

Network for  
Astronomy  
School  
Education

WELCOME TO

# REMEMBERING JAY PASACHOFF

BETELGEUSE OCCULTATION

*An IAU NASE + Eclipse WG workshop*

*December 16, 2023, online meeting*

# Introduction



The Network for Astronomy School Education (IAU-NASE), organized this special workshop in honor of a colleague and a friend, Jay Pasachoff, one of the most famous astronomers on the planet.



Almost all the people devoted to the astronomical observation, professionals and amateurs, know his *A Field Guide to the Stars and Planets*, and he majority of whom are aware of his professional and personal passion for eclipses, where part of some of his travels as an “eclipse follower”.



Jay is not any more among us, but his face, enthusiasm, charisma are and will be always present.



# Navigating this Meeting

## CONTENT COMPASS:

- 01 Overview

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- 02 Part 1: Betelgeuse occultation

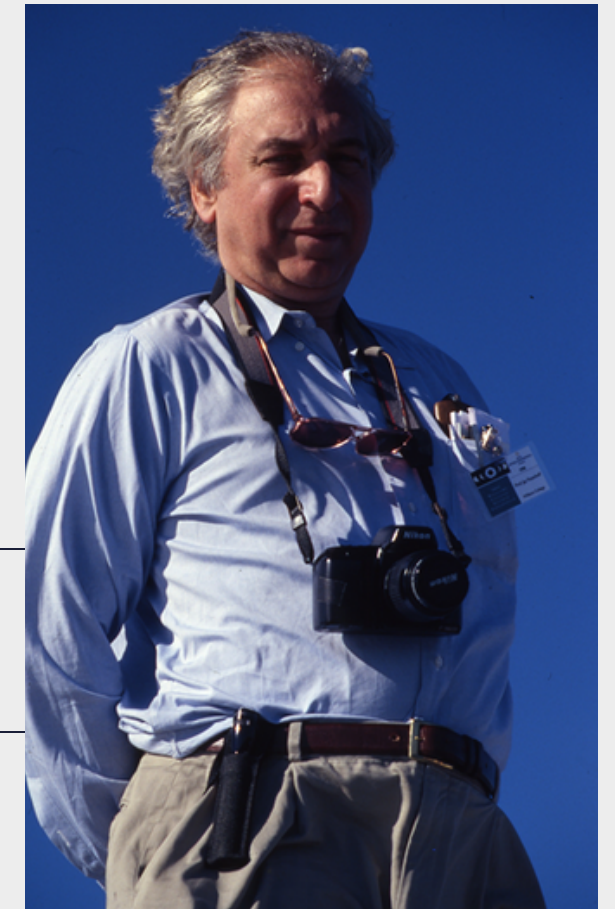
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- 03 Part 2: Jay Pasachoff's profile

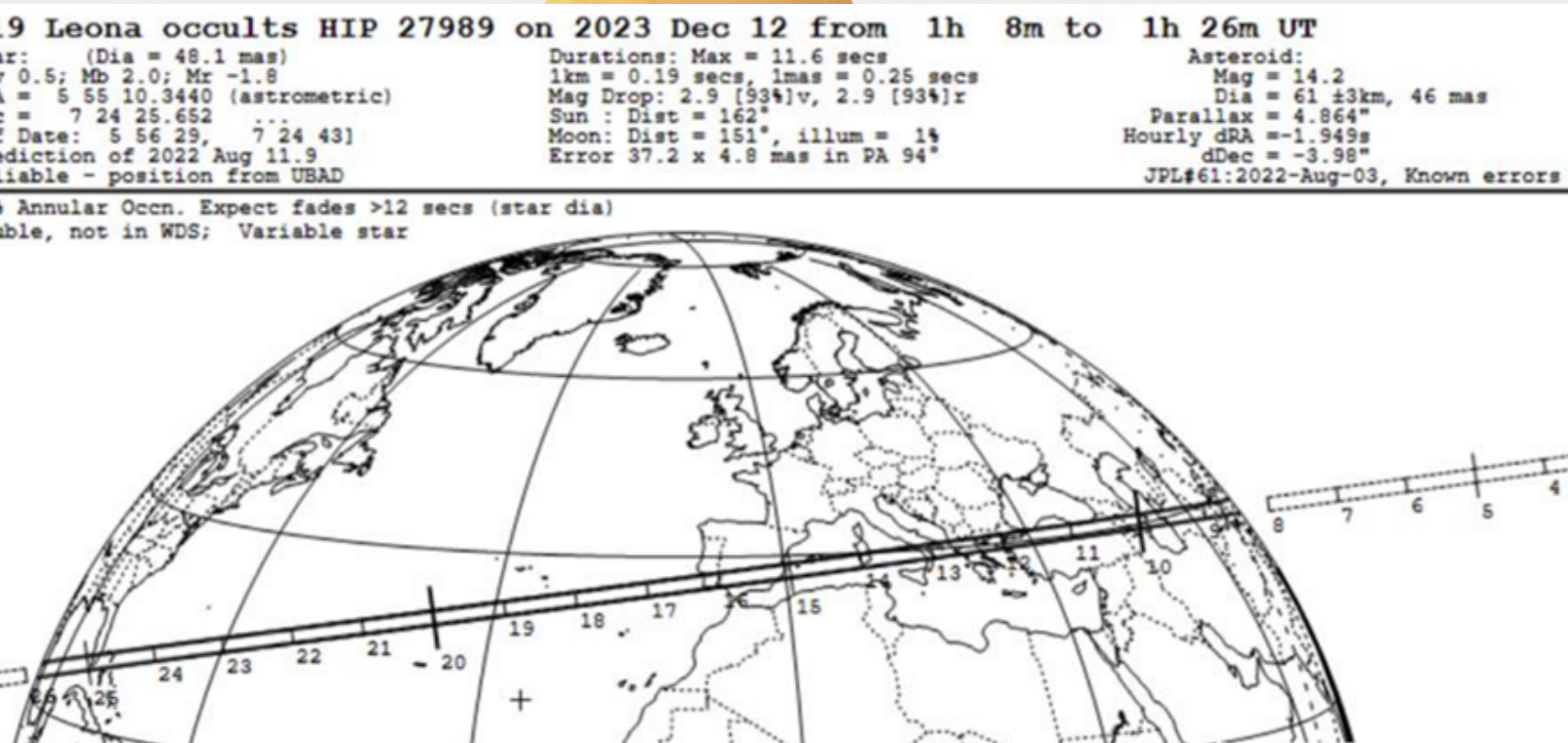
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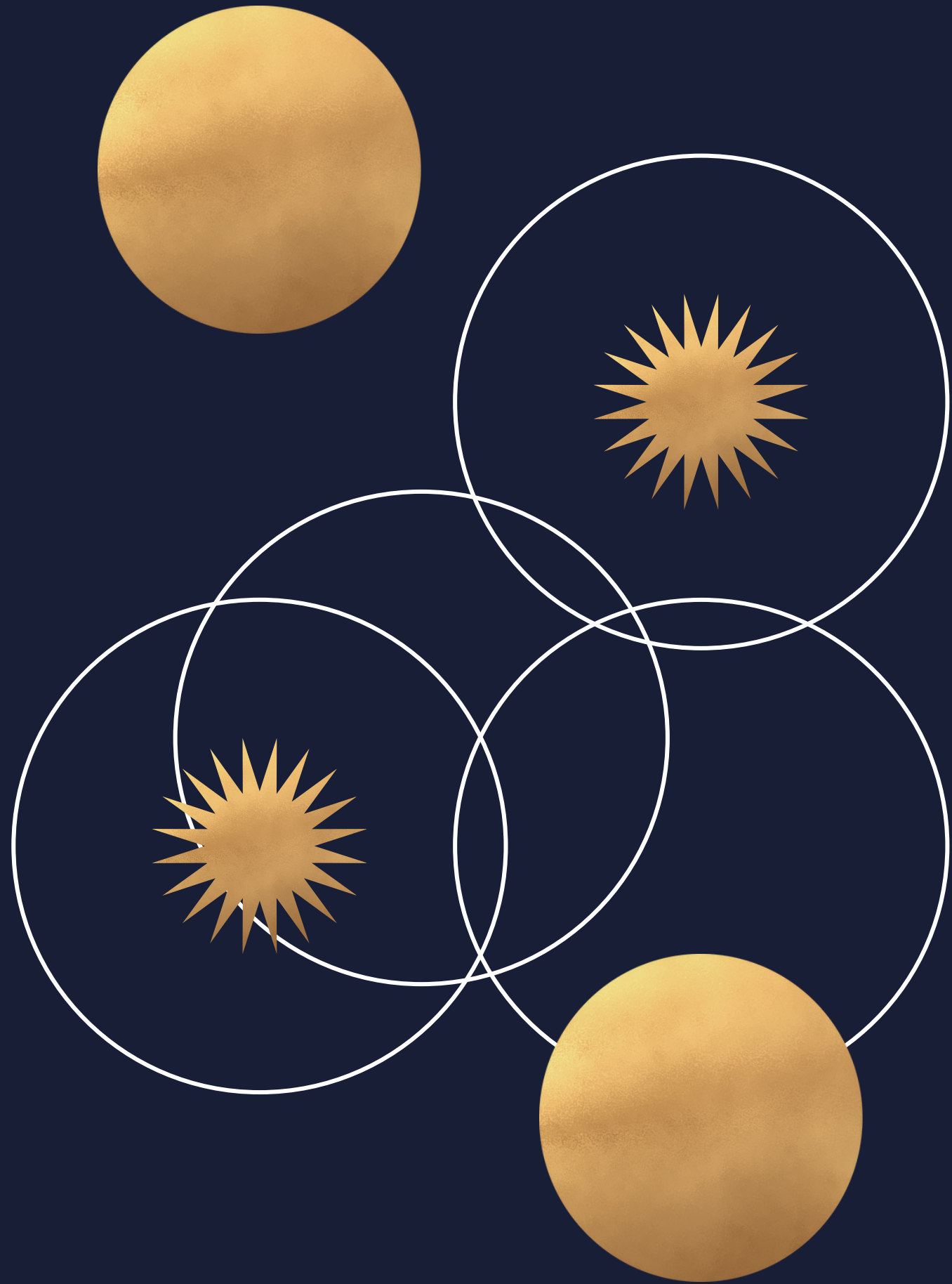
- 04 Closing remarks

