

NOW:

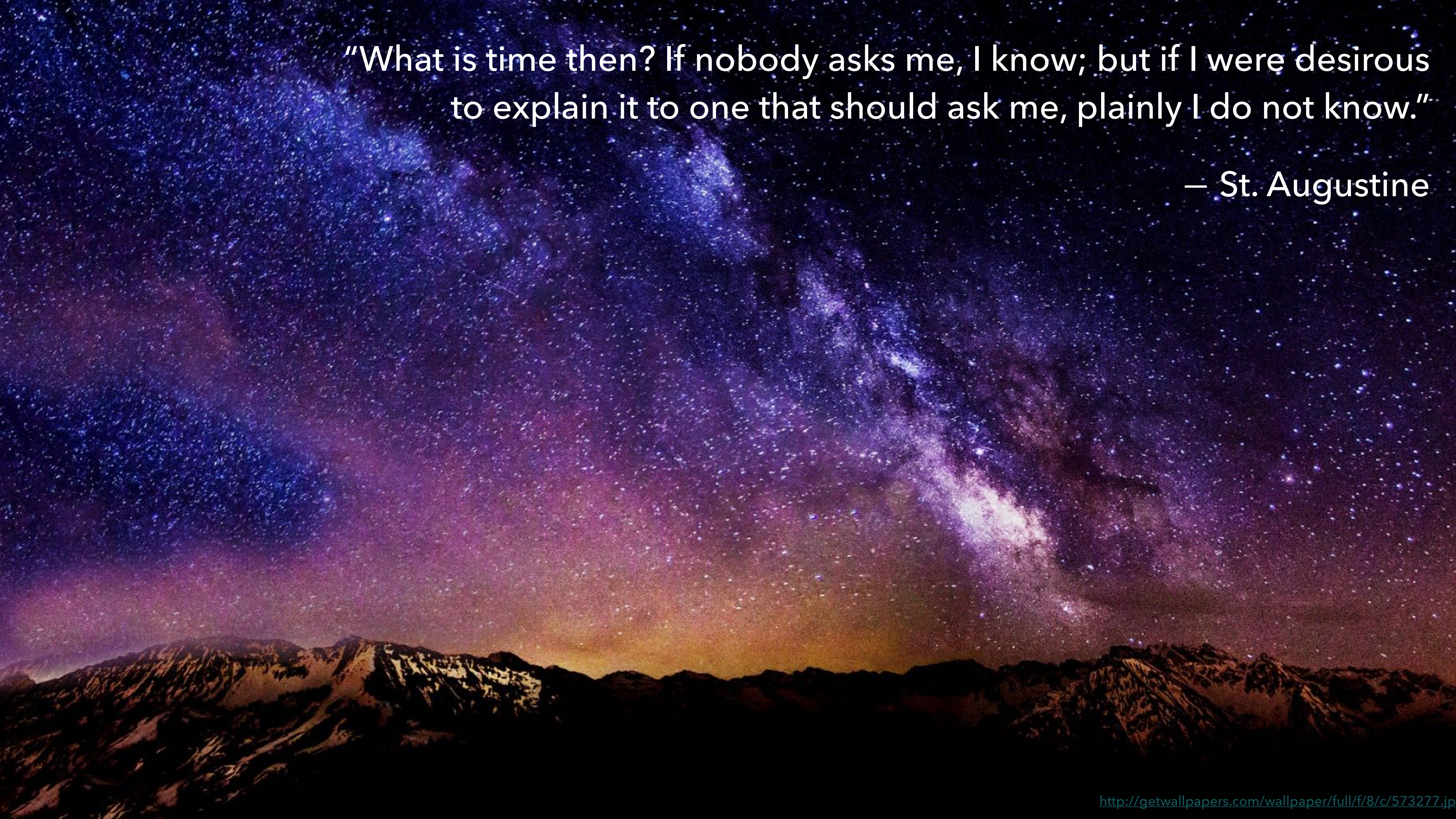
---

**TIME**







A night sky with the Milky Way galaxy visible, arching across the frame. The stars are in shades of blue, purple, and white. Below the sky, a range of mountains is visible, with snow on their peaks and ridges. The overall scene is dark and atmospheric.

“What is time then? If nobody asks me, I know; but if I were desirous to explain it to one that should ask me, plainly I do not know.”

– St. Augustine



WHY TIME AT ITP?

**PHILOSOPHY**

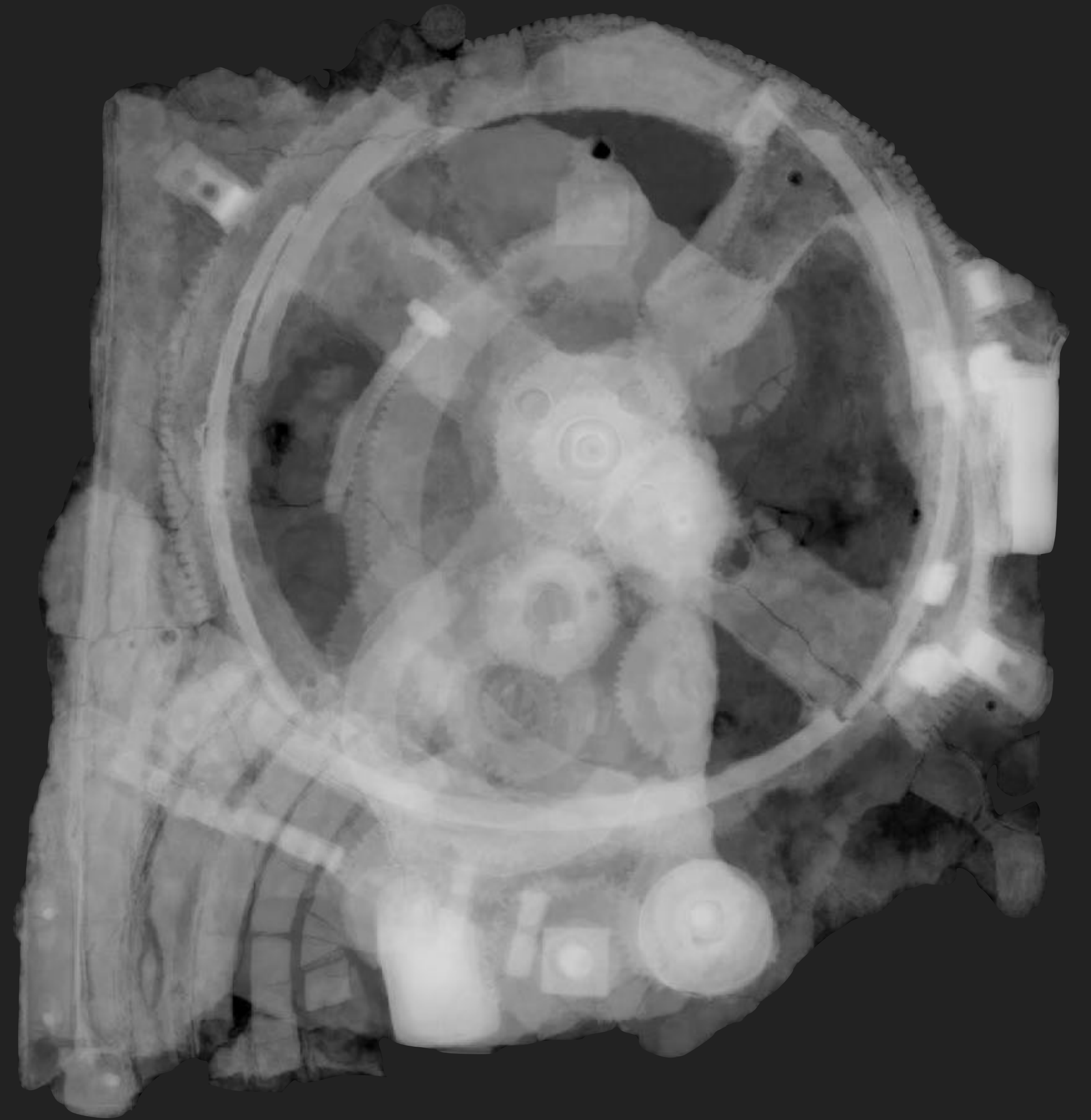
Language, history, politics, life...

**+**

**SCIENCE**

Modeling nature, engineering, code, design...



