered the primary organ of sight
- Detailed Latin annotations explaining each layer's function
- A profile view showing the eye's position within the skull

Significance

This visualization represents a pivotal moment in medieval understanding where medical knowledge merged with astronomical concepts. Just as scholars conceived of the cosmos as nested celestial spheres, they viewed the human eye as a miniature version of this divine architecture. This parallel between microcosm and macrocosm reflects the medieval belief in the interconnectedness of human perception and universal order.

Contemporary Connection

The medieval concept of the eye as a complex system of layered spheres anticipates modern optical science while adding an artistic dimension that resonates with contemporary light artists' work. Like these medieval scholars, today's artists in the LUMEN exhibition explore how the mechanics of vision can reveal deeper truths about our relationship with the universe.



Medieval Theories of Light and Vision: A Convergence of Science and the Sacred

Summary

The medieval understanding of light and vision represents a fascinating intersection of scientific inquiry, philosophical debate, and spiritual meaning.

These exhibition panels reveal three key aspects of medieval optical theory:

- 1) The fundamental connection between mechanics and metaphor in understanding vision
- 2) The rich etymological and practical meanings of "lumen" (light) in medieval thought
- 3) The competing theories of extramission versus intromission in explaining how sight works

Central Ideas

- Medieval scholars bridged practical observation with spiritual insight
- Vision was considered both a physical process and a gateway to divine knowledge
- The debate between whether light rays exited or entered the eye shaped optical understanding
- Cross-cultural exchange of optical and medical knowledge advanced the field
- Artists applied these theories to create works that would "catch the eye" and "materialize the divine"

Contemporary Connection

This medieval understanding of light and vision as both physical and metaphysical phenomena resonates with our upcoming exploration of contemporary light art. Like their medieval predecessors, modern artists such as Olafur Eliasson continue to explore how light shapes both our physical perception and spiritual experience of space.

Olafur Eliasson

OPEN

On view through July 6, 2025



ART &
SCIENCE
COLLIDE

Presented by
Getty

Olafur Eliasson at MOCA

(b. 1967, Copenhagen, Denmark; lives in Berlin)

OPEN Exhibition, The Geffen Contemporary at MOCA, Los Angeles

From Medieval Optics to Modern Perception

Bridging medieval vision and contemporary light (in this research project and presentation):

Just as medieval scholars explored the nature of light through intricate diagrams and instruments, Olafur Eliasson's work transforms MOCA's industrial spaces into laboratories of visual perception. His exhibition OPEN continues humanity's enduring fascination with light, color, and vision that we've traced through medieval manuscripts and instruments.

Exhibition Highlights

- Commissioned installations that investigate light and color
- Interactive experiences exploring perception and physics
- Optical devices that transform architectural space
- Works responding to Los Angeles' unique atmospheric conditions

Contemporary Resonance

Eliasson's practice mirrors medieval investigations in surprising ways:

- Like the medieval "tunics" of the eye, his works reveal layers of visual perception
- Where medieval scholars used instruments to measure celestial light, Eliasson creates devices that refract and reframe our environment
- His exploration of "the chromatic spectrum of visible light" echoes medieval debates about the nature of vision and light's behavior

- Eliasson's entire exhibit which is titled "Open" masterfully culminates our exploration of humanity's relationship with light, while pushing into new territory. Where medieval scholars used instruments to observe celestial phenomena, Eliasson creates immersive experiences that turn the entire museum into a viewing device. His rainbow installation perfectly demonstrates this approach: using prisms and light to reveal what nature typically conceals - the full circular geometry of the rainbow.
- What makes this exhibition extraordinary is Eliasson's research-based methodology that merges art with scientific inquiry. He's not seeking definitive answers but rather creating spaces for exploration and expanded perception. As he states, each artwork "opens up new ways of perceiving the world," inviting viewers to question their relationship with phenomena both intimate and vast - from the behavior of light to the atmosphere above us. This makes the exhibition both a culmination of historical light studies and a laboratory for future consciousness, where art becomes a tool for understanding ourselves and our place within larger systems.
- The exhibition is actively investigating how we perceive, understand, and relate to our world. In doing so, it bridges centuries of light study while opening new pathways for environmental awareness and perceptual expansion.

TO FACING MY NUMBNESS?
 TO VULNERABILITY?
 TO RECEIVING A NO?
 TO OTHERS' PERSPECTIVES?
 TO SLOWNESS?
 TO ENGAGING FULLY WITH MY SENSES?

AM I OPEN

TO EXPLORE WHERE I PLACE MY ATTENTION?
 TO FIERCE TENDERNESS?
 TO ASKING "WHY" INSTEAD OF "HOW"?
 TO RELAXING MY ATTACHMENT TO OUTCOME?
 TO WONDER?
 TO SHARING? (OUR PLANET)

A large, vibrant rainbow arches across a dark gallery space. The rainbow is composed of distinct bands of color: red, orange, yellow, green, cyan, and blue. The background is a plain, light-colored wall. In the foreground, the silhouettes of several people are visible, walking through the gallery. The overall atmosphere is one of wonder and artistic exploration.

Open

Olafur Eliasson (2024)
Remaking the Rainbow

In this groundbreaking installation, Eliasson transforms a fundamental natural phenomenon into an artistic meditation on light and perception. Within a darkened exhibition space, he creates an artificial rainbow using the simple elements of bright white light and a prism. While natural rainbows appear as arcs due to the Earth's horizon, Eliasson's installation reveals the rainbow's true geometric nature as a complete circle (though partially obscured by the gallery floor).