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See the [WS at the NASE YouTube Channel](#) →



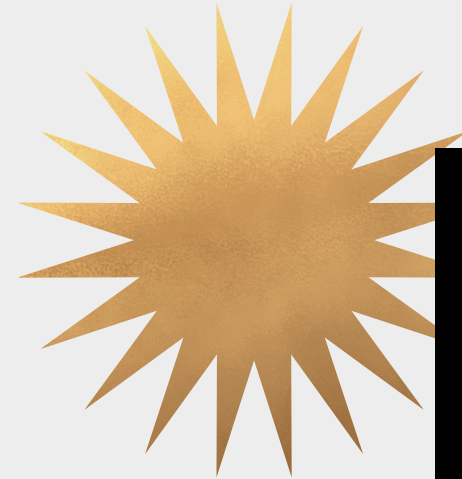


# OPENING SESION

Rosa M. Ros

Beatriz García

# Betelgeuse occultation



Occultations  
and eclipses

Costantino Sigismondi  
IRoma, Italy

Student  
Observers

Jose M. Diaz,  
Ubeda, Spain

Amateur  
Observers

Carles Schnabel  
AA Sabadell, Spain



Η επιπρόσθηση του Betelgeuse από τον αστεροειδή Leona 319  
στη μνήμη του Καθ. Jay Pasachoff  
12 – 12 – 2023, 03:12 το ξημέρωμα  
Παρατήρηση: KERDOS OBSERVATORY, Γρεβενά

Εκδήλωση στο Ελληνικό Μουσείο Μετεωριτών  
Τετάρτη 13 Δεκεμβρίου 2023  
20.00 – 21.15

Κεντρικός ομιλητής: κος Τάκης Θεοδοσίου  
Συντονιστής για την Ελλάδα ASTEROID DAY  
«Η επιπρόσθηση του Beltegeuse από τον αστεροειδή Leona 319»

Οργάνωση:  
Δρ. Μαργαρίτα Μεταξά, Εθνική Συντονίστρια στην Ελλάδα  
Γραφείου για την Διάχυση της Αστρονομίας, Διεθνής Αστρονομική Ένωση  
Καθηγήτρια Αρακαείου  
Μουσείο Μετεωριτών

A star chart of the constellation Orion, showing the positions of stars alpha, gamma, and beta. The chart includes various logos and text in Greek.