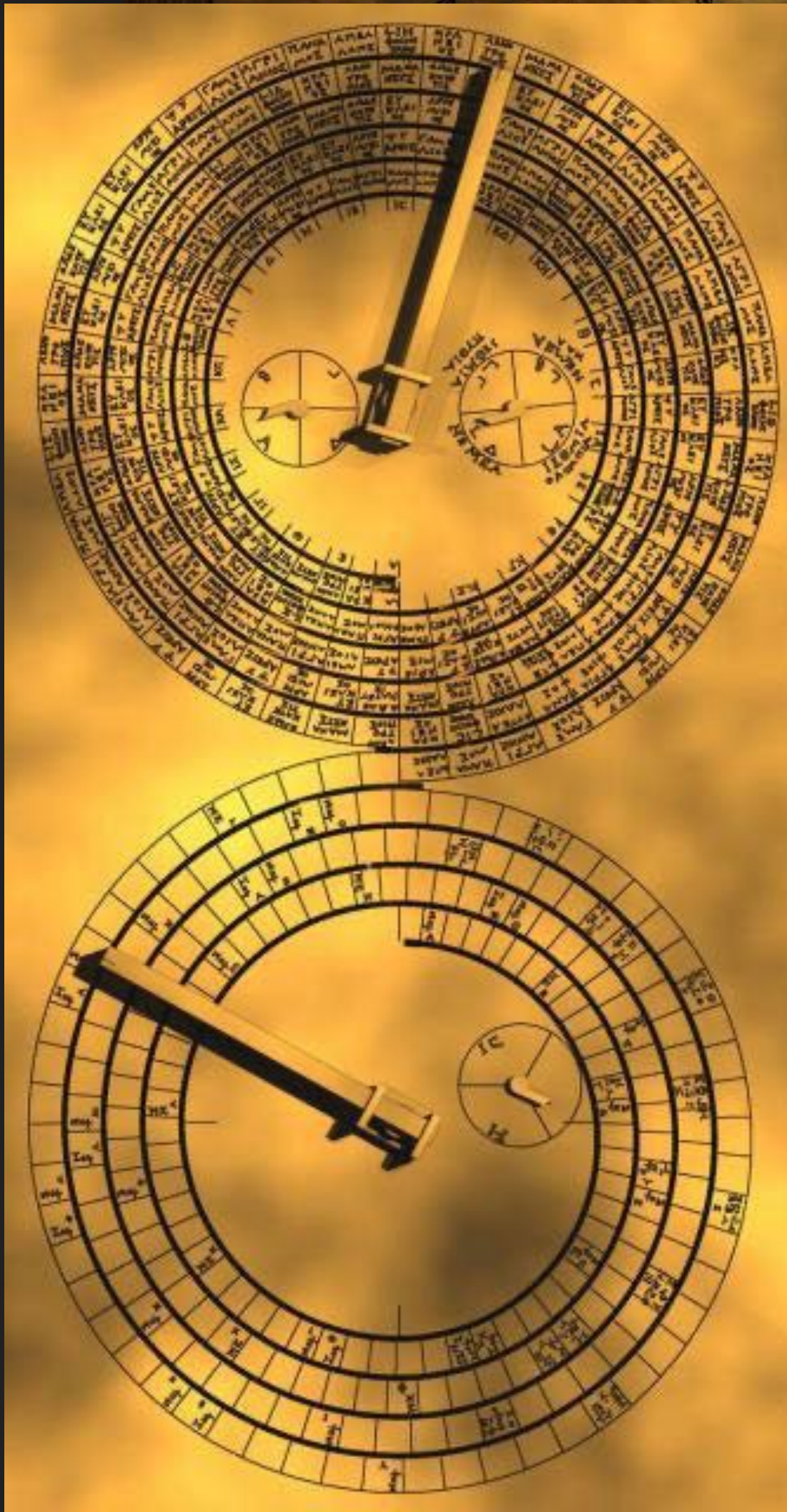


<https://en.wikipedia.org/>

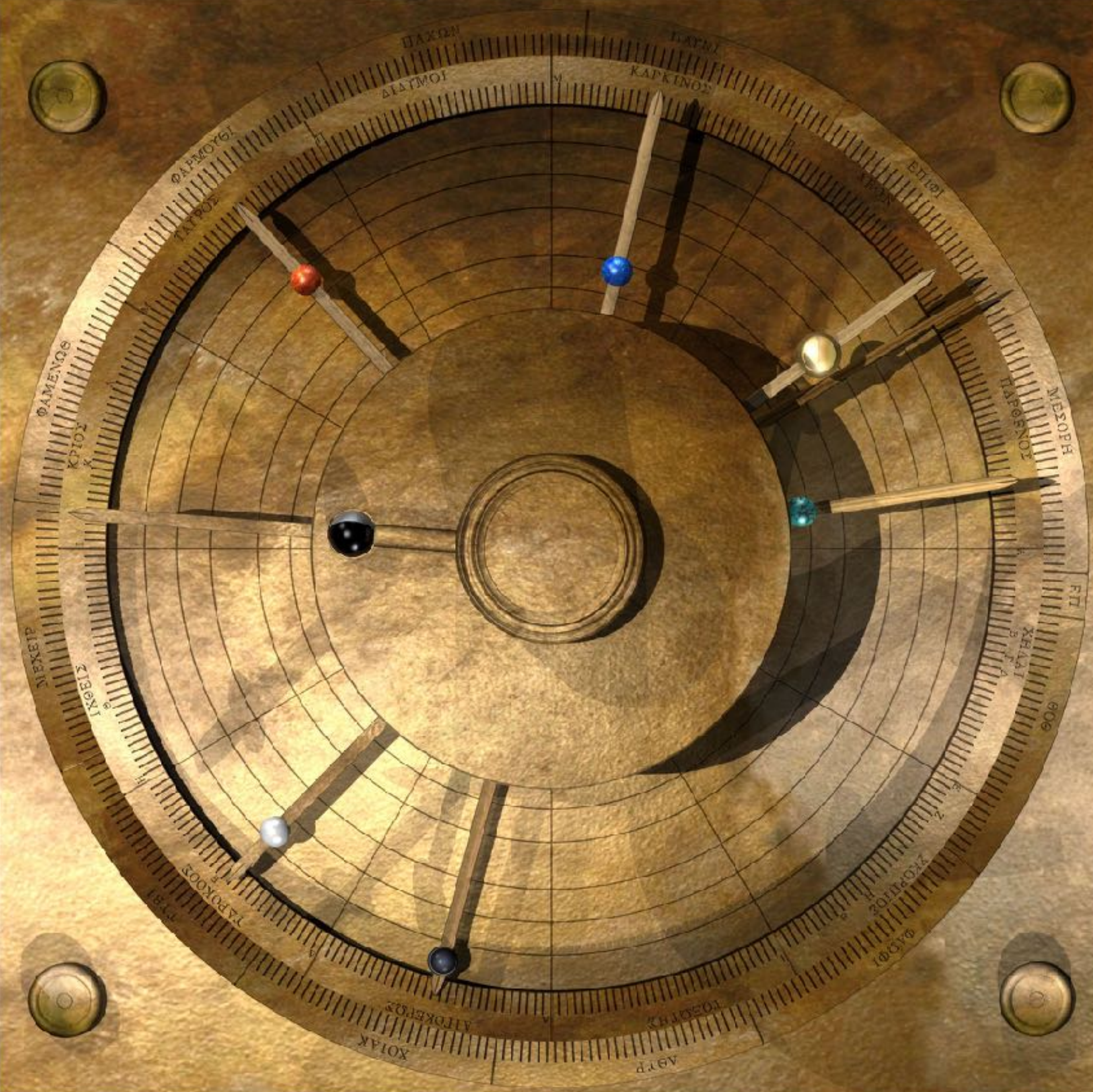


# ANTIKYTHERA MECHANISM

~ 100 BCE



ΣΑΡΚΤΟ ΥΡΟΣ ΔΥΝΕΙ ΕΘΟΣ



Α ΜΗΔΙΑΡΧΟΝΤΑΙ ΕΠΙΤΕΛΛΕΙΝ Α Μ ΚΑΡΚΙΝΟΣ ΑΡΧΕΤΑΙ  
 ΣΜΕΡΙΑ ΦΟΙΝΟΣ ΠΙΝΗ Α ΤΡΟΤΑΙ ΘΕΡΙΝΑΙ  
 ΑΝΑΤΕΜΟΥΣΙΝ ΕΣΤΕΡΙΑΝ ΣΠΙΣΑΝ ΑΝΤΕΜΕΙΕΣΙΟΣ  
 ΑΝΑΤΕΛΛΕΙ ΕΣΤΕΡΙΑΙΟ Ε Ξ ΥΟΝ ΑΝΤΕΜΕΙΕΣΙΟΣ  
 ΤΕΜΕΙΟ ΑΕ ΤΟΣ ΔΥΝΕΙΕΣΙΟΣ  
 ΣΚΟΡΠΙΟΣ ΑΡΧΕΤΑΙ ΑΝΑΤΕΛΛΕΙΝ Α Τ ΛΕΟΝ ΑΡΧΕΤΑΙ ΕΠΙΤΕΛΛΕΙΝ  
 Ρ Σ Τ Υ Φ Χ

Α Β Γ Δ Ε Ι Η Θ Ι Κ Λ

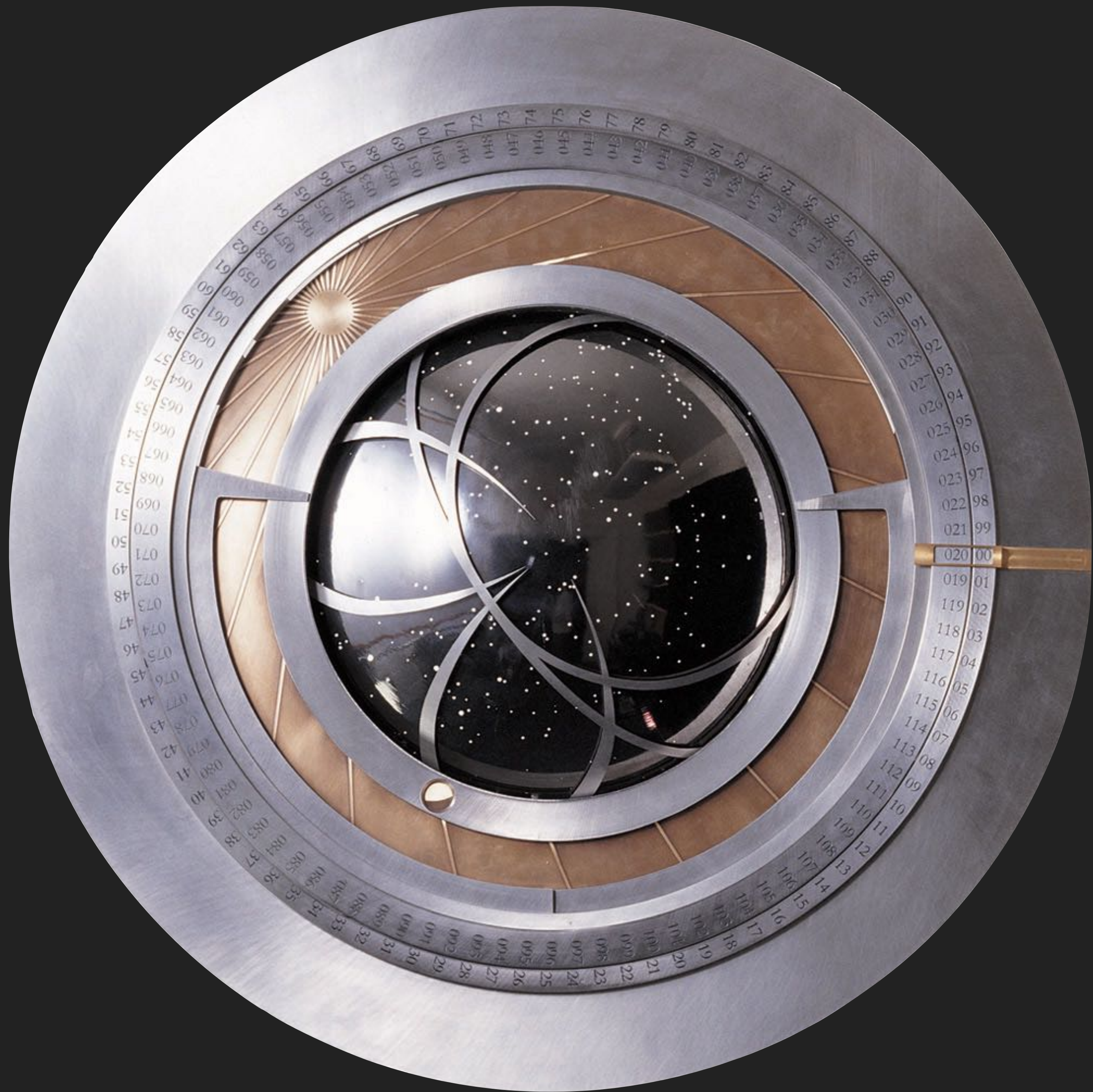
ΤΟΣΟΤΗΣ ΑΡΧΕΤΑΙ ΕΠΙΤΕΛΛΕΙΝ Α Υ Φ Χ

BACK





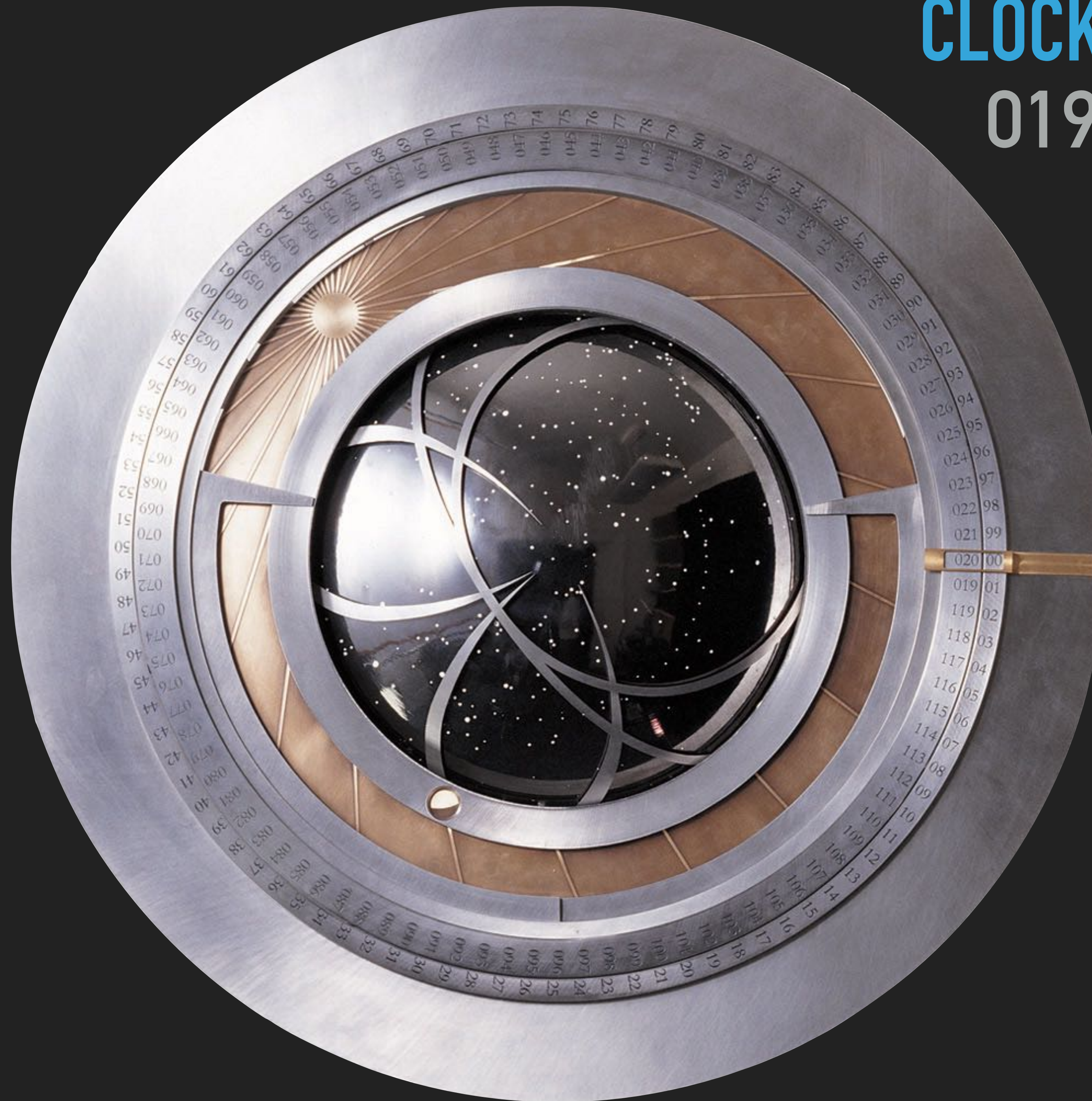






# CLOCK of the LONG NOW

01997, ONGOING





A Story That Lasts 10,000 Years (featuring Neil Gaiman)

X  
LONG NOW





**DANNY HILLIS**

Computer Science Pioneer



**STEWART BRAND**

Whole Earth Founder



**BRIAN ENO**

Musician



**JEFF BEZOS**

Money









WHY TIME AT ITP?

**PHILOSOPHY**

Language, history, politics, life...