The piece creates a compelling dialogue between natural and artificial phenomena: where natural rainbows emerge from sunlight striking water droplets at precise angles, Eliasson's version deconstructs this process through prismatic refraction, displaying the full spectrum of visible light—red, orange, yellow, green, cyan, and blue.

This work exemplifies Eliasson's broader artistic investigation into color phenomena and perception. His statement that "color does not exist in itself but only when looked at" connects directly to medieval theories of vision and light, while offering a contemporary perspective on how color exists as an interaction between light, surface, and observer.

Device for seeing potential solar futures

Olafur Eliasson (2024): Kaleidoscopic Vision of Space and Light

Technical Analysis

This installation ingeniously merges historical optical principles with contemporary environmental commentary through:

- A hexagonal kaleidoscope structure (741 x 442 x 388 cm)
- Six upward-tapering mirrors creating infinite reflections
- Mono-frequency yellow light that transforms visual perception
- Mechanical systems incorporating fans and air circulation
- Mixed media: stainless steel, aluminum, mirror foil, and floating debris

Conceptual Bridges

The work creates fascinating parallels with historical understanding of light:

- Like ancient astronomical instruments, it creates a device for observing celestial phenomena
- Echoes the medieval concentric spheres seen in eye diagrams
- Uses Renaissance principles of perspective and optical manipulation
- Creates an immersive color experience that demonstrates theories of visual adaptation

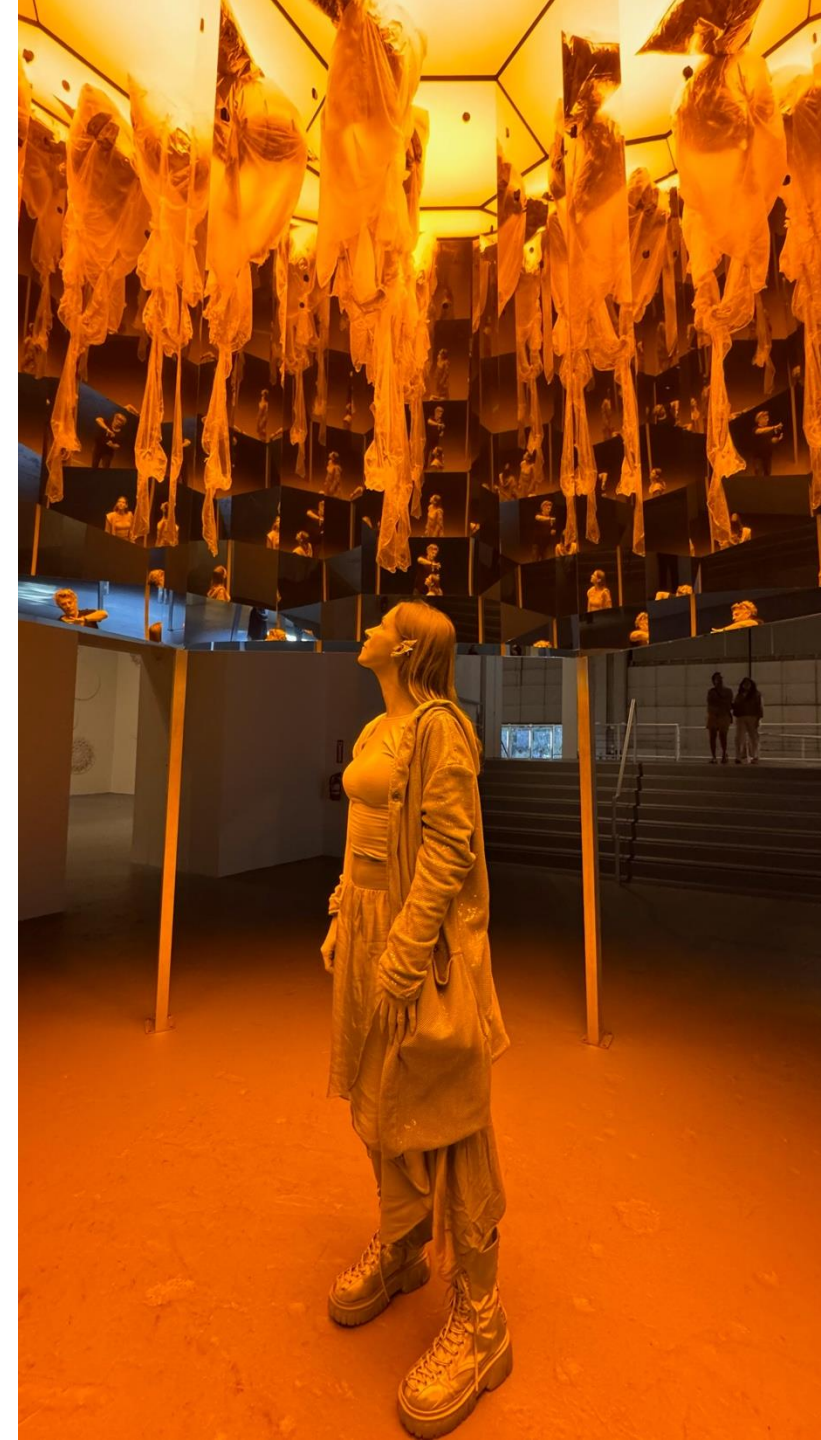
Contemporary Innovation

The installation advances historical concepts through:

- Dynamic airflow systems keeping materials in perpetual motion
- Use of mono-frequency light to alter color perception
- Integration of environmental commentary through "space junk"
- Manipulation of viewers' visual adaptation (yellow immersion leading to purple afterimages)

Historical Convergence

Eliasson's work synthesizes multiple historical approaches to understanding light: the ancient Greeks' celestial observations, medieval scholars' systematic diagrams of vision, and Renaissance experimentation with perspective and optical devices. He transforms these traditional ways of seeing into an immersive experience that challenges our perception while addressing modern environmental concerns, demonstrating how historical theories of light and vision remain relevant.