International  
Project

Margarita Metaxa  
Greece



# Jay as a near Collaborator

NASE AND JAY PASACHOFF

IAU NASE

Didactics of Astronomy

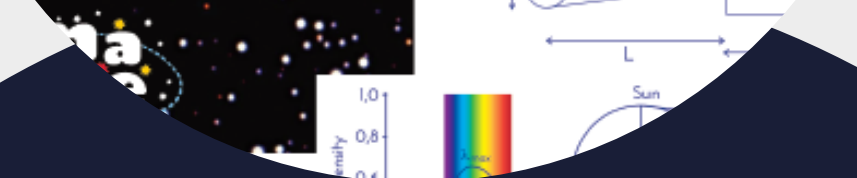


## 4 steps to the Universe

Astronomy course for teachers and science graduates

Network for Astronomy School Education NASE International Astronomical Union IAU

Editors: Rosa M. Ros and Mary Kay Hemenway



Historia de la astronomía  
Jay Pasachoff, Magda Stavinschi,  
Mary Kay Hemenway

NASE Author



Cultural Astronomy

IAU NASE



# Onward: Our Journey

ENCOUNTERS WITH A NOTABLE MAN



**GALAPAGOS  
2005**

Jay Pasachoff  
with Naomi



**HAWAII,  
2015**

AT the IAU Assembly,  
with Paulo Bretones

**ARGENTINA  
2017**

Partial solar eclipse

**RIO DE JANEIRO  
2009**

With John Hearshaw,  
Rosa Ros, Magda  
Stavinski



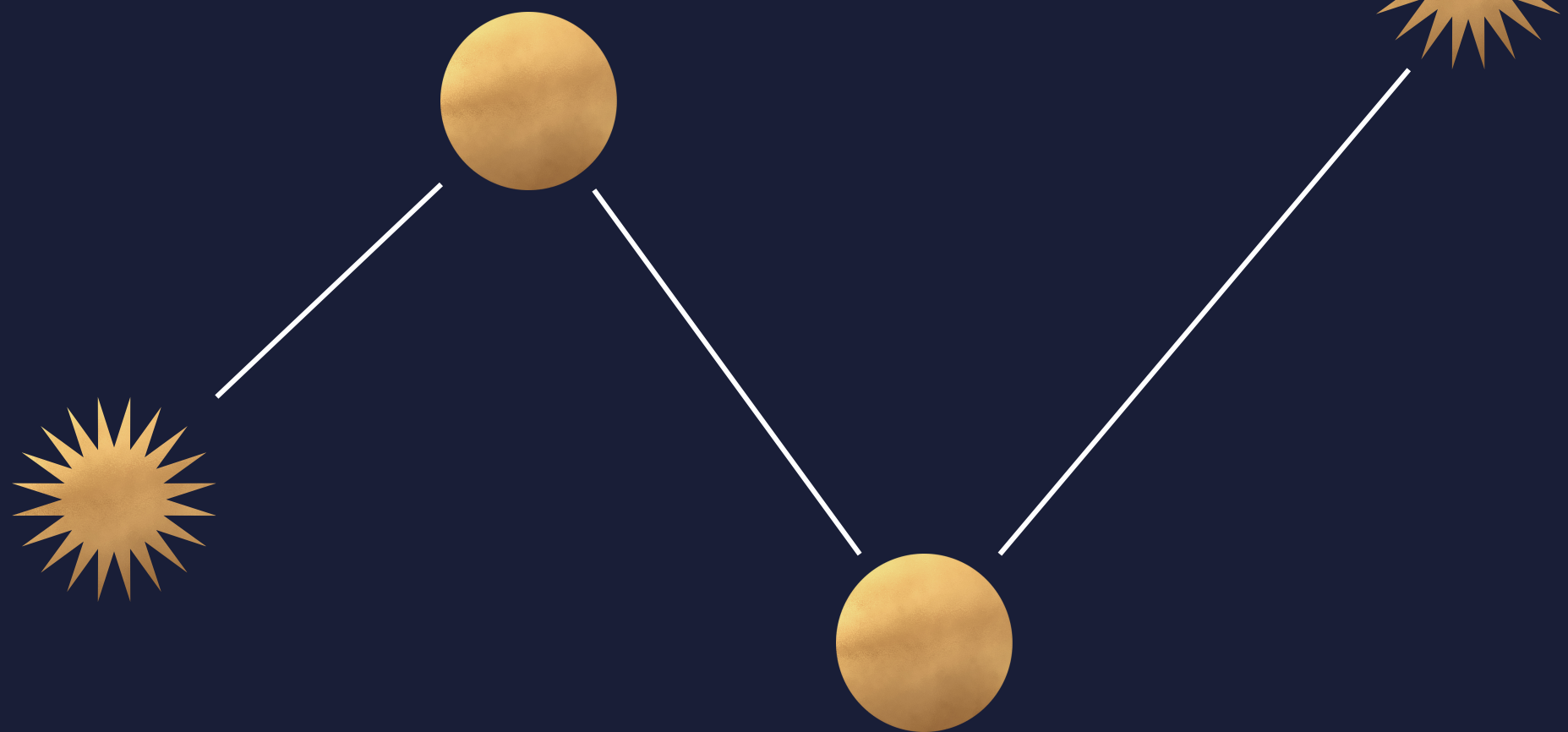
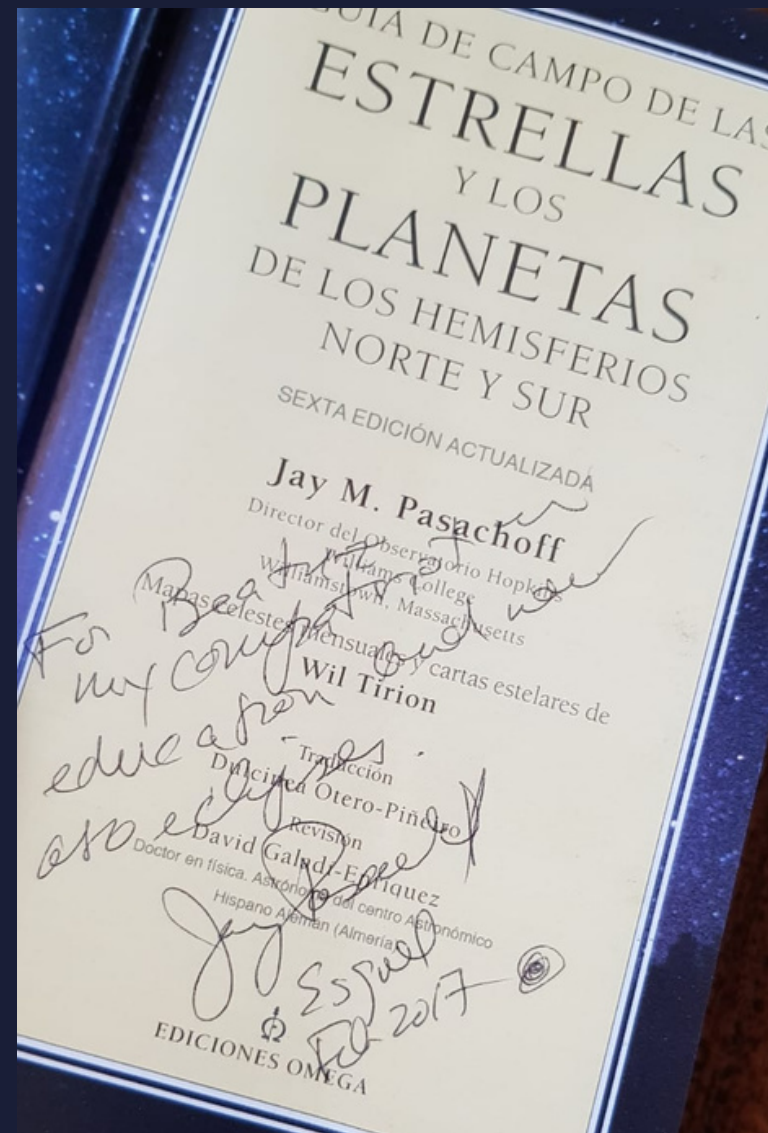
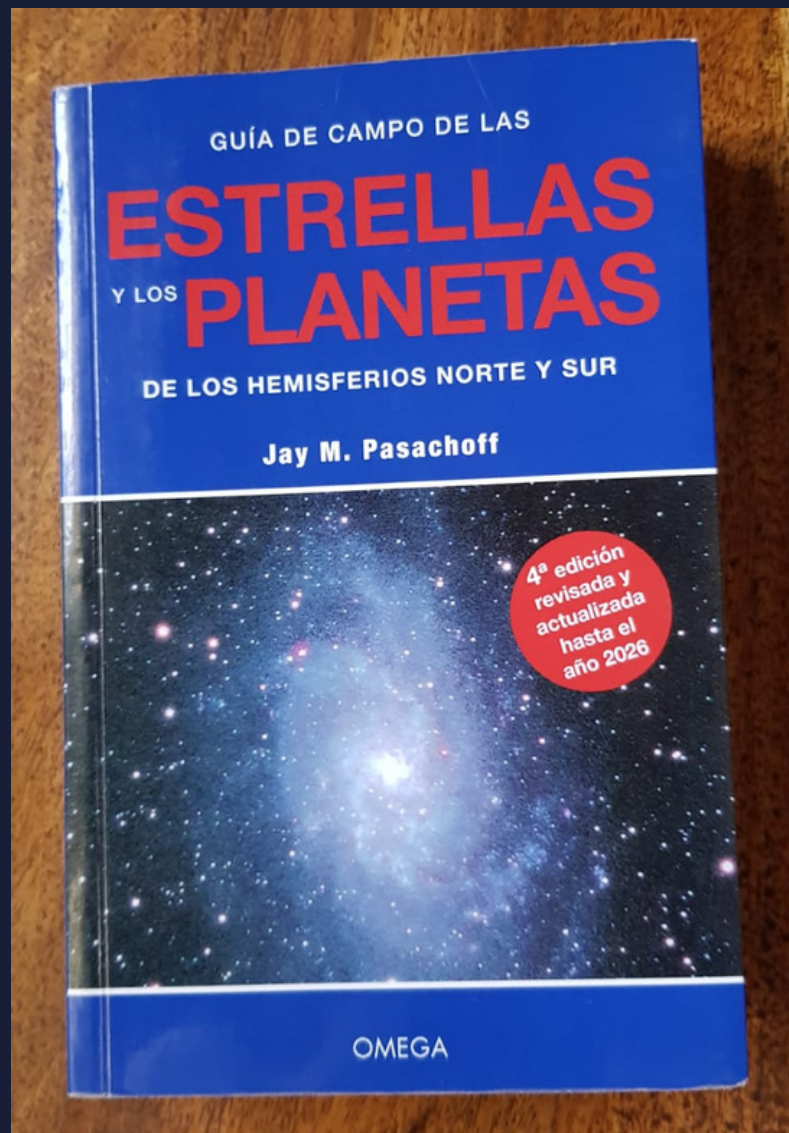
# Some memories