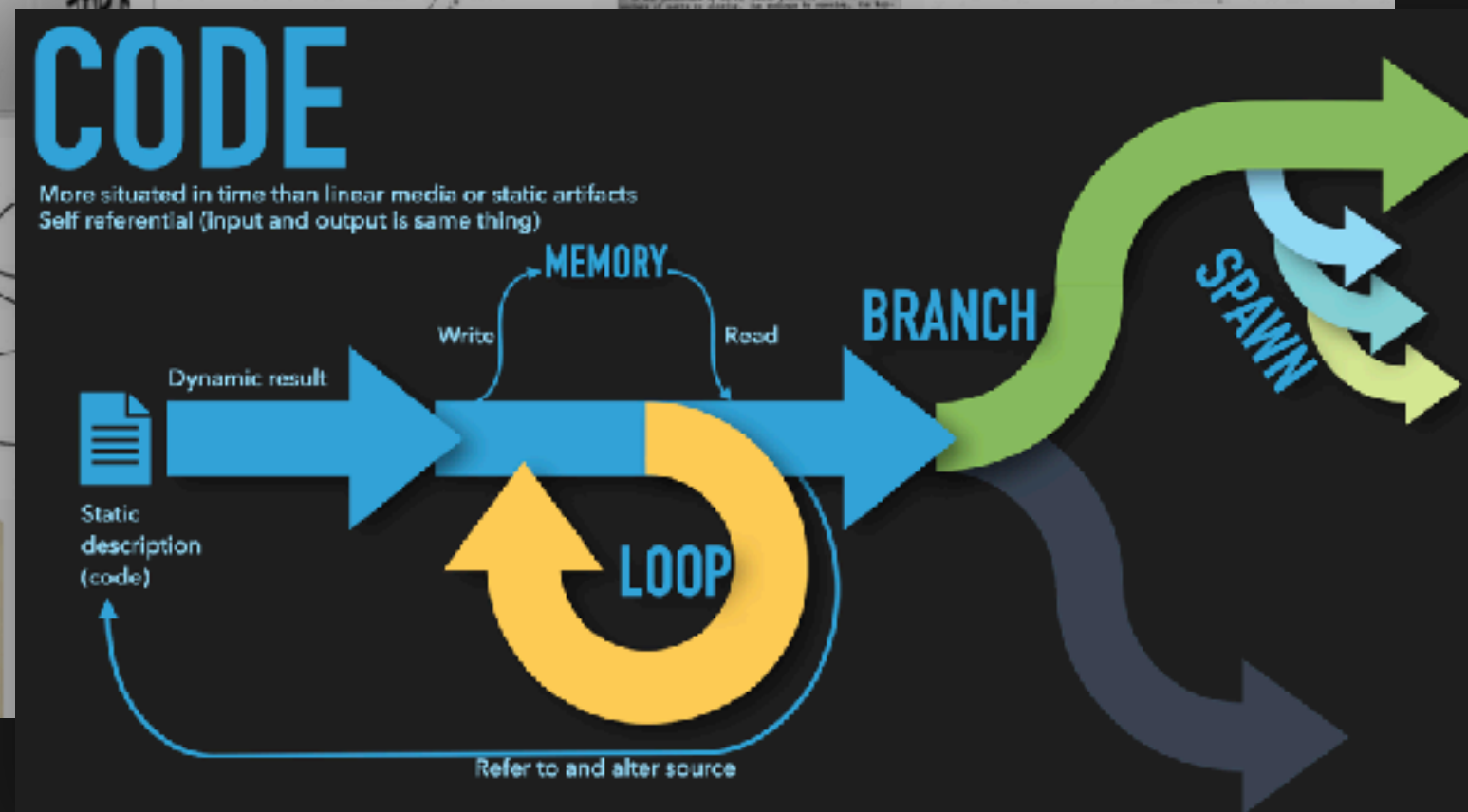
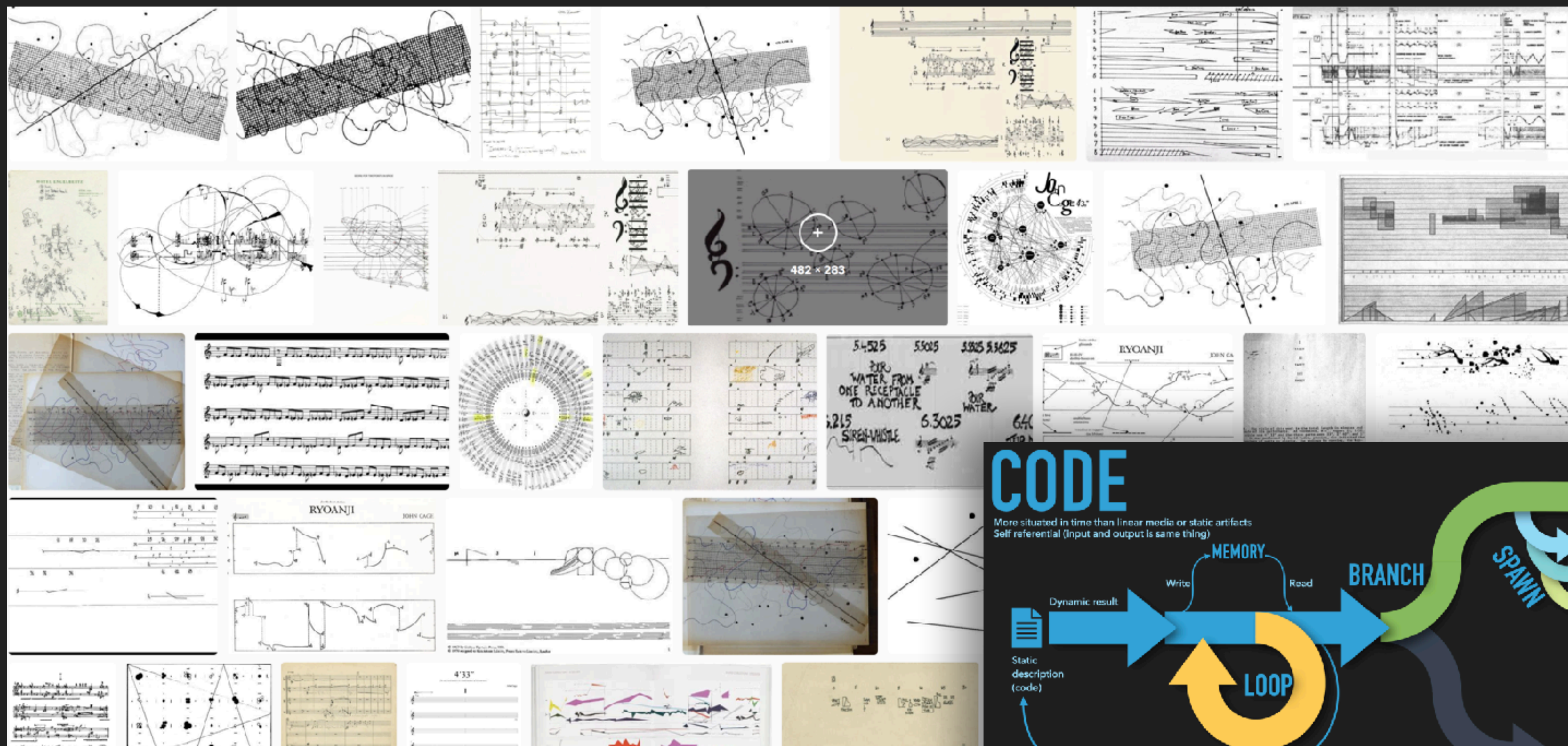
**+**

**SCIENCE**

Modeling nature, engineering, code, design...



# Graphical music scores guide musical activity in time



Code executes in time in unique ways  
(slide from upcoming "Time Code")





Sparkfun RTC Breakout boards



Mechanical watch movement

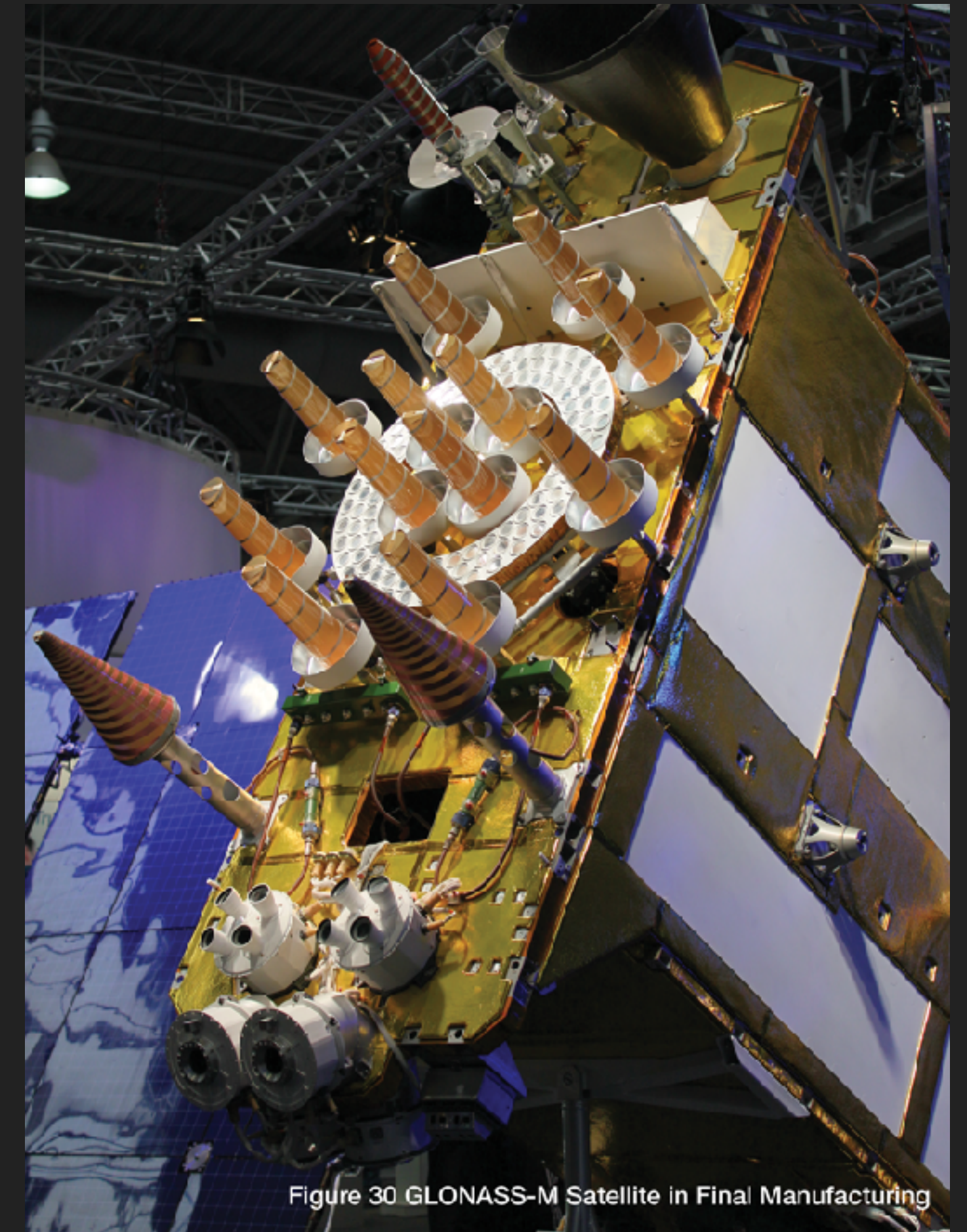


Figure 30 GLONASS-M Satellite in Final Manufacturing

Russian GLONASS satellite with atomic clock



VID-28 Bi-axial stepper motor









Strausborg Astronomical Clock [Atlas Obscura](#)





COMPUT ECCLESIASTIQUE

TEMPS APPARENT

EQUATIONS SOLAIRES & LUNAIRES







# LESIASTIQUE

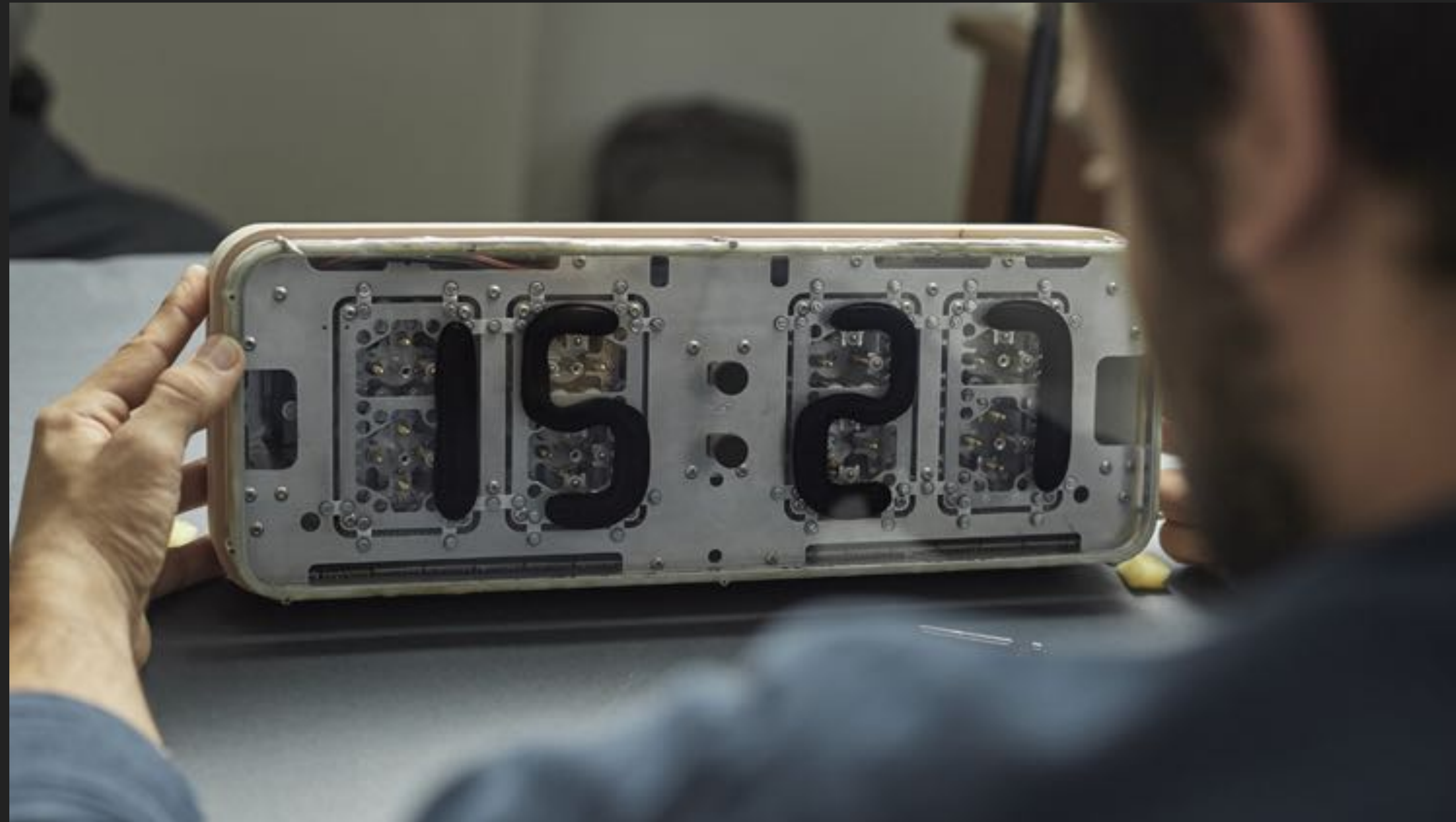




# COMPUT ECCLESIASTIQUE

A large scroll or calendar page with text and numbers. The scroll is partially unrolled, showing a list of names and dates. The text is written in a small, dense font. The scroll is positioned on the right side of the image.