[Link to this video](#)

Observatory for seeing the atmosphere's futures

Olafur Eliasson (2024)

Stainless steel, aluminum, and mirror foil

The installation consists of a four-sided kaleidoscopic structure made of stainless steel, aluminum, and mirror foil that extends through the Geffen's ceiling. It creates an intriguing optical experience where viewers see a framed patch of sky that's multiplied and curved by the mirrored walls to create the illusion of a complete sphere. What's particularly compelling is how it changes throughout the day - from pristine blue spheres on clear days to shifting color gradients at dawn and dusk.

This piece indirectly references both historical astronomical observation tools (like the astrolabe) and modern environmental concerns. Like medieval instruments that helped people understand celestial movements, this contemporary "observatory" helps us visualize and contemplate our atmosphere's future. The dynamic nature of the piece - with clouds, birds, and planes interrupting the view and creating rhythmic patterns - emphasizes the living, changing nature of our atmosphere.





[Link to this video](#)

Viewing machine for imagining oceanic futures

Olafur Eliasson (2024)

Stainless steel, aluminum, mirror foil, acrylic basin, water, LED lights, motor

Technical Specifications:

- Four-sided kaleidoscopic structure with non-tapering mirrored walls
- Integrated LED strip system echoing skylight grid
- Motorized acrylic water basin with tilt mechanism
- Infinite reflection system through precisely aligned mirrors
- Direct integration with building's existing skylight

This immersive installation creates a mesmerizing dialogue between water, light, and infinite reflection. Uniquely positioned beneath a skylight, this kaleidoscopic structure features non-tapering walls that generate endless reflections, enhanced by LED strips mirroring the skylight's grid pattern. A mechanized basin of water at the top creates rhythmic waves, merging natural and artificial elements into a contemplative space that challenges our perception of depth and dimension. The piece invites viewers to experience both the sensation of being underwater and gazing into an impossible space above, creating a powerful meditation on our relationship with oceanic environments and their possible futures.





[Link to this video](#)



Your changing atmosphere

Olafur Eliasson (2024)

Polarization filters, transparent Plexiglas, stainless steel, LED light system, ballast, dimmer

Technical Specifications:

- Rhombic triacontahedron structure with 30 diamond-shaped faces
- Nested double-layer design with identical inner and outer forms
- Complex latticework tiling system based on quasicrystal research
- Integrated LED light system with center illumination
- Multiple material layers: polarizing filters (outer), diffuser glass with polarizing layer (inner), and reactive plastic (connecting rhombohedra)

This sophisticated installation creates an ever-changing interplay of light and color through advanced optical engineering. The sculpture's complex geometric structure combines two identical polyhedrons of different sizes, connected by an intricate lattice system derived from quasicrystal research. As viewers move around the eye-level installation, the interaction between polarizing filters and transparent plastic creates a dynamic color-shifting effect, transforming the piece's appearance with each new perspective. The central light source illuminates the structure from within, enhancing the work's dimensional complexity and creating a mesmerizing display of shifting chromatic patterns.



[Link to this video](#)

Technical Specifications:

- 48 glass spheres arranged in a complete ring
- Each sphere partially painted with transparent rainbow colors
- Silver reflective coating on back third of each sphere
- Progressive spectrum representation through adjacent spheres
- Dynamic viewer reflection integration
- This installation brilliantly bridges historical and contemporary approaches to understanding light and color.

Medieval and Renaissance Connection:

- Echoes the circular arrangements found in medieval astronomical instruments
- Recalls the crystalline spheres of medieval cosmology
- References medieval theories of light reflection and vision
- Employs principles of optics and reflection studied by Renaissance masters
- Demonstrates advanced understanding of color progression similar to Newton's later studies
- Utilizes sophisticated geometry in its circular arrangement

Tomorrow's daylight

Olafur Eliasson (2021)

Contemporary Innovation:

Like historical devices that helped us understand celestial phenomena, this piece creates a tool for examining light itself. The 48 spheres create a complete rainbow spectrum, but with a crucial contemporary twist - each sphere becomes both an optical device and a mirror, incorporating the viewer's reflection into the work. This self-reflective element transforms the traditional objective study of light into a participatory experience, where observer and observed become intertwined.

This piece particularly resonates with the Getty's LUMEN exhibition themes by showing how historical approaches to understanding light and color continue to inform contemporary artistic practice, while pushing into new territory of environmental awareness and viewer participation.