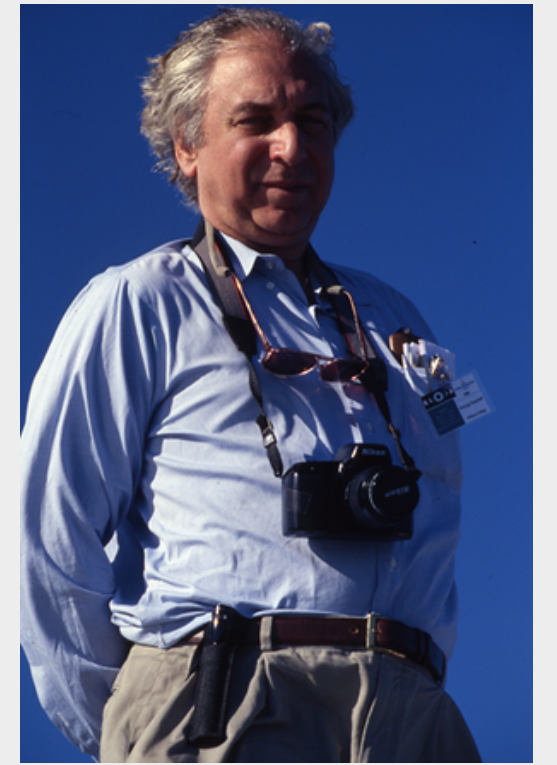
# The Journey Begins!

LET'S NAVIGATE OUR WAY

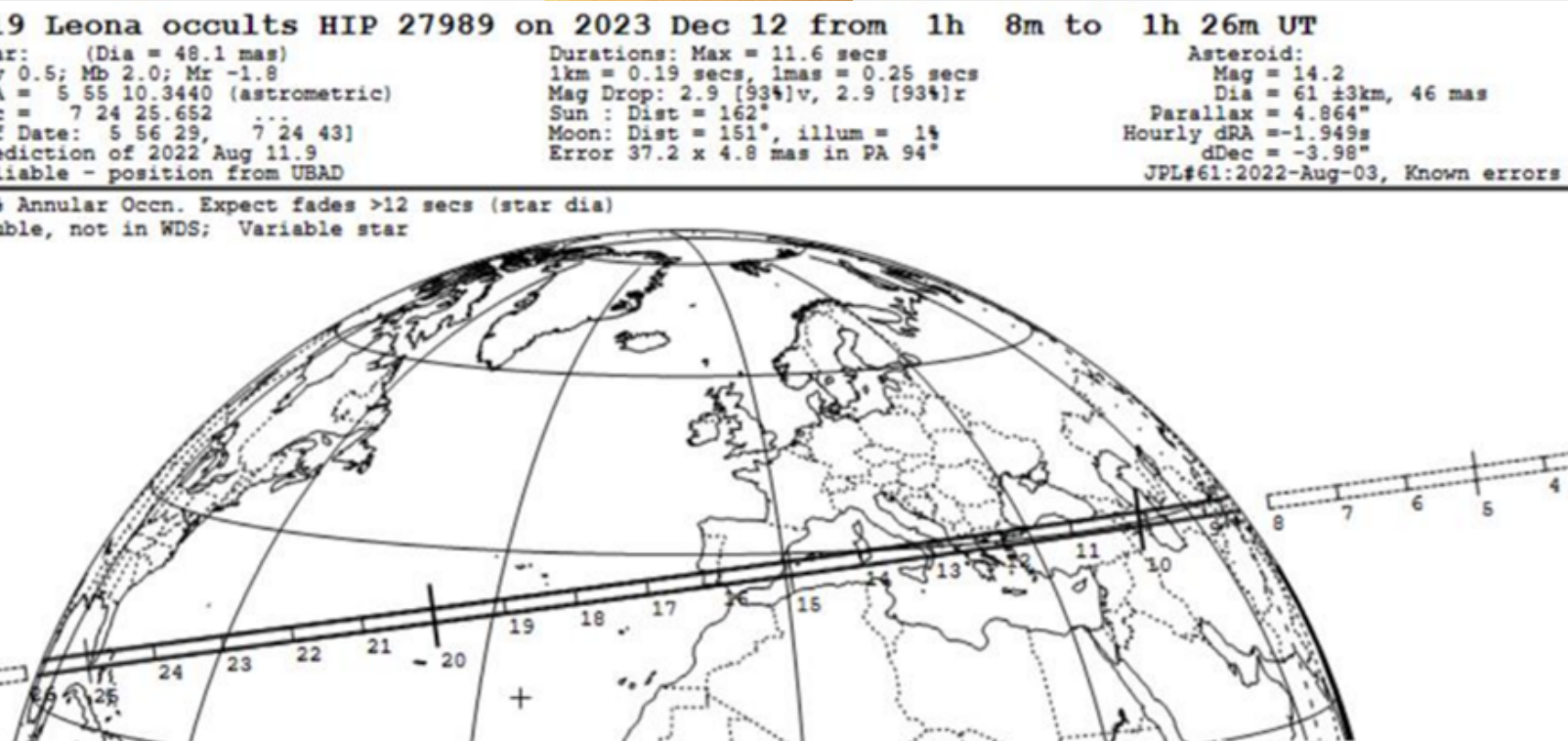


Tribute to Jay Pasachoff

# Navigating this Meeting



## Part 1: Betelgeuse occultation



13:45 - 14:15 “Betelgeuse occultation”, Carles Schnabel, Associació Astronòmica de Sabadell, Sabadell, Spain.