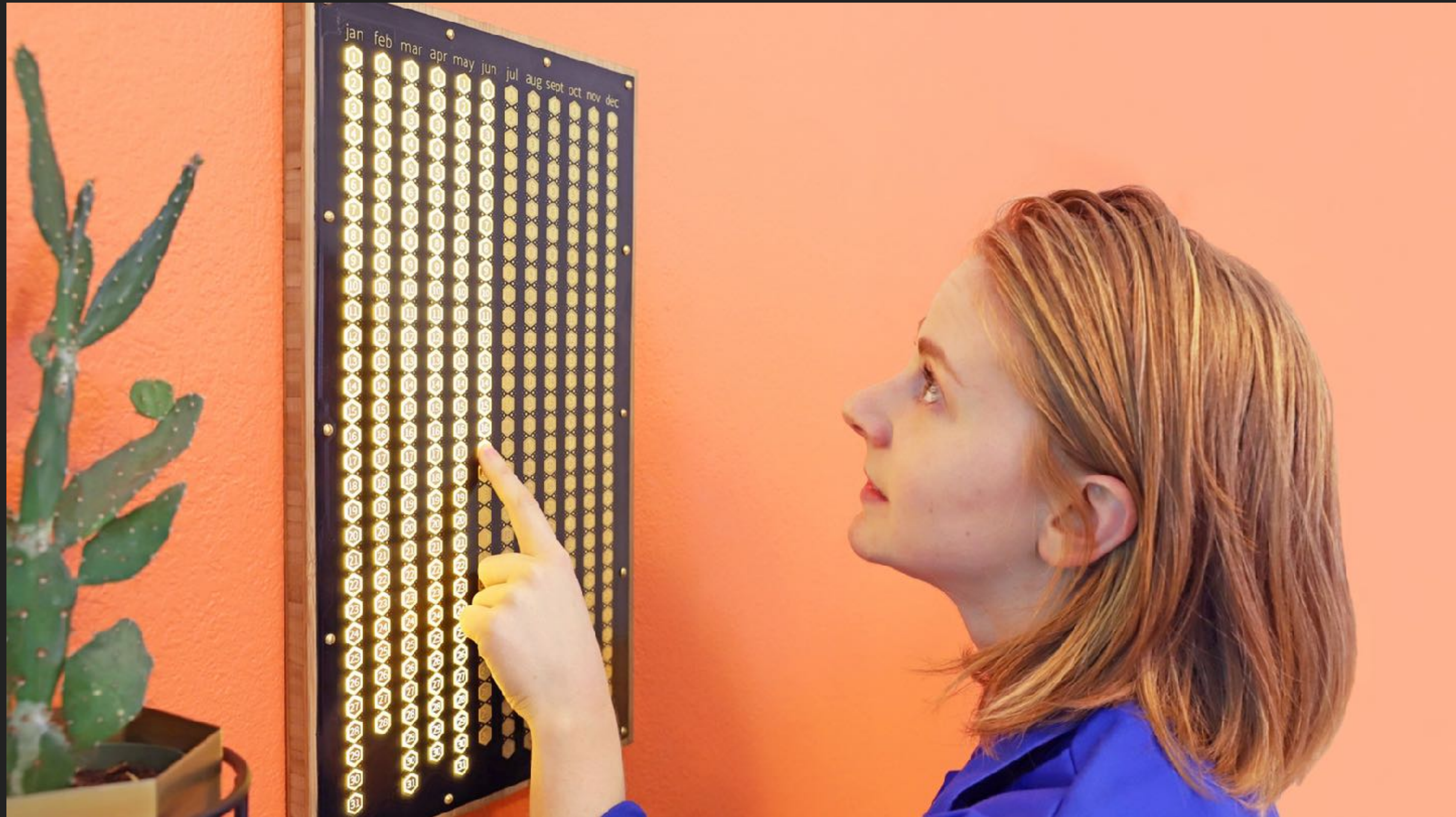
[Ferrofluid Clock](#)





[Scott Thrift 1-year and 1-day clock](#)





[Simone Giertz Every Day Calendar](#)



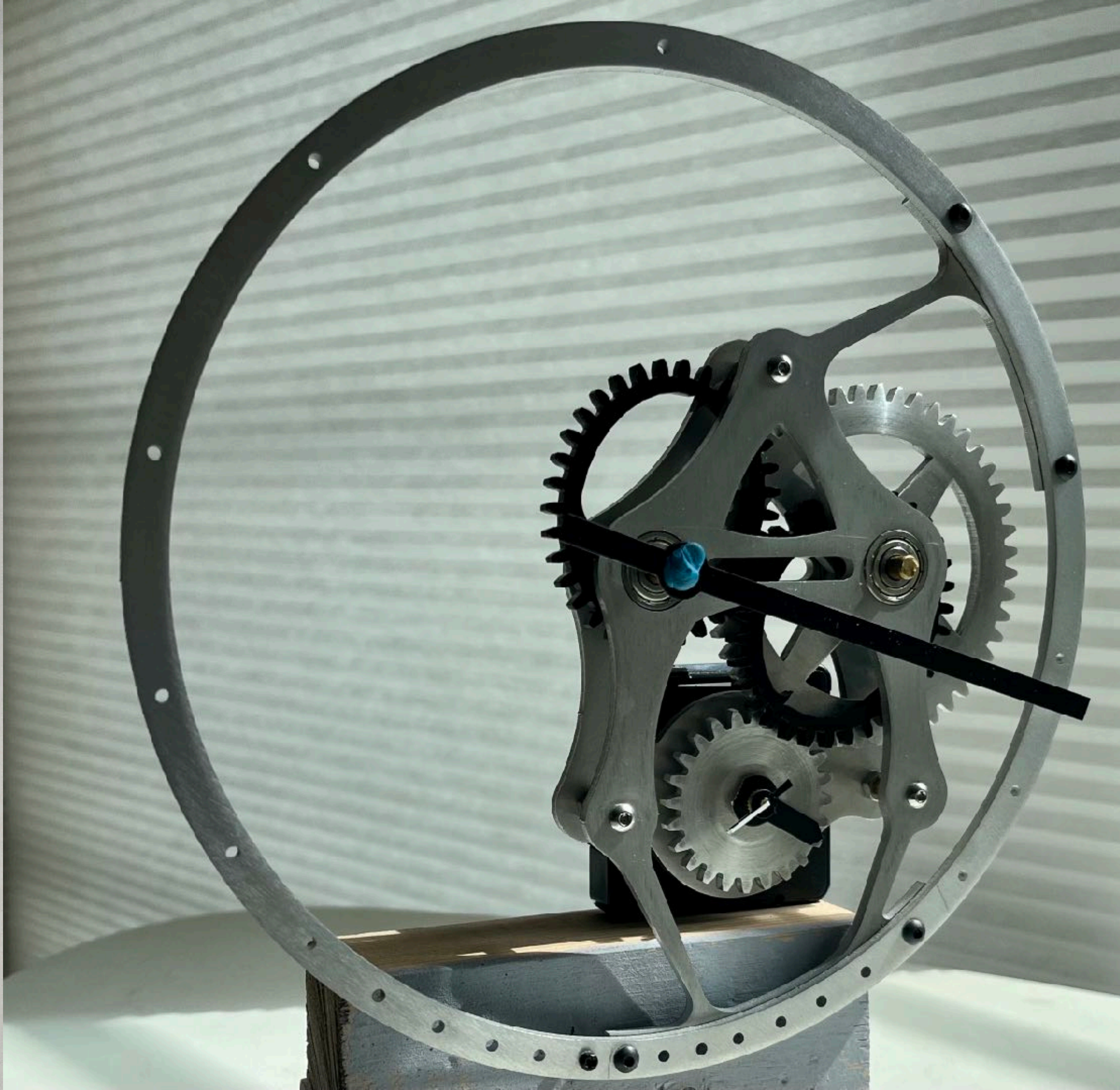
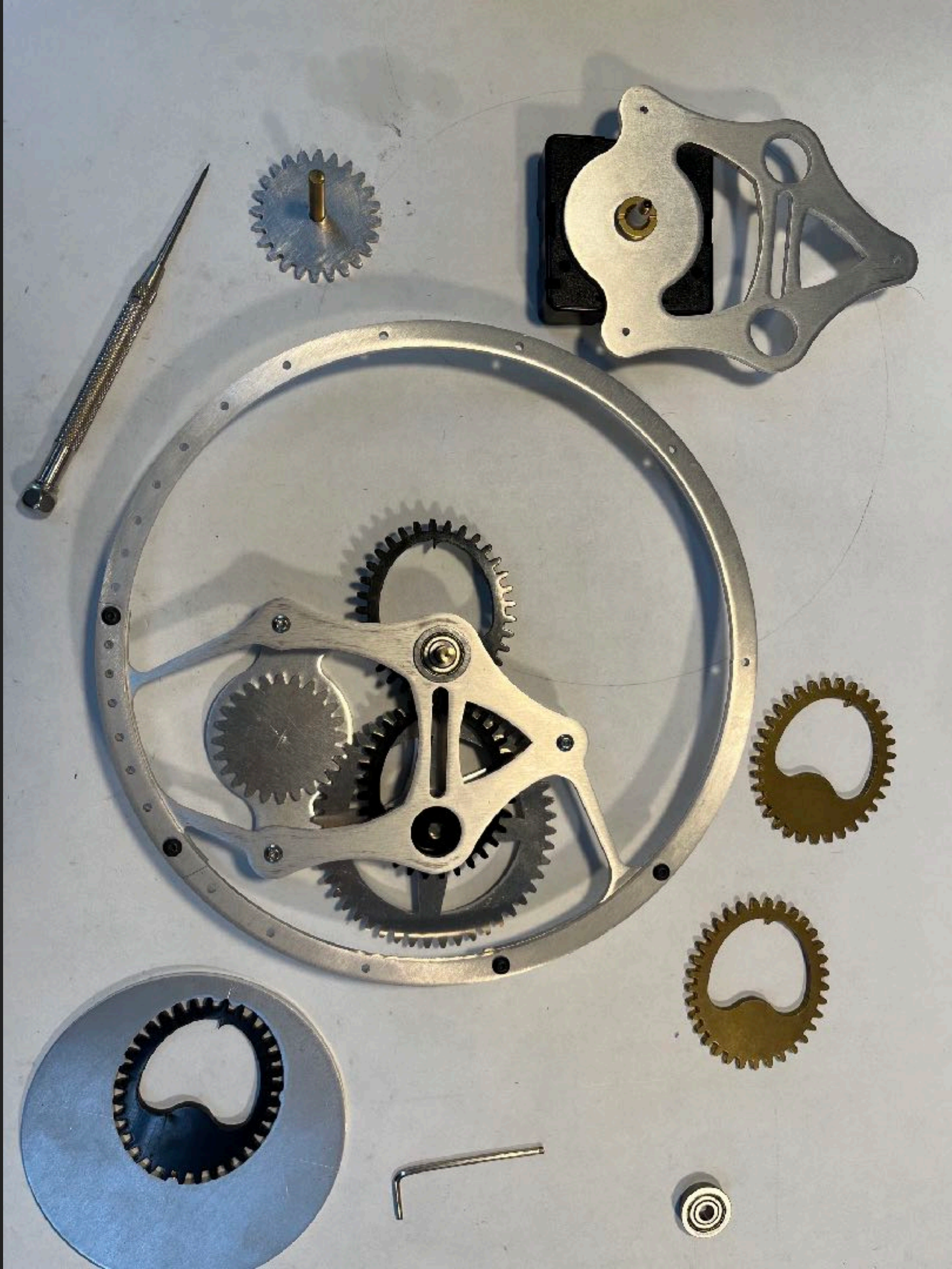




So so much more, some here, some for you to find and share...