[Link to this video](#)

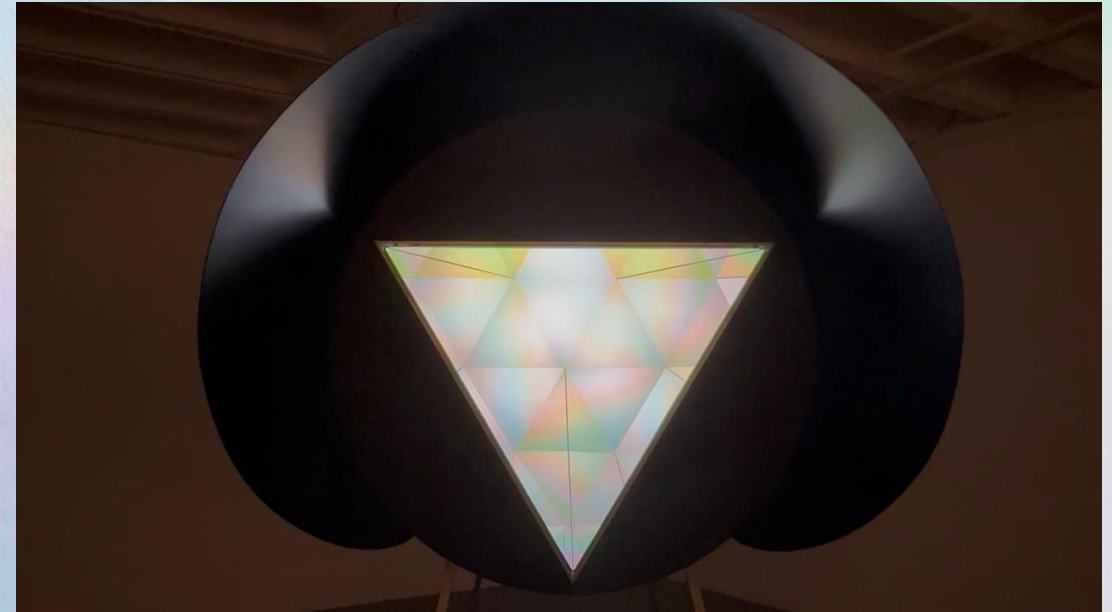
Kaleidoscope for Plural Perspectives

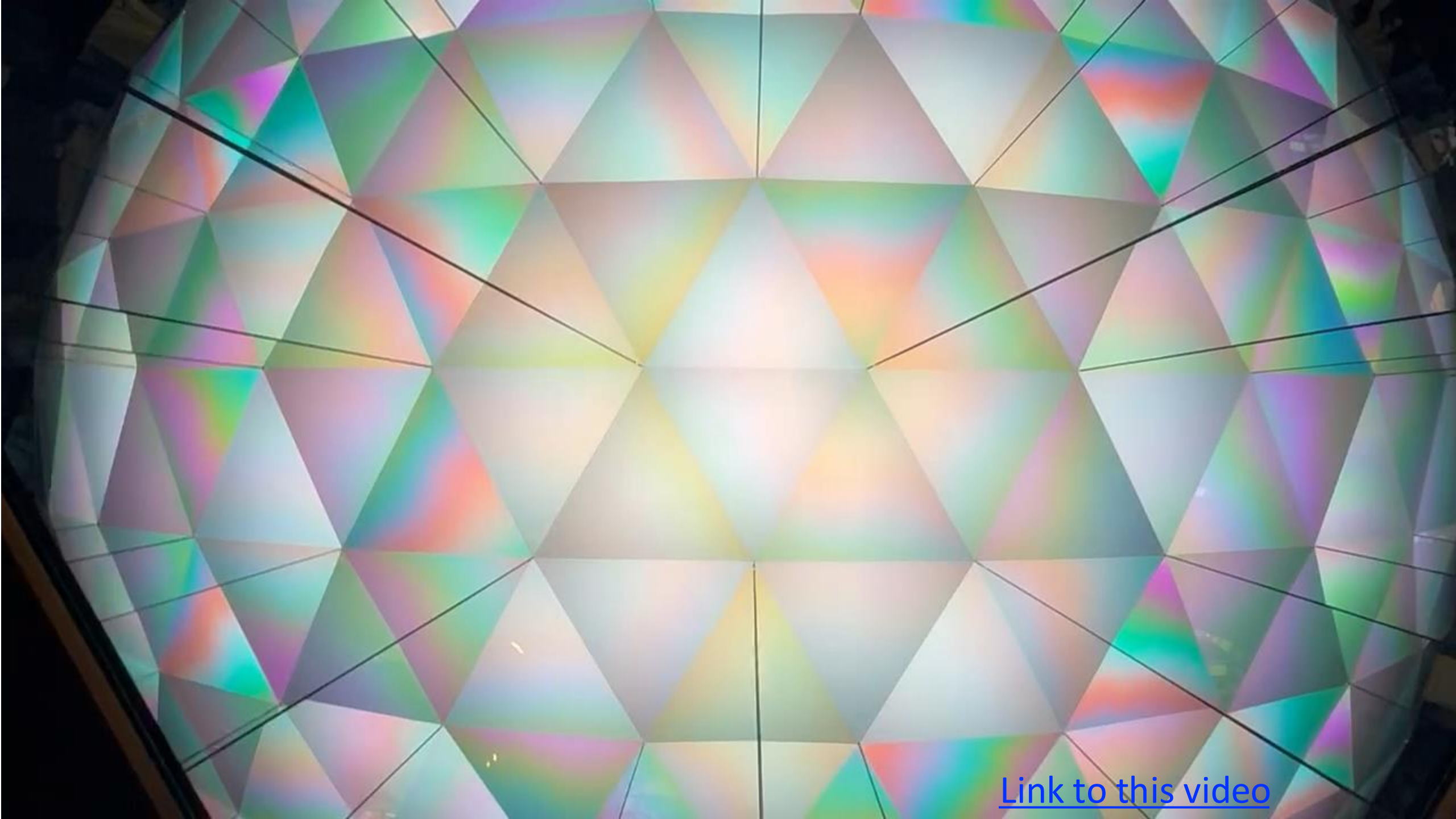
Olafur Eliasson (2024)

Kaleidoscope for plural perspectives (2024) by Olafur Eliasson extends the medieval investigation of light and perception into our contemporary moment. Just as medieval scholars explored the layered nature of vision through concentric spheres, Eliasson creates a dynamic optical instrument that reveals the fundamental relationship between light, material, and human perception.