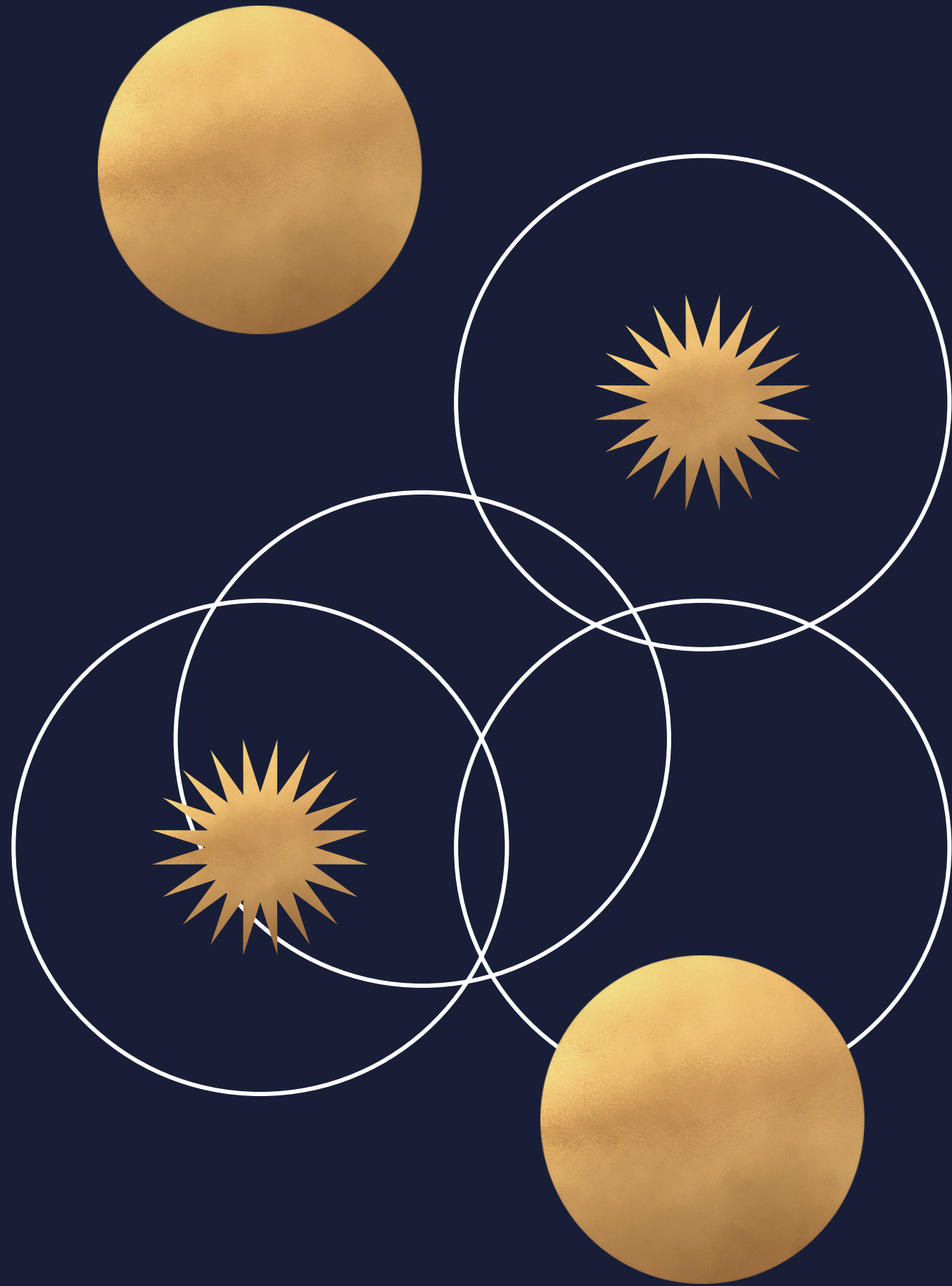
14:15 - 14:30 “Observations from Andalucia, Spain”, José M. Díaz, Úbeda, Spain

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14:30 - 14:45 “Solar and stellar diameters with eclipses and occultations”, Costantino Sigismondi, Roma, Italy.

14:45 - 15:00 “Betelgeuse occultation, observations from Greece”, Margarita Metaxa, Athens, Greece.