<https://www.fddrsn.net/teaching/time/gallery/>

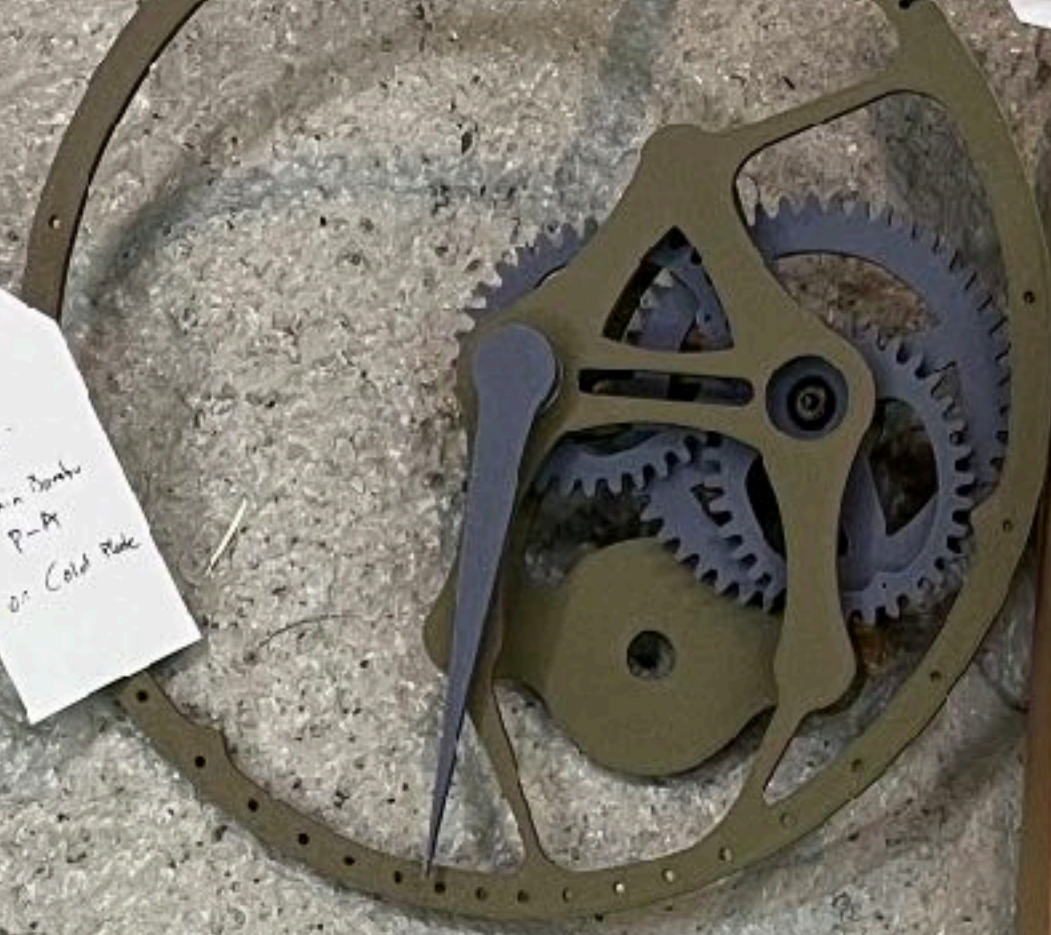




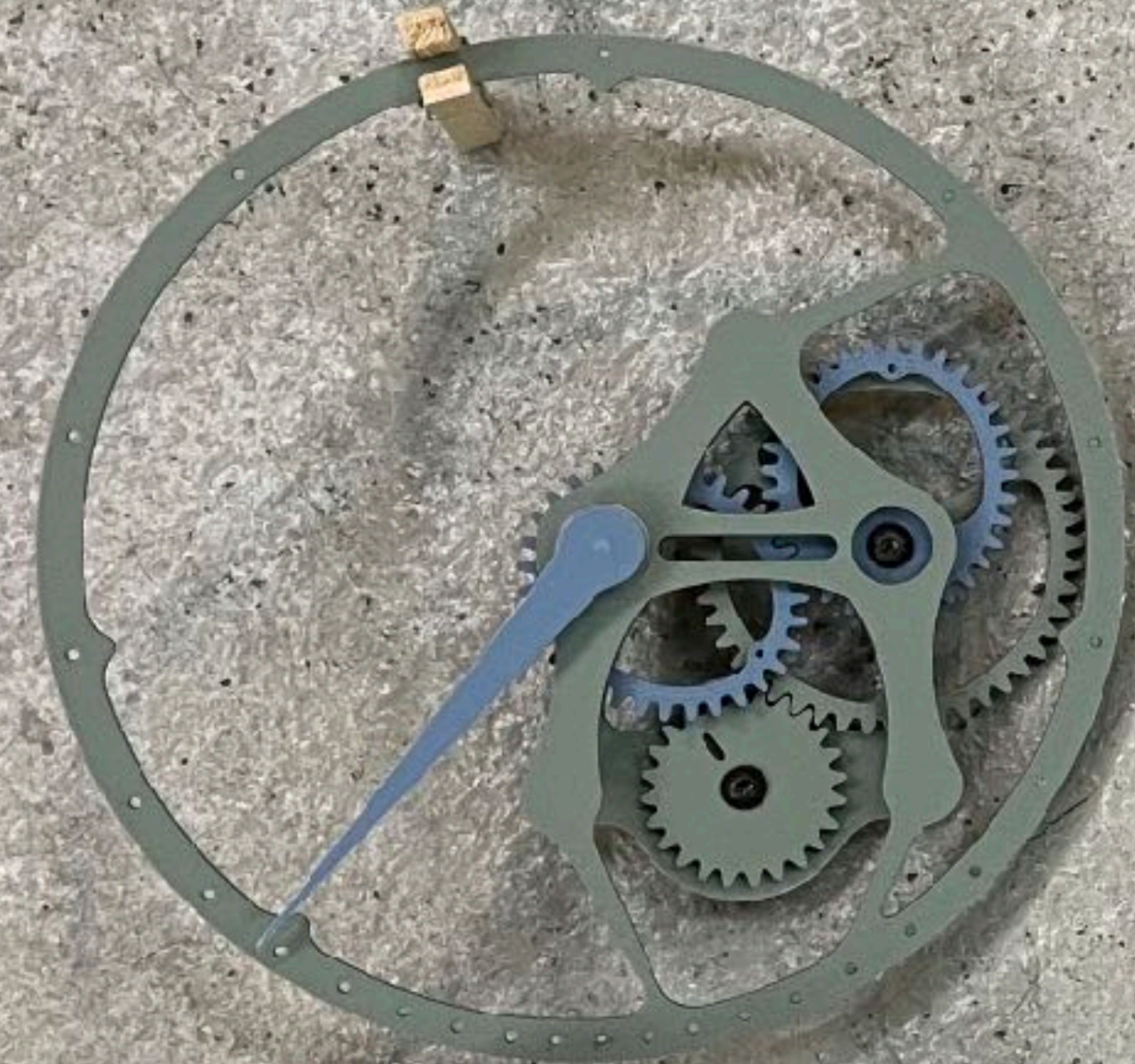




Green -  
Plain Beak  
Push  
or Cold Plate



White Core  
100 (1000)



Grey -  
Dark PLA  
Tough  
Black -  
ASA (P)

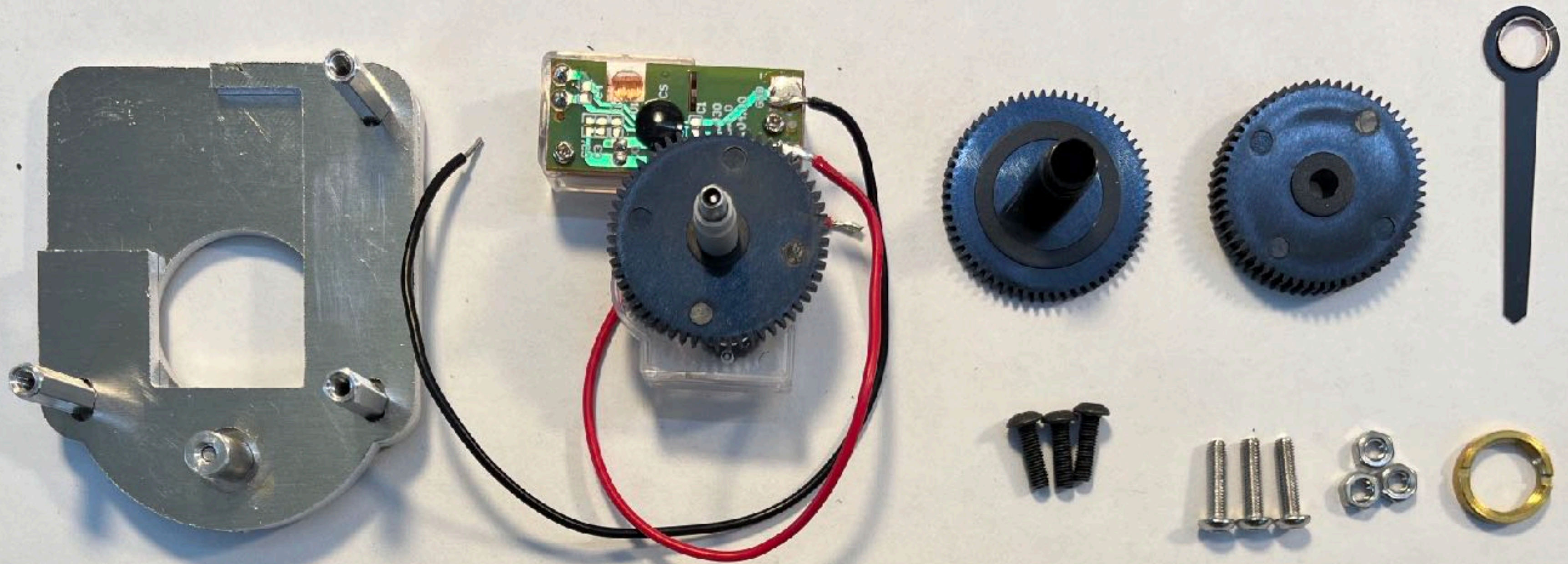


Black  
PLA (P)





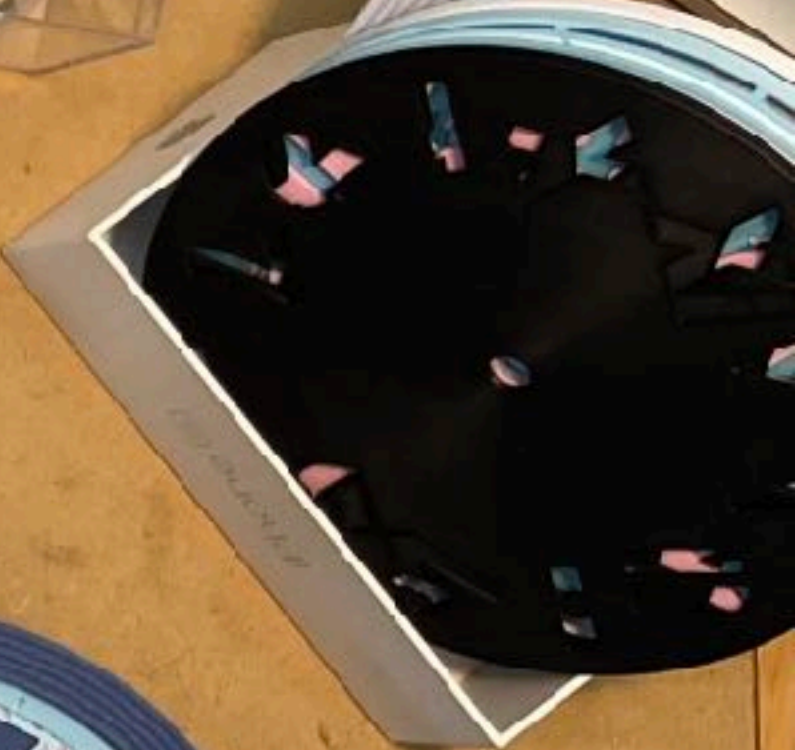
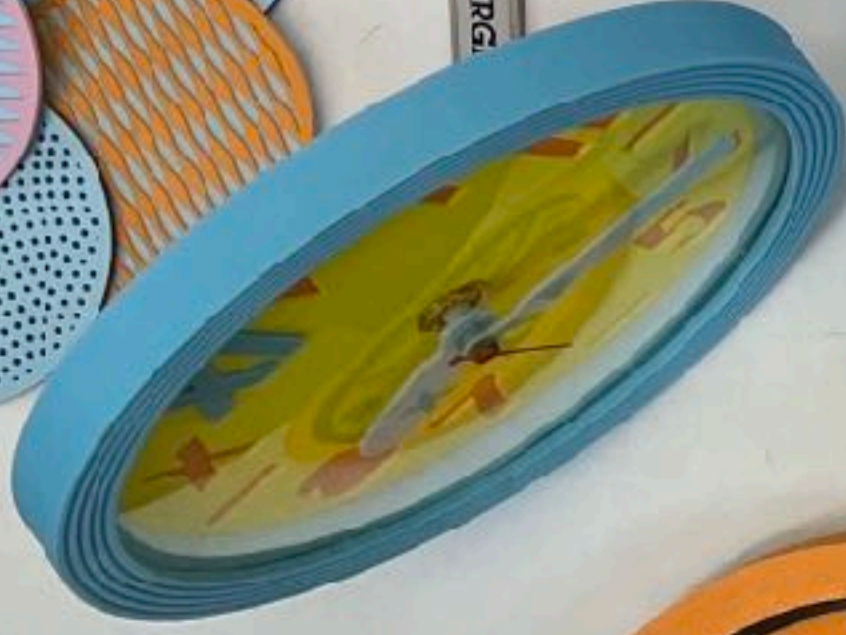
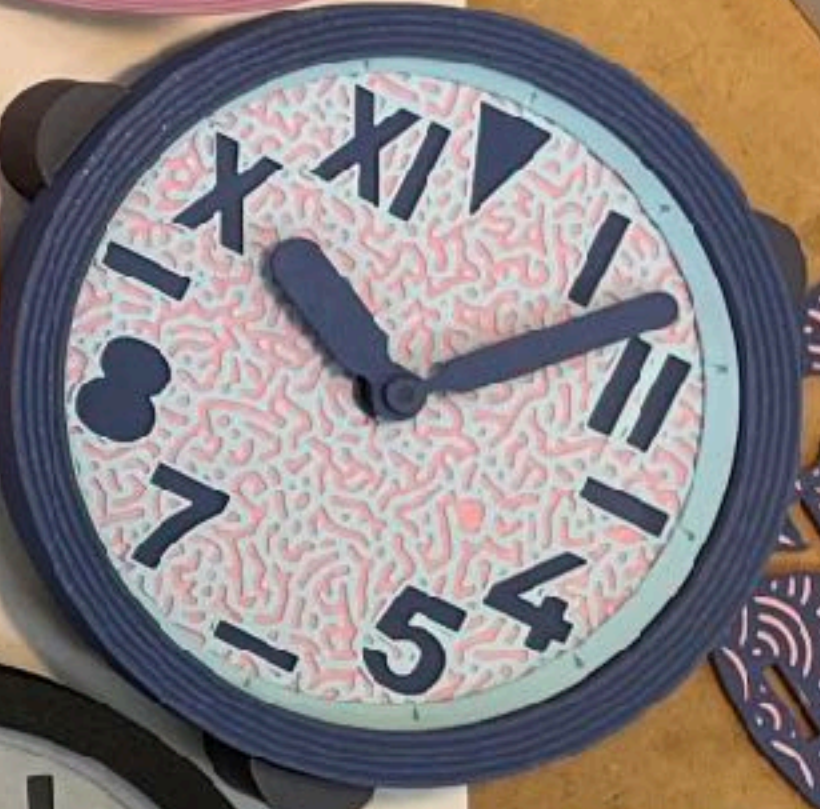




