Using stainless steel, aluminum, glass mirror, LED light, and polarizing filters, this work creates a complex, constantly evolving pattern of colors through a triangular aperture. The mechanism - three discs, two with polarizing filters and one with reactive plastic - mirrors the medieval understanding of light as both physical phenomenon and perceptual experience. As the discs rotate, the changing orientations generate different colors, while internal mirrors create reflections that vary based on viewing angle - demonstrating how perception, like medieval "tunics" of the eye, exists in multiple layers of experience.

This piece exemplifies how contemporary light artists continue to explore questions first posed in medieval optical treatises: How do materials transform light? How does our perception create meaning from these transformations? And how might these investigations reveal fundamental patterns of existence?





[Link to this video](#)

Your sunset shadow

Olafur Eliasson (2024)

Eliasson's installation cleverly builds on the medieval understanding of light as both a scientific phenomenon and a means of human connection with the cosmos. Like the medieval scholars who studied how light created shadows and reflections through their astronomical instruments, Eliasson uses modern LED technology to explore similar concepts of light's interaction with human presence.

The medieval techniques we discussed - particularly their use of precisely positioned light sources in astronomical devices like the astrolabe - find a contemporary parallel in Eliasson's precise arrangement of eleven spotlights. Where medieval scholars used mechanical devices to track celestial movements, Eliasson creates an interactive environment where viewers become part of the measurement apparatus itself.

The installation's title "Your sunset shadow" particularly resonates with medieval concepts of "living light" (*lux vivens*) that we saw in Hildegard of Bingen's work. Just as medieval scholars saw light as both divine manifestation and natural phenomenon, Eliasson creates an environment where natural phenomena (shadows) become personalized experiences.

The way the installation responds to visitors' movements, creating overlapping silhouettes that "dance across the wall," echoes medieval understanding of light as an interactive medium between observer and observed. The varying intensities and scales of shadows produced as visitors move closer to and further from the lights creates a kind of modern parallel to the medieval understanding of celestial mechanics, where bodies in space affected each other through their relative positions.

[Link to this video](#)

Pluriverse assembly

Olafur Eliasson (2024)

Looking at Eliasson's "Pluriverse Assembly" (2021) through the lens of medieval light studies reveals fascinating parallels with historical approaches to understanding light and cosmic phenomena.

Like the medieval astrolabe and armillary sphere we explored, which used rotating rings and precise mechanical elements to track celestial movements, Eliasson's installation employs rotating glass rings, mechanical components, and custom kaleidoscopic devices to create its effects. Where medieval scholars used their instruments to understand cosmic patterns, Eliasson creates what he calls a "primordial phantasmagoria" - an ever-evolving display of light phenomena that recalls medieval concepts of celestial mechanics.

The piece's technical elements - rotating discs holding glass lenses, plants suspended in oil, and angled mirrors - echo the sophisticated optical devices developed during the medieval period. Just as scholars like Hildegard of Bingen studied how light interacted with different materials to understand both physical and metaphysical properties, Eliasson experiments with various materials and their interactions with light to create what he terms "radically analogue films."

The installation's name "Pluriverse assembly" particularly resonates with medieval cosmological understanding. Where medieval scholars conceived of the universe as multiple nested spheres (as seen in Nicole Oresme's illustrations), Eliasson creates a dynamic system of rotating elements that generates multiple, simultaneous light-worlds or "pluriverses." The way the piece transforms two-dimensional projections into apparently three-dimensional forms mirrors medieval debates about light's role in human perception and understanding of dimensional space.

The use of plant material suspended in oil recalls medieval optical experiments with various mediums to understand light's behavior, while the emphasis on mechanical rotation echoes the medieval understanding of celestial mechanics as expressed in devices like the armillary sphere and astrolabe.



[Link to this behind the projection screen video](#)

Light Across Spectra

Ways I have previously explored light in audiovisual projects

- Thermal Gestures Collaboration with Marco Pinter (2023) A synesthetic performance combining vocal art with thermal imaging, where body heat and breath become visible light projections. This work transforms far infrared radiation (9,000-14,000 nanometers) into visible spectrum light (400-700 nanometers), revealing typically invisible electromagnetic emanations from the human body through movement and sound. [Link to video](#)
- ResoVair- for Buckminster Fuller Institute's 40th anniversary, a multisensory composition and performance mapping biological rhythms to light and sound, where each minute represents one hour of Earth's daily 24-hour cycle. The work integrates neurostimulation protocols through light and sound frequencies, including the fundamental 7.83 Hz Schumann resonance, creating a visual and auditory representation of multi-scale biological rhythms from cellular to planetary levels. [Link to video](#)
- Hypnagogic Light Experiment (2017) An investigation into consciousness using precisely calibrated LED frequencies (3-100 Hz), synchronized with 3D soundscapes. This work explored the intersection of light frequencies with brainwave patterns, combining traditional meditation practices with modern light technology to facilitate altered states of consciousness. [Link to video](#)

These works demonstrate how light can be used across different electromagnetic spectra and time scales to reveal hidden patterns of life and consciousness, bridging ancient understanding of light's transformative properties with modern technological capabilities.