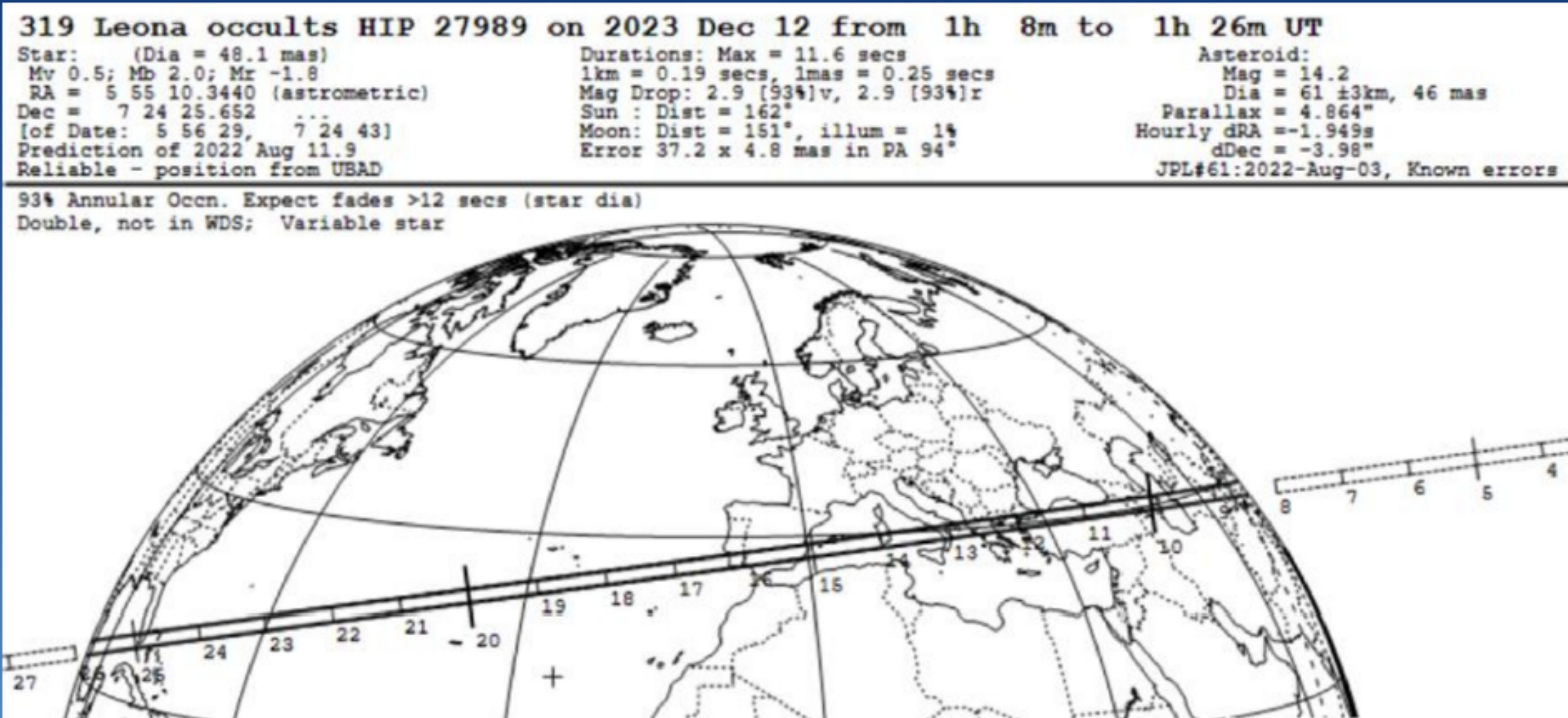




# BETELGEUSE OCCULTATION

Carles Schnabel, Associació  
Astronómica de Sabadell,  
Sabadell, Spain.