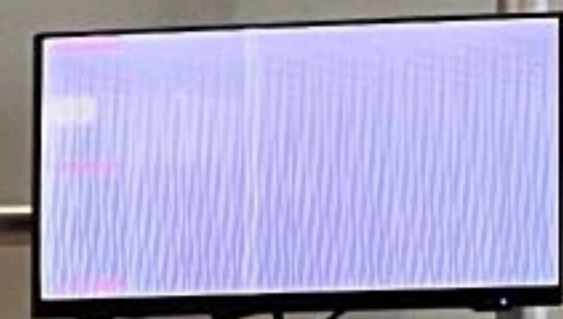
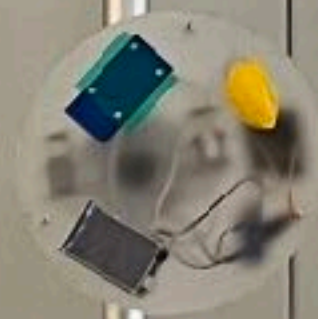


**TIME**

2022

Prof. Jeff Feldman

Xiao Jiang Time (Vital Clock)  
 Rocky Xiaoyu Ke Clock 1  
 Gracy Whellhan Time Lapse  
 Clock Shirley Wu though a  
 patriarchy would privilege the  
 changelessness of the sun  
 over the inconstancy of the  
 moon and you Suraj Barthy US  
 Yaj Shao Fullmoon MJ Gandhi  
 Xela Surf Xiao Tan Chaotic  
 Clock















Heidi Neilson's [Moon Arrow](#) always points at the moon (sometimes it's behind the Earth).



# ACTIVITY: HUMAN PLANETARIUM

Teams formed and assigned an object in the sky.

## 1. Form teams based on your day of week birth date under the International Fixed Calendar

( I am a Tuesday )

Record your day to the shared spreadsheet:





# ACTIVITY: HUMAN PLANETARIUM

Teams formed and assigned an object in the sky.

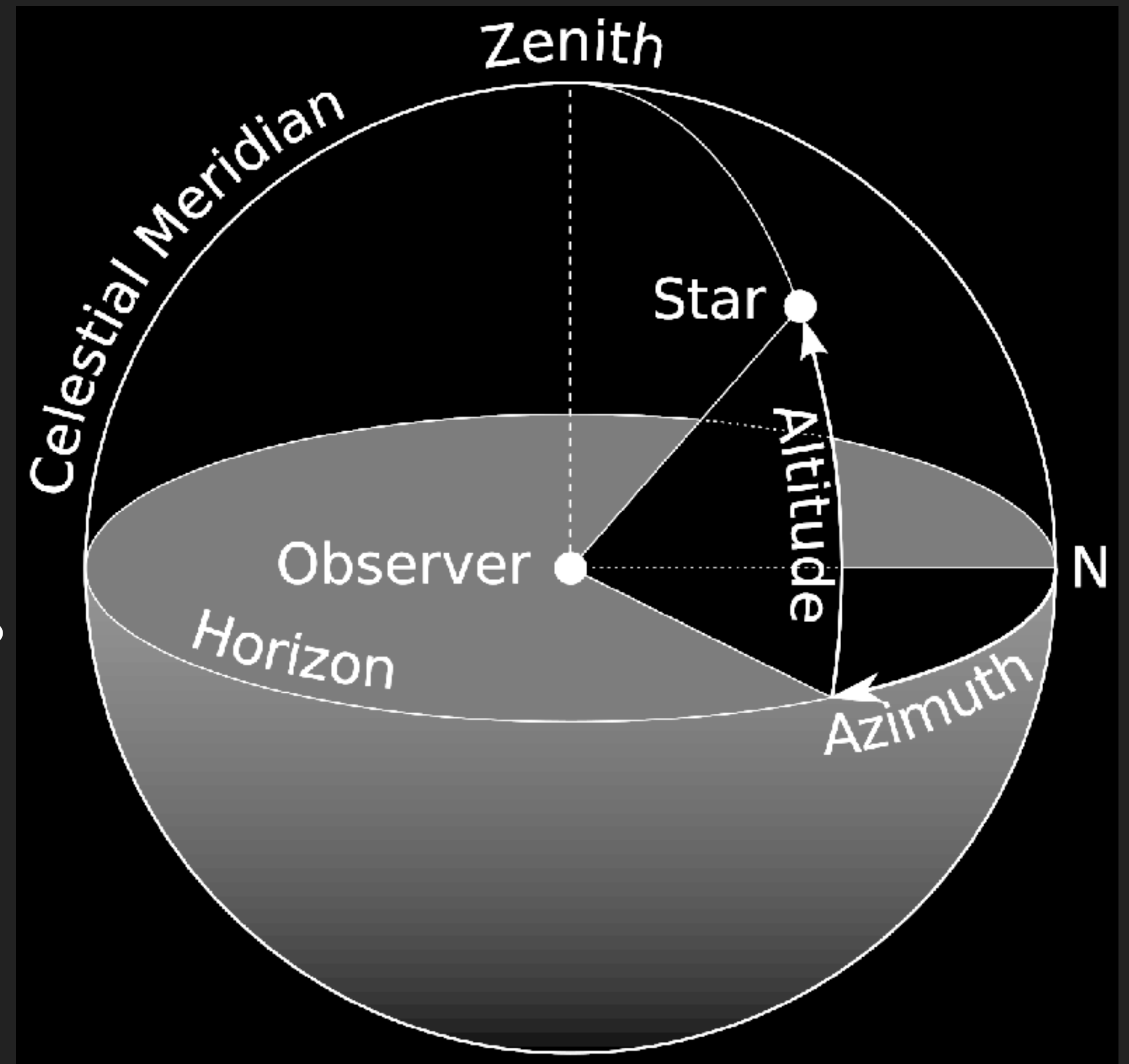
## 1. Form groups.

## 2. Locate your object in the sky.

Use Stellarium, SunCalc and MoonCalc, etc. Make sure to set location to 370 Jay Street, and time to ~7PM EDT today. Find coordinates as Azimuth and Altitude or Elevation (as opposed to Right Ascension and Declination). Use compass and level apps to find direction towards sky object. Set compass to use true (not magnetic) north. Use anything (paper + tape, your arm, anything) as pointers.

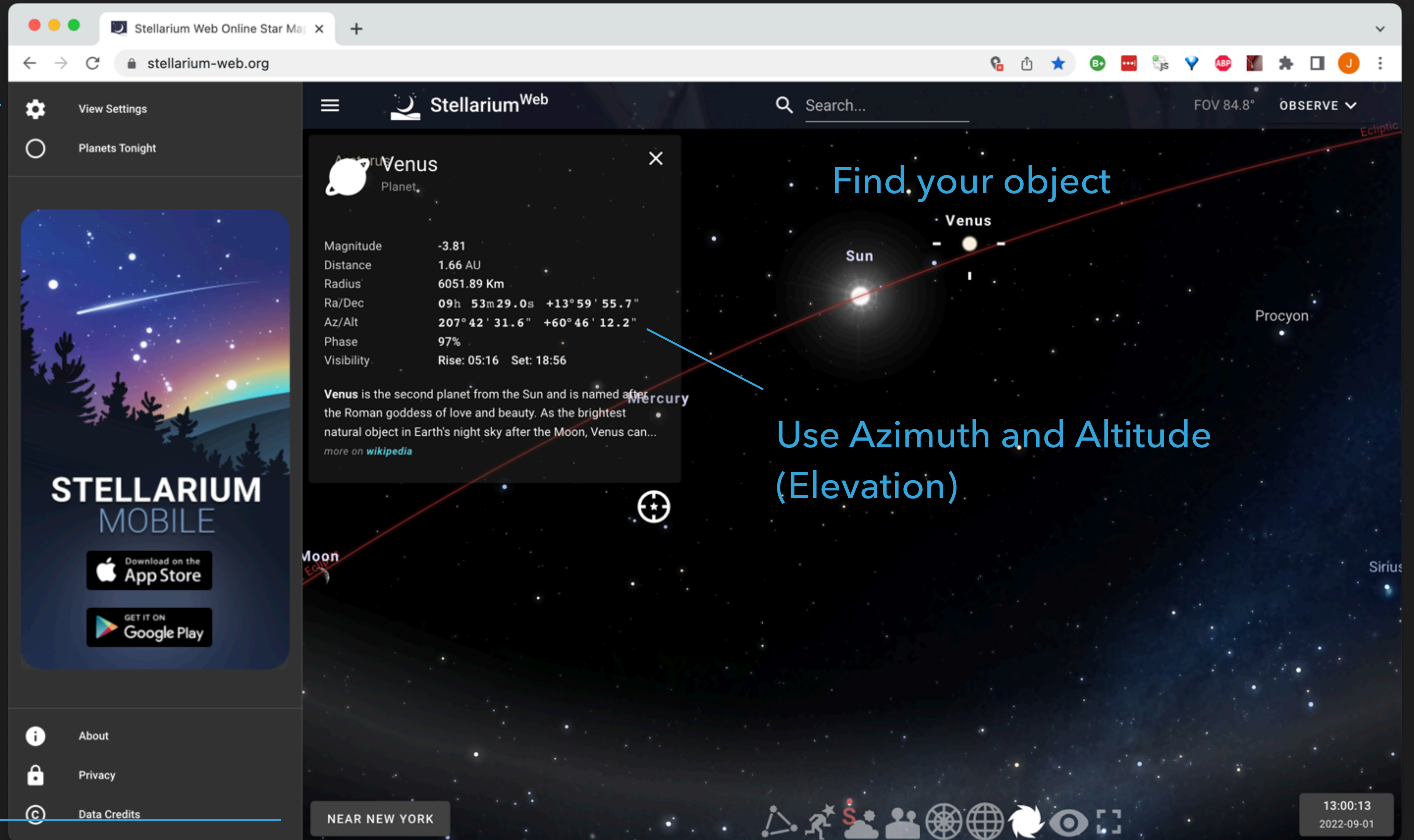
## 3. Get ready to point to your object.