Interreflections

Amanda Gregory and Scott Gregory (my twin brother) 2021

Like medieval scholars who saw celestial mechanics as a way to understand both physical phenomena and cosmic consciousness, "Interreflection" creates a bridge between observable light phenomena and deeper universal rhythms. Where medieval instruments like the astrolabe measured celestial movements through precise mechanical means, this piece uses modern digital tools to capture and transform light's interaction with water into kaleidoscopic patterns that mirror universal organizational principles.

The work particularly resonates with Hildegard of Bingen's concept of "living light" (*lux vivens*) by connecting visual phenomena with fundamental Earth frequencies. Just as medieval scholars understood light as both a physical phenomenon and a gateway to understanding cosmic order, "Interreflection" uses light patterns refracting through water to audiovisualize the Schumann Resonance - Earth's fundamental electromagnetic frequency that has shaped life's evolution.

The piece's use of kaleidoscopic techniques recalls medieval understandings of how light creates patterns and symmetries in nature, while its incorporation of modern neural network-like effects brings this ancient appreciation for geometric light patterns into dialogue with contemporary technology. The progression through various frequencies, synchronized with evolving visual patterns, creates what medieval scholars might have recognized as a kind of cosmic harmony - a visual and auditory representation of universal principles.

[Link to audiovisual](#)

Nested Light: Harmonics Across Scales

An audiovisual work in development by Amanda Gregory

This project extends ancient traditions of studying light and harmonics into the digital age. Using stable diffusion AI and Touch Designer, the work creates evolving landscapes that respond to two key sonic elements: nested vocal patterns and Infitone synthesizer harmonics. The vocal elements generate binaural frequencies, EMDR rhythmic patterns that propagate through multiple time scales, and neural entrainment frequencies spanning from delta waves to gamma. The synthesizer creates multiple layers of harmonic relationships, with cascading overtone series and frequency ratios driving visual transformations. The system maps these sonic elements onto landscape transformations in real-time, creating a dynamic interplay between sound and light that reveals underlying mathematical relationships. Where Renaissance scholars used mechanical devices to understand cosmic harmonies, this work uses digital tools to make these patterns visible and audible. The result is an audiovisual meditation on nested rhythms and harmonics, expressing mathematical relationships that span from human perceptual scales to universal patterns.

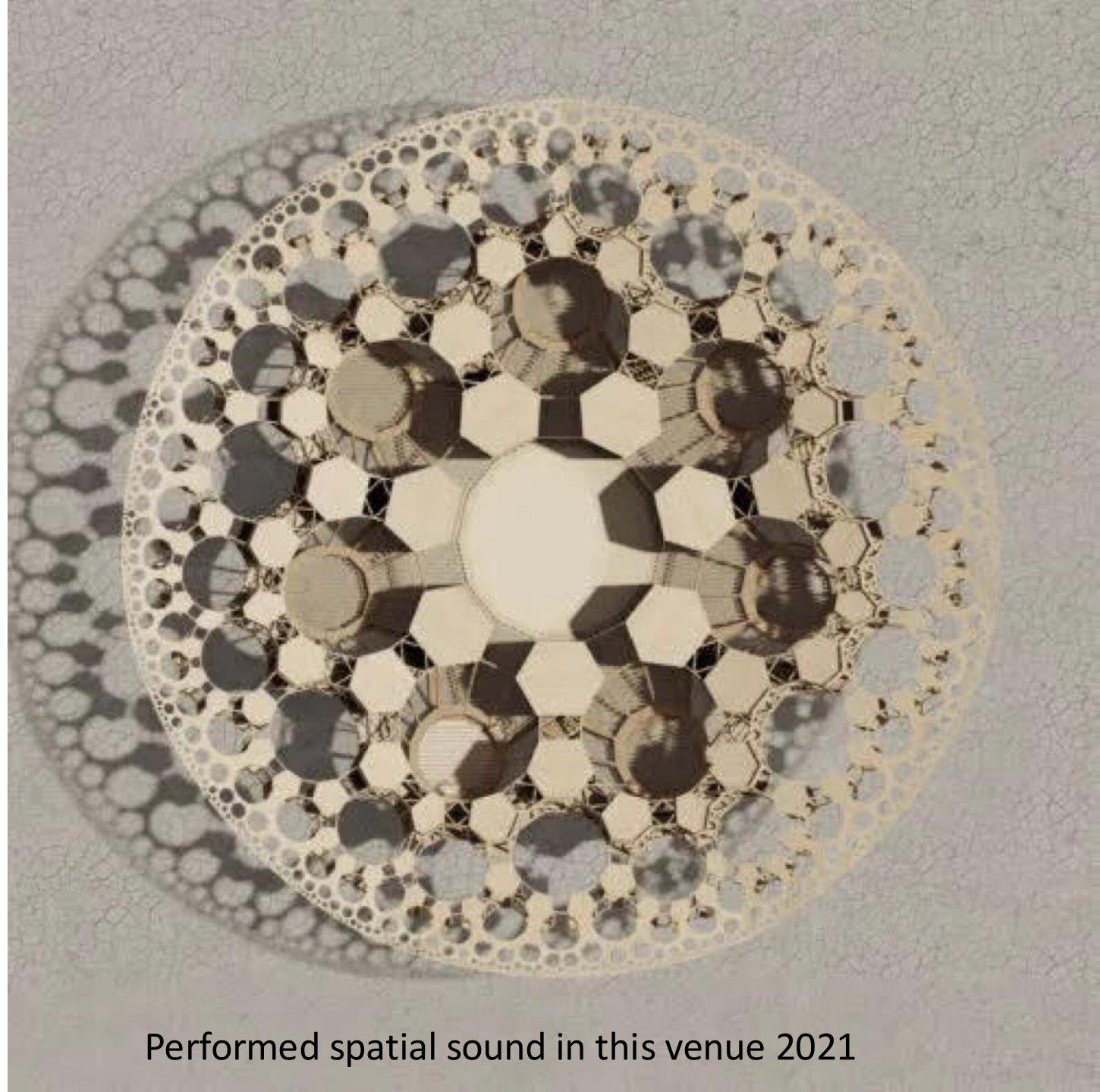
Future projects also include audiovisualizing the Nested Observer Window Theory of Consciousness and synchronizing the visuals with 3D spatial sound