# Betelgeuse occultation 2023, December 12

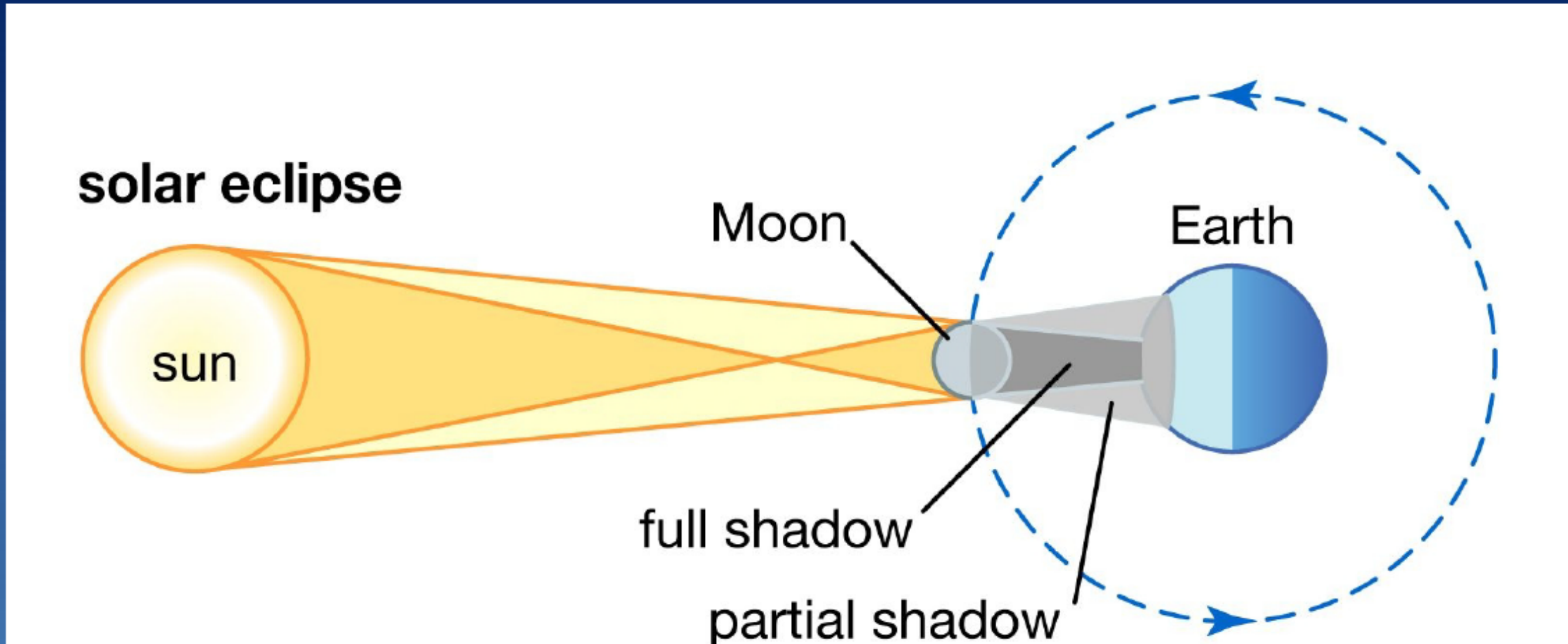


Carles Schnabel

Agrupació Astronòmica de Sabadell – Catalonia/Spain

International Occultation Timing Association / European Section

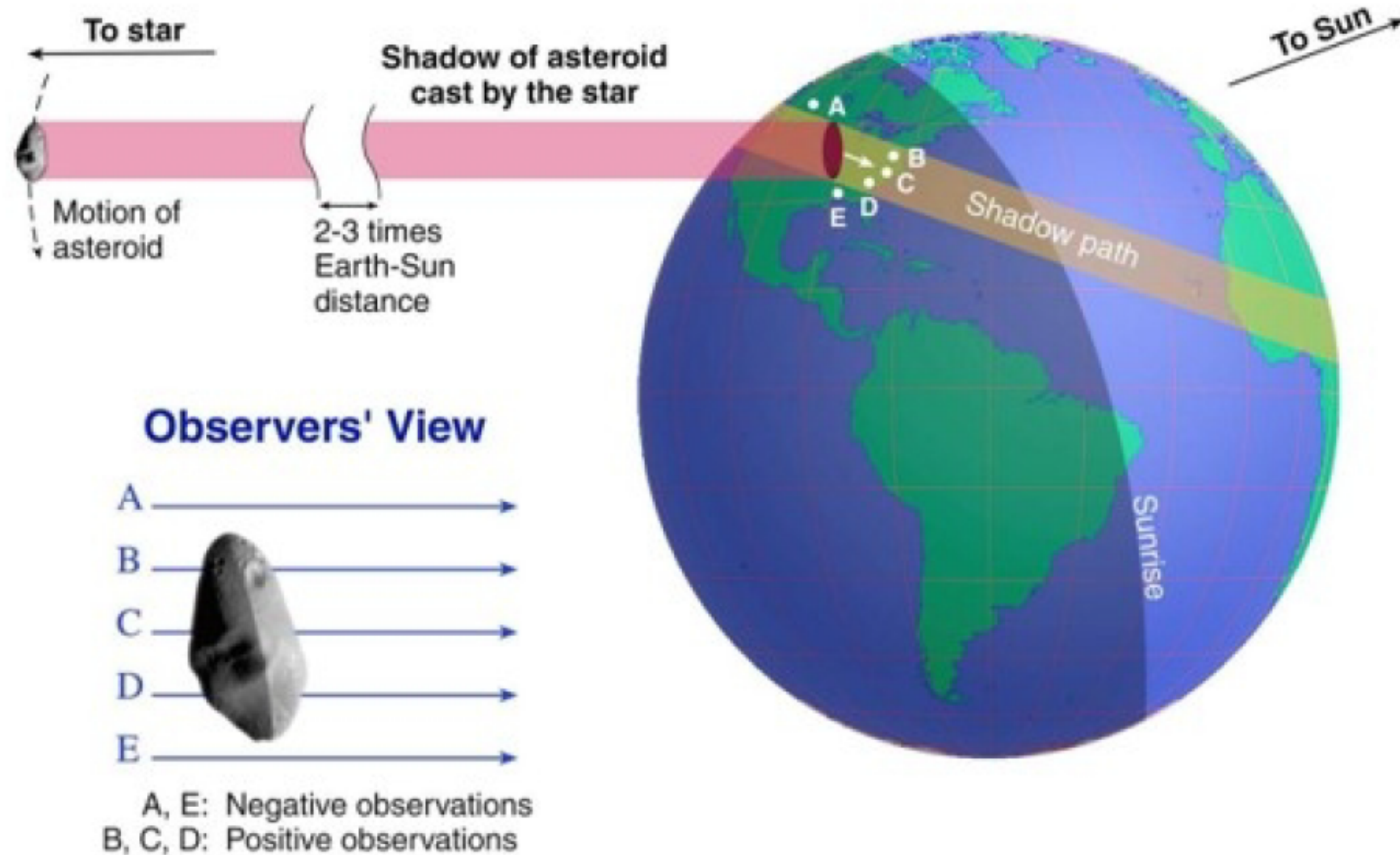
# Occultation of the Sun: Eclipse of the Sun

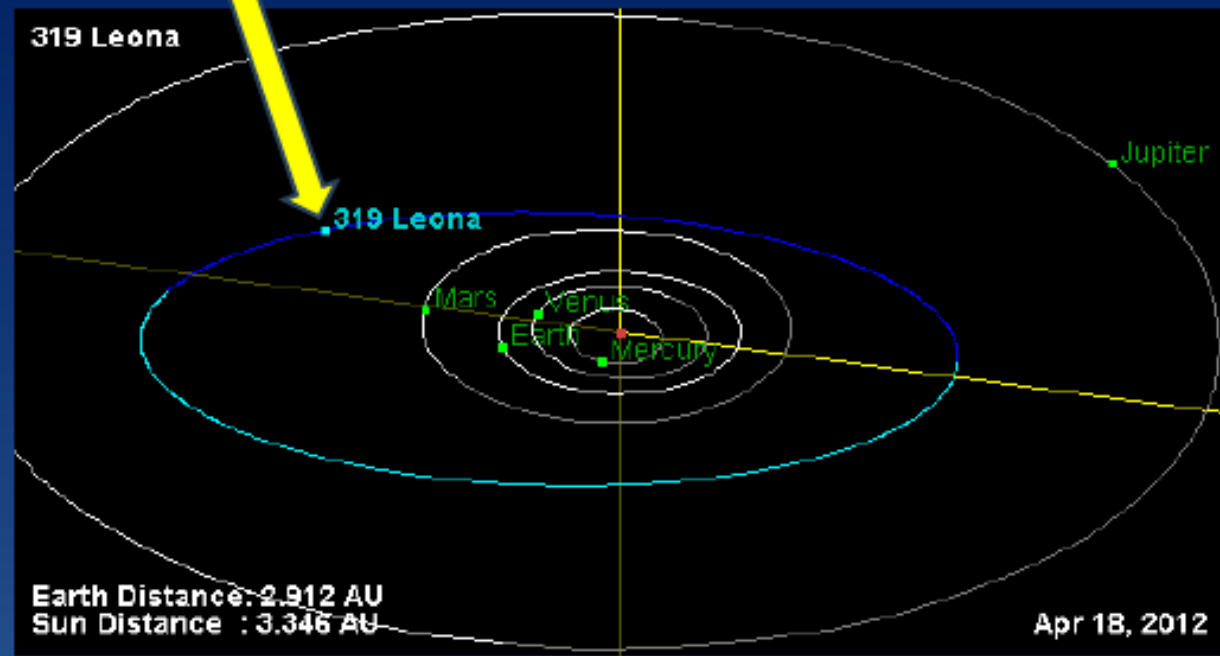


On the night from 11 to 12 December 2023

Asteroid (319) Leona will occult the star Betelgeuse as seen from a path going from central Asia to southern N. America

### Geometry of an Asteroid Occultation





**319 Leona** is a dark asteroid.

It isn't visible to the naked eye.

Diameter: approximately 70 kilometers.

Distance to Earth: about 30 light minutes.



**Betelgeuse** is a red supergiant star in the constellation of Orion.

It's the tenth brightest star in the night sky.

Diameter: between 850 and 900 million kilometers.

Distance to Earth: about 600 light years.