Get creative





Turn on Ecliptic  
in View Settings



Find your object

Use Azimuth and Altitude  
(Elevation)

Set location

Turn off atmosphere and ground

Set to current time

Note - mobile free version is cool but doesn't offer the useful ecliptic setting



# Sky objects

Mars

Mercury

Moon

Venus

Saturn

Polaris

Capella

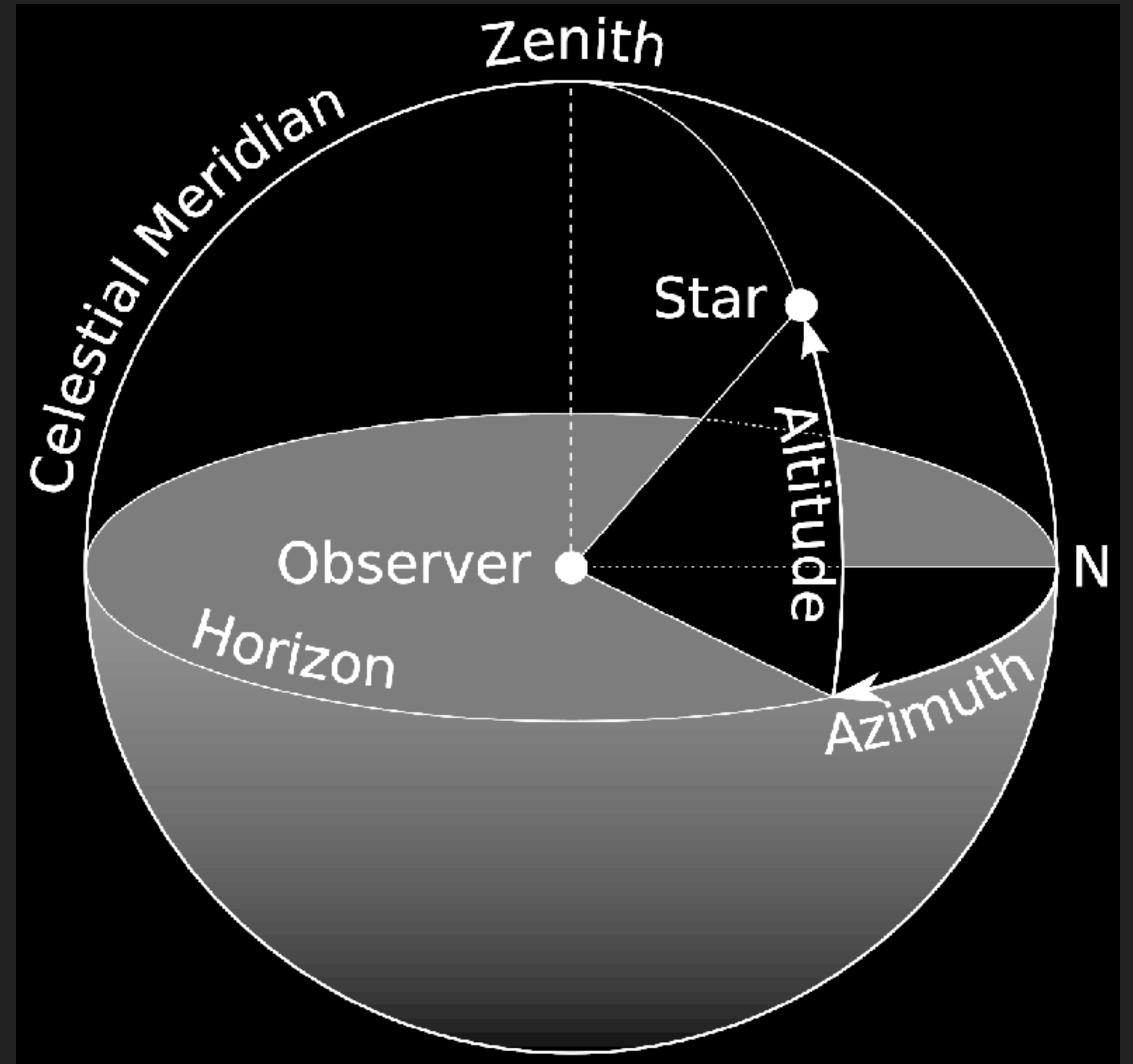
# Azimuth to direction

North = 0

East = 90

South = 180

West = 270





**GNOMON**



**gnomon** (n.)

"vertical shaft that tells time by the shadow it casts" ... from Latin *gnomon*, from Greek *gnōmōn* "indicator (of a sundial), carpenter's rule" ... "one that discerns or examines, interpreter, expert," from *gignōskein* "to come to know," **from Proto-Indo-European root \*gno- "to know."**



# TAOSI GNOMON

Xiangfen 襄汾, Shanxi Province

2300 - 1900 BCE

Oldest gnomon, oldest observatory



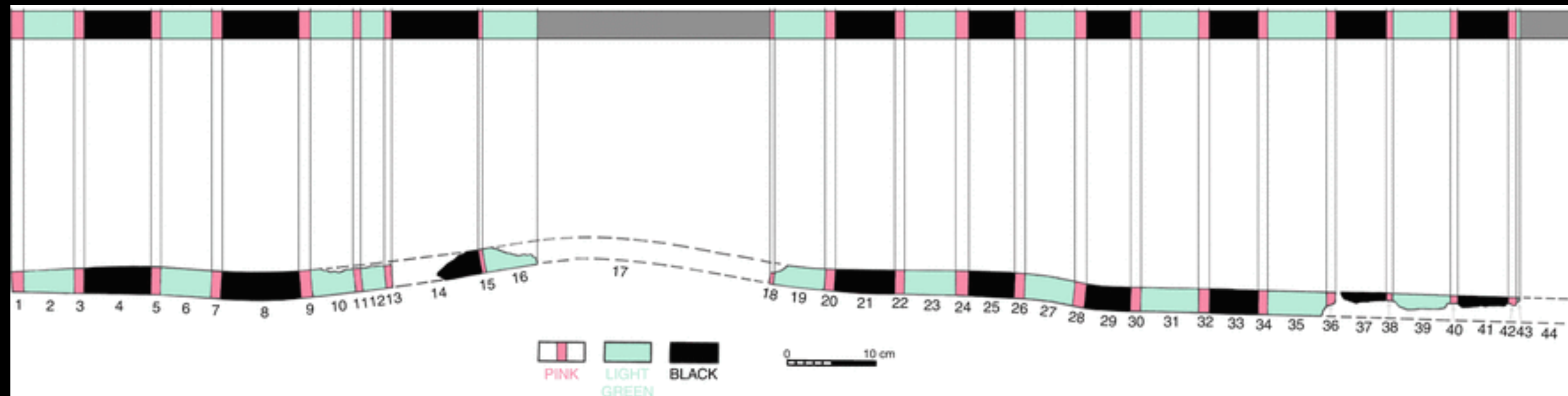


# TAOSI GNOMON

Xiangfen 襄汾, Shanxi Province

23rd - 19th century BCE

Oldest gnomon, oldest observatory





# TAOSI GNOMON

Xiangfen 襄汾, Shanxi Province

2300 - 1900 BCE

Oldest gnomon, oldest observatory







# EGYPTIAN SUNDIAL

13th century BCE  
"temporary hours"





# BYZANTINE SUNDIAL 6TH CENTURY CE







# JANTAR MANTAR, JAIPUR

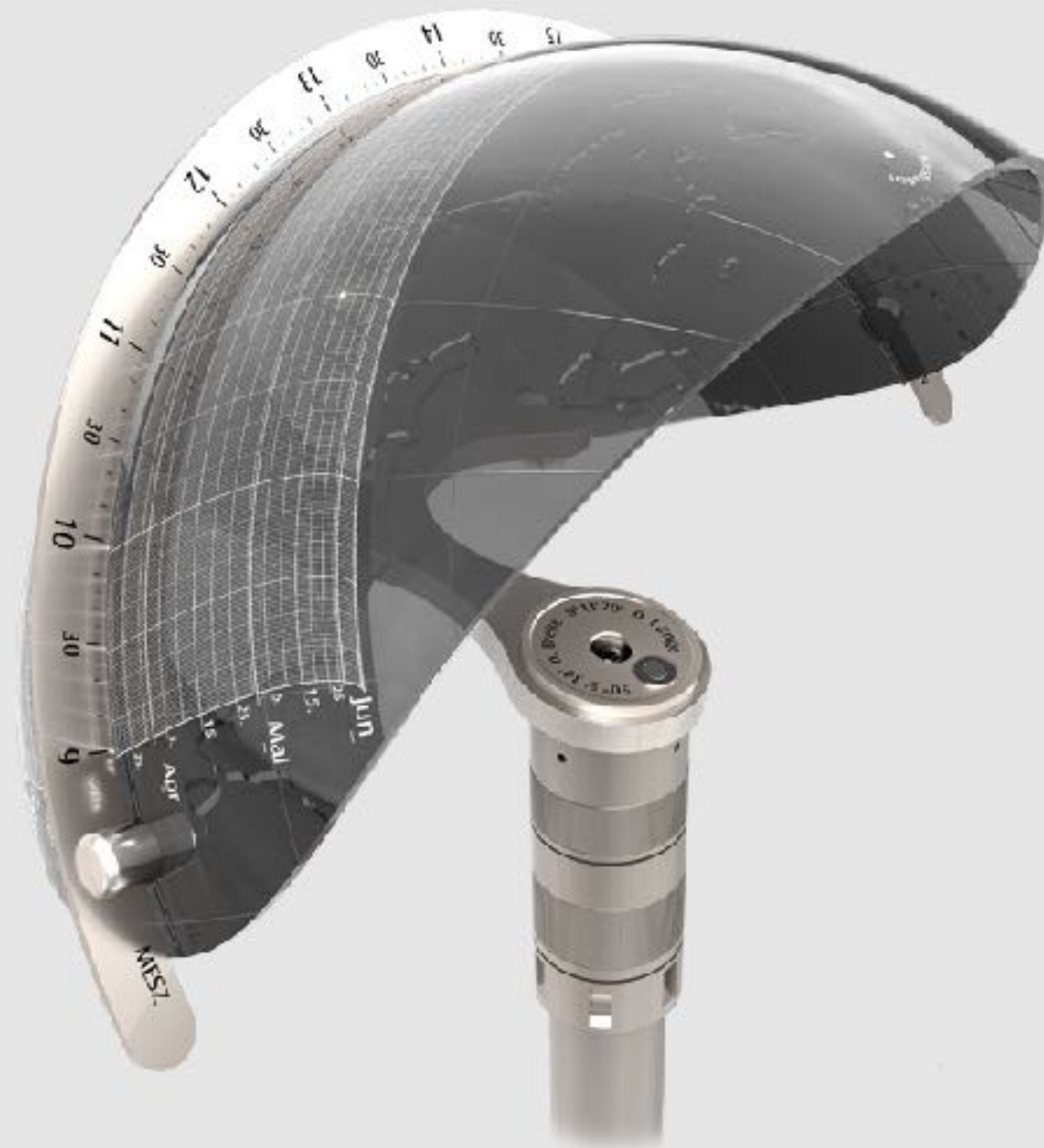




**JANTAR MANTAR, JAIPUR**



HELIOS Subsolaris  
Lichtpunktgenau



SOLAR RING  
400 year success story



<https://www.helios-sonnenuhren.de/en/helios-subsolaris>  
<https://www.helios-sonnenuhren.de/en/helios-solar-ring>

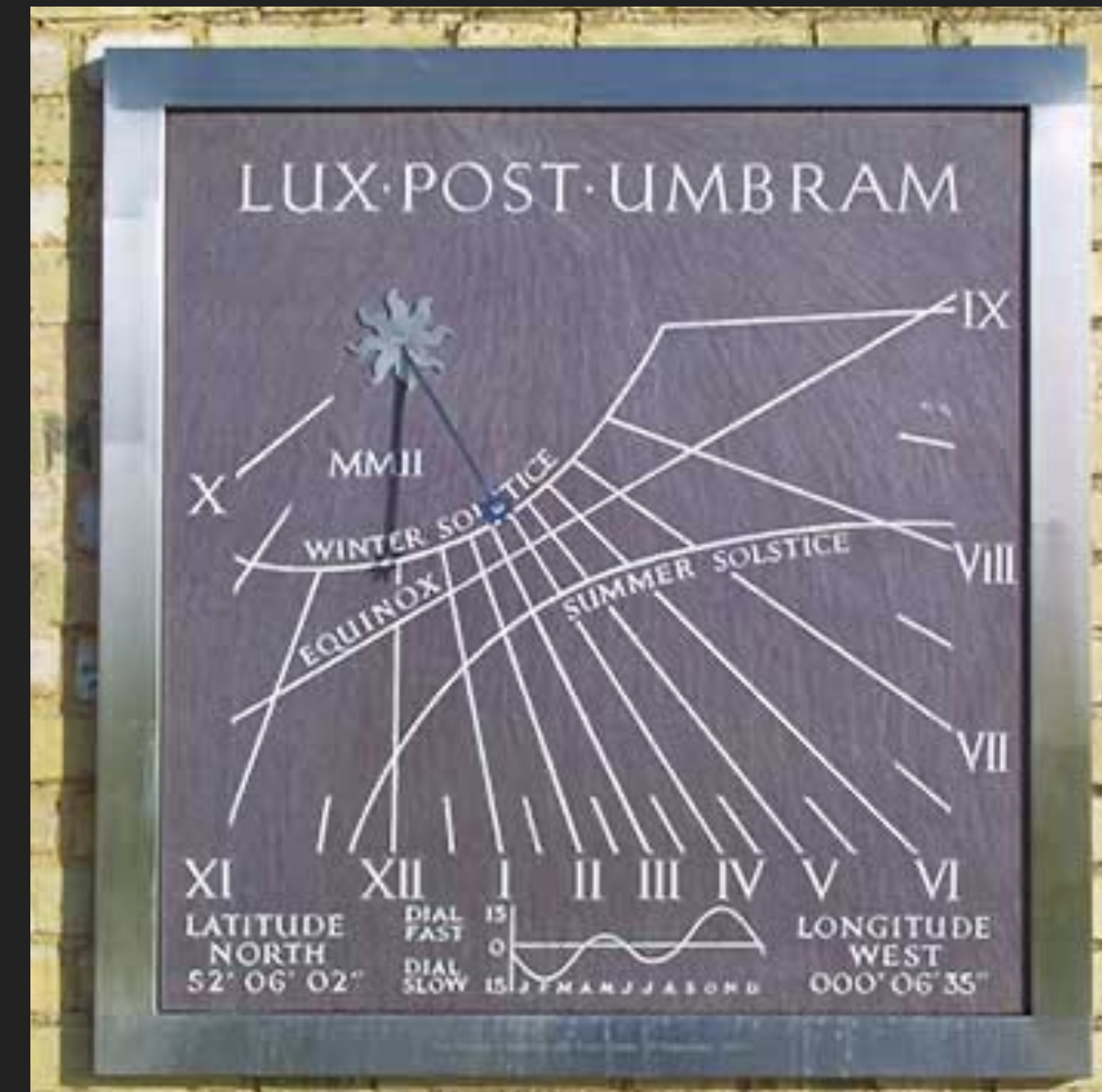


# HORIZONTAL



[sundialsoc.org.uk](http://sundialsoc.org.uk)

# VERTICAL



<https://www.davidharber.co.uk/>



# EQUITORIAL



[ebay.com](http://ebay.com)