[Link to audiovisual sample](#)

Future Projects

- Audiovisualization of the Nested Observer Window Theory of Consciousness
- Translating consciousness theory into dynamic light and sound mapping hierarchical patterns of awareness through audiovisual geometry
- Creating immersive environments that reveal nested levels of consciousness

[Link to paper](#)



Performed spatial sound in this venue 2021

3D Spatial Sound and Light Integration

- Developing new tools for spatializing both sound and visual elements
- Exploring how geometric patterns manifest across multiple sensory dimensions
- Collaborating on studies and interactive environments that explore collective consciousness

These projects extend ancient understanding of light and sound as gateways to consciousness into new technological realms, while maintaining connection to traditional wisdom about how humans perceive and interact with illuminated space.

- 4D audiovisual geometries

[Link to spatial sound](#)

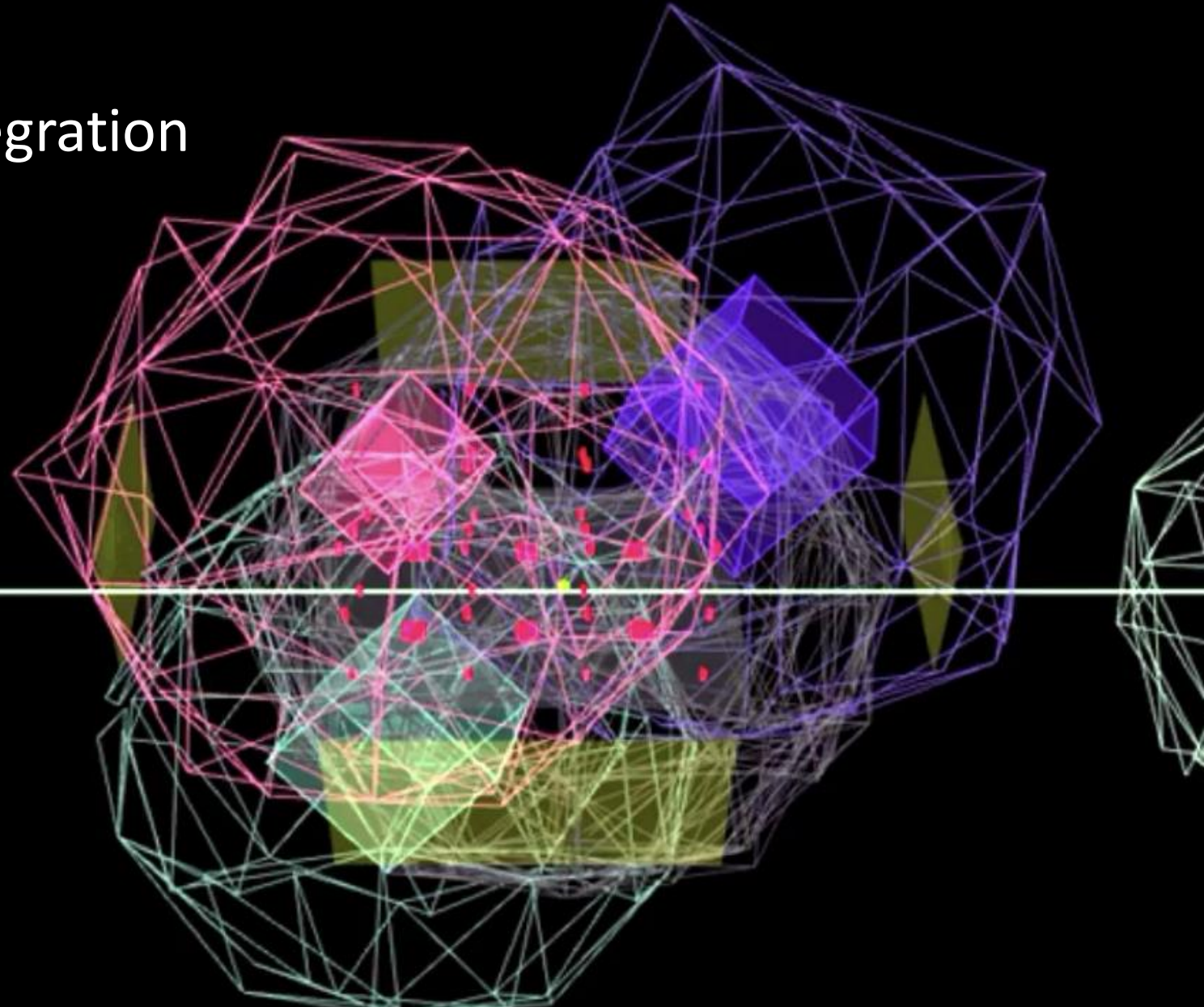


Image from collab with 4D Sound 2019

The Future of Light

From Ancient Wisdom to Emerging Technologies

Building on humanity's enduring fascination with light - from medieval astrolabes to Renaissance optics - contemporary artists and scientists are exploring radical new ways of manipulating and understanding and implementing light:

Emerging Technologies:

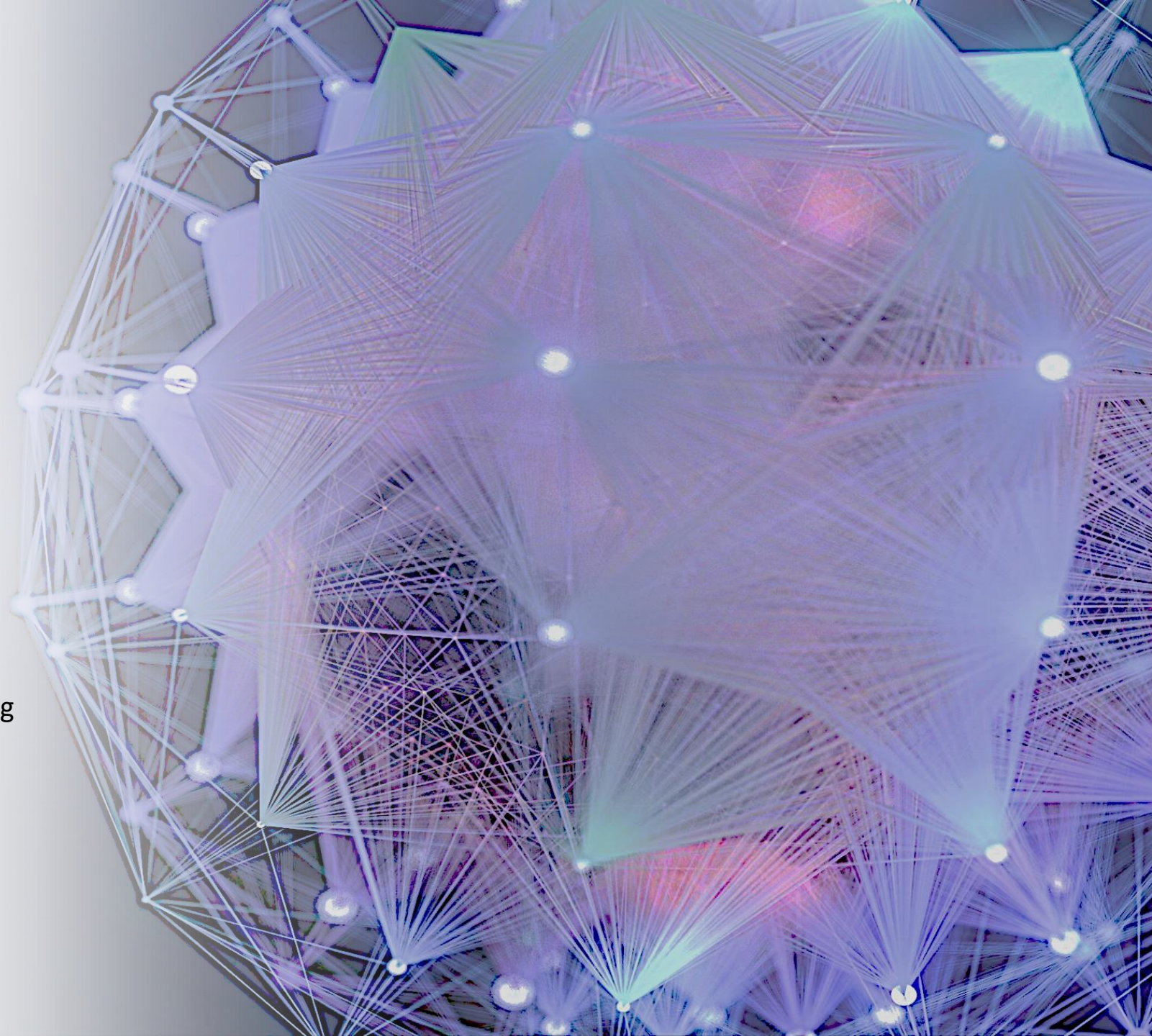
- Volumetric Displays and Light Field Technology: Creating true 3D images in space
- Neural Networks for Light Simulation: AI systems modeling complex light behaviors
- Quantum Light Processing: Manipulating individual photons for quantum displays
- Drone Light Arrays: Orchestrating thousands of points of light in 3D space
- Advanced Holography: Moving beyond static images to interactive holograms
- Bioluminescent Systems: Integration of bioluminescent organisms with digital systems
- Nano-optical Materials: Metamaterials that manipulate light in unprecedented ways
- Brain-Computer Interfaces: Direct neural control of light installations
- Atmospheric Light Manipulation: Large-scale environmental light art
- 4D Light Synthesis: Time-based light sculptures incorporating duration as dimension

[Link to image source](#)



Future Possibilities

- Interactive light environments responding to collective consciousness
- Light-based quantum computing visualization systems
- Biolight communication networks between different species
- Neural light interfaces for direct experience sharing
- Environmental light systems for climate communication
- Light-based healing environments incorporating ancient wisdom with modern technology



Closing thoughts

Like medieval scholars who saw light as both physical phenomenon and spiritual medium, these emerging technologies continue humanity's quest to understand and harness light's transformative potential. They bridge ancient insights about light's fundamental role in consciousness with cutting-edge technical capabilities.

These developments suggest a future where light becomes an increasingly sophisticated medium for communication, healing, and understanding our place in the universe - extending the work of ancient light scholars into realms they could only imagine.



Thank you for exploring this presentation