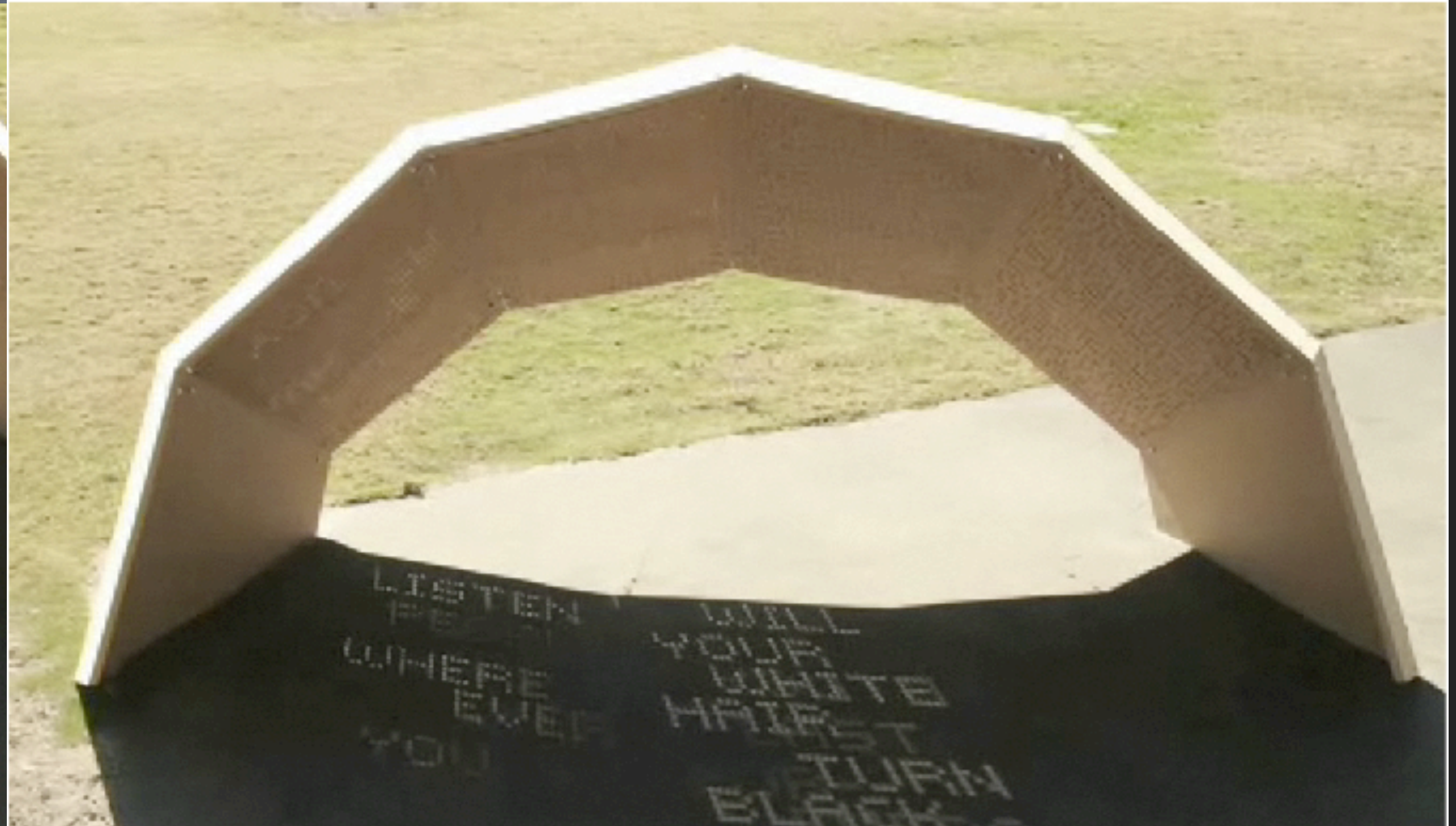
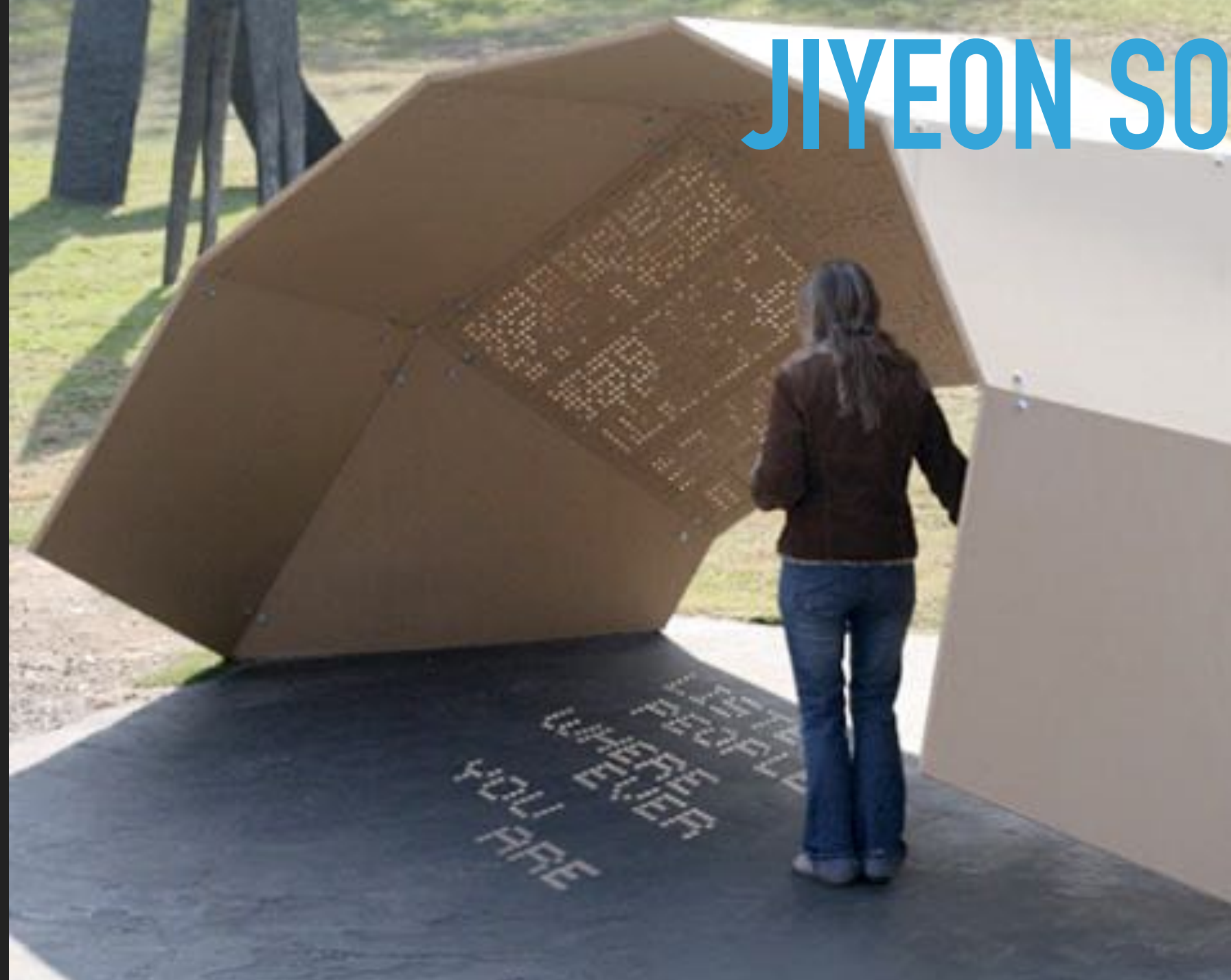
# CONCAVE



[Jang Yeong-sil Science Garden](http://Jang Yeong-sil Science Garden)



# JIYEON SONG, ONE DAY POEM PAVILION







**DIGITAL**

<https://www.thingiverse.com/thing:1068443>



# EVERY CITY IS A SUNDIAL



[https://www.youtube.com/watch?v=\\_E3lqHq2tNU](https://www.youtube.com/watch?v=_E3lqHq2tNU)





**MANHATTAN HENGE**



EVERY WINDOW...





EVERY WINDOW ...





Computation path of the sun for:

11201-1832 New York, USA

04.Sep.2019 12:00 UTC-4 >|<

Solar data for the selected location

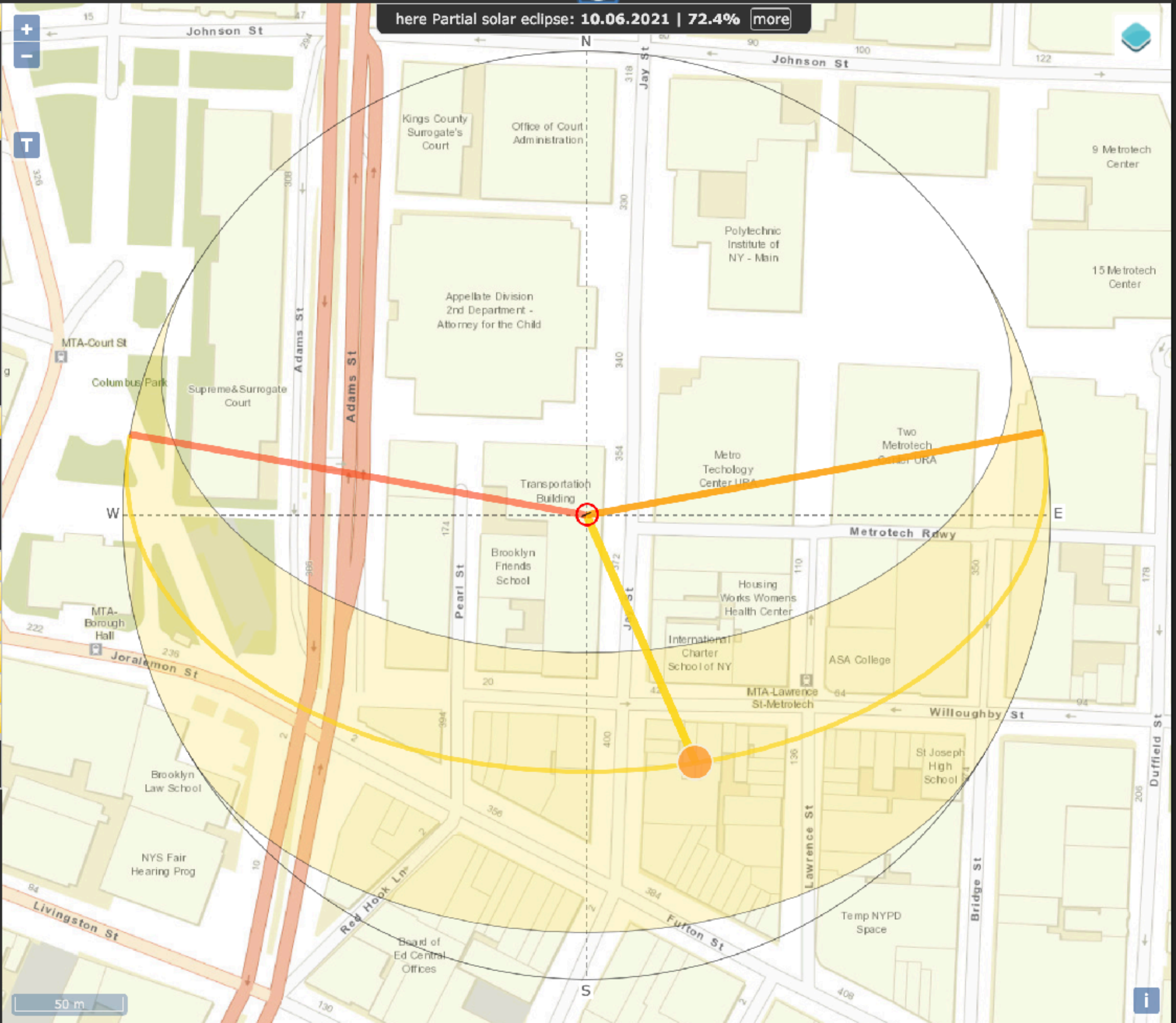
Dawn: 05:57:42  
 Sunrise: 06:25:20  
 Culmination: 12:55:00  
 Sunset: 19:23:57  
 Dusk: 19:51:30  
 Daylight duration: 12h58m37s  
 Distance [km]: 150.869.998  
 Altitude: 54.26°  
 Azimuth: 156.18°  
 Shadow length [m]: 0.72  
 at an object level [m]:

Geodata for the selected location

Height: 37m   
 Lat: N 40°41'34.86" 40.69302°  
 Lng: W 73°59'14.96" -73.98749°  
 UTM: 18T 585548 4505173  
 TZ: America/New\_York DST EDT

- More solar data
- Print
- Contact
- Help & API
- The same for the Moon
- Legal Disclosure / Privacy Policy

This website In German language  
[sonnenverlauf.de](http://sonnenverlauf.de)





Computation path of the sun for:

11201-1832 New York, USA

04.Sep.2019 14:54 UTC-4 >|<

Solar data for the selected location

Dawn: 05:57:42  
 Sunrise: 06:25:20  
 Culmination: 12:55:00  
 Sunset: 19:23:57  
 Dusk: 19:51:30

Daylight duration: 12h58m37s  
 Distance [km]: 150.865.563

Altitude: 47.20°  
 Azimuth: 226.44°

Shadow length [m]: 0.93  
 at an object level [m]: 1

Geodata for the selected location

Height: 37m

Lat: N 40°41'34.86" 40.69302°  
 Lng: W 73°59'14.96" -73.98749°  
 UTM: 18T 585548 4505173  
 TZ: America/New\_York DST EDT

More solar data


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