# Leona and Betelgeuse to scale

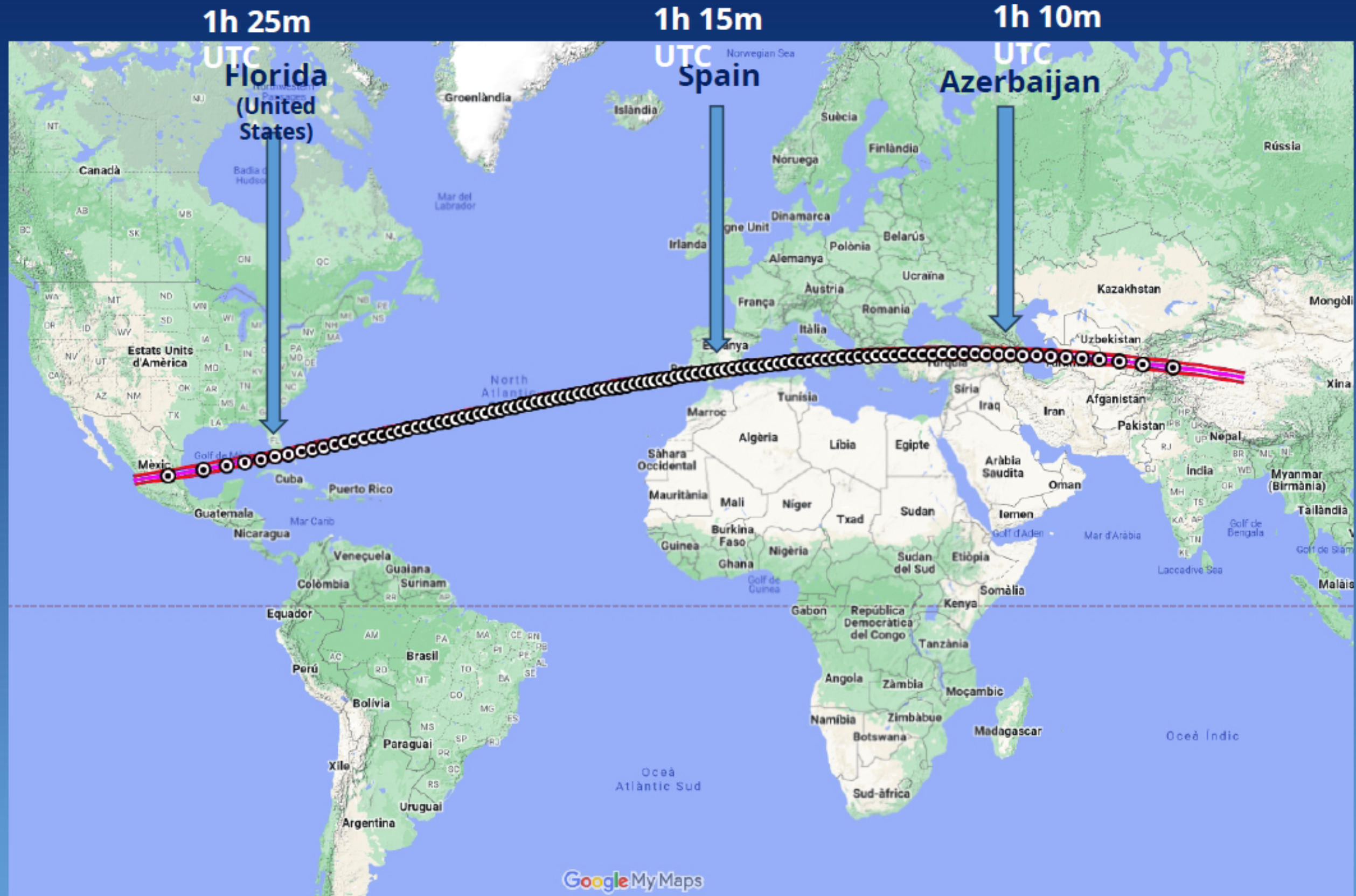
If the star Betelgeuse had a diameter of 1.9m, the asteroid Leona would have a diameter of 0.001mm. Betelgeuse would be 10,000 km away and Leona would be at a distance of 5 meters.



This means that Betelgeuse would be represented by a 1.9 meter diameter sphere placed at 10,000 km, the distance between Barcelona and Los Angeles, while the asteroid would be a 0.001 mm point located at a distance of 5 meters



# Betelgeuse occultation on the night from 11 to 12 December 2023



Link to the map: [https://www.google.com/maps/d/edit?mid=1litFRSEU6DuXqaaUhVdMqb-AWJQBlyM&usp=share\\_link](https://www.google.com/maps/d/edit?mid=1litFRSEU6DuXqaaUhVdMqb-AWJQBlyM&usp=share_link)



# (319) Leona occultation, September 13th, 2023

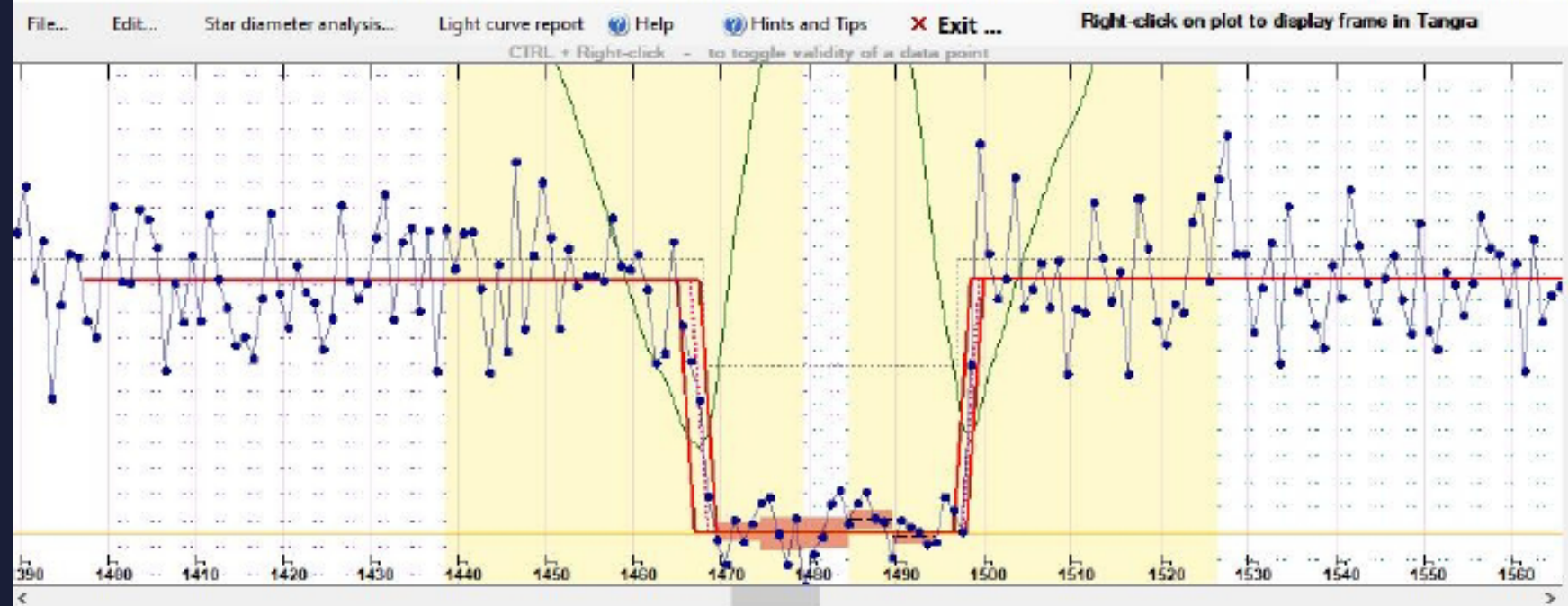
**Llegenda**

- 1-sigma
- 3h 43m
- Center line
- Path limit



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus



Scale: Objects 5.7 1.00

1. Read, Integrity, Set time, Bin & normalise 2. (info) Fourier plot 3. Find events 4. Select event to analyse 5. Analyse event #1 6. Camera corrections & final times Event #1

**Camera corrections**

Video camera: WAT-910HX

Camera delay: 0.5 frames

Number of video frames integrated: 2

Exposure delay: 2 frames

Video system:  NTSC  PAL  Other  Unknown (ADVS)

Time difference from video stamp to start of exposure: -0.100 secs

**Final results \*\* Event #1**

Time Source: Tangra

D at frame 1467.5 +1.0/-1.5

UTC of D: 3 43 28.73 ± 0.10

Transition: 1 frames

R at frame 1498.5 +0.5/-1.0

UTC of R: 3 43 31.21 ± 0.06

Transition: 1 frames

**Save AOTA images**

Save Tab 5 image for Event #1

Save Tab 4 image of plot analysis

SnR = 6.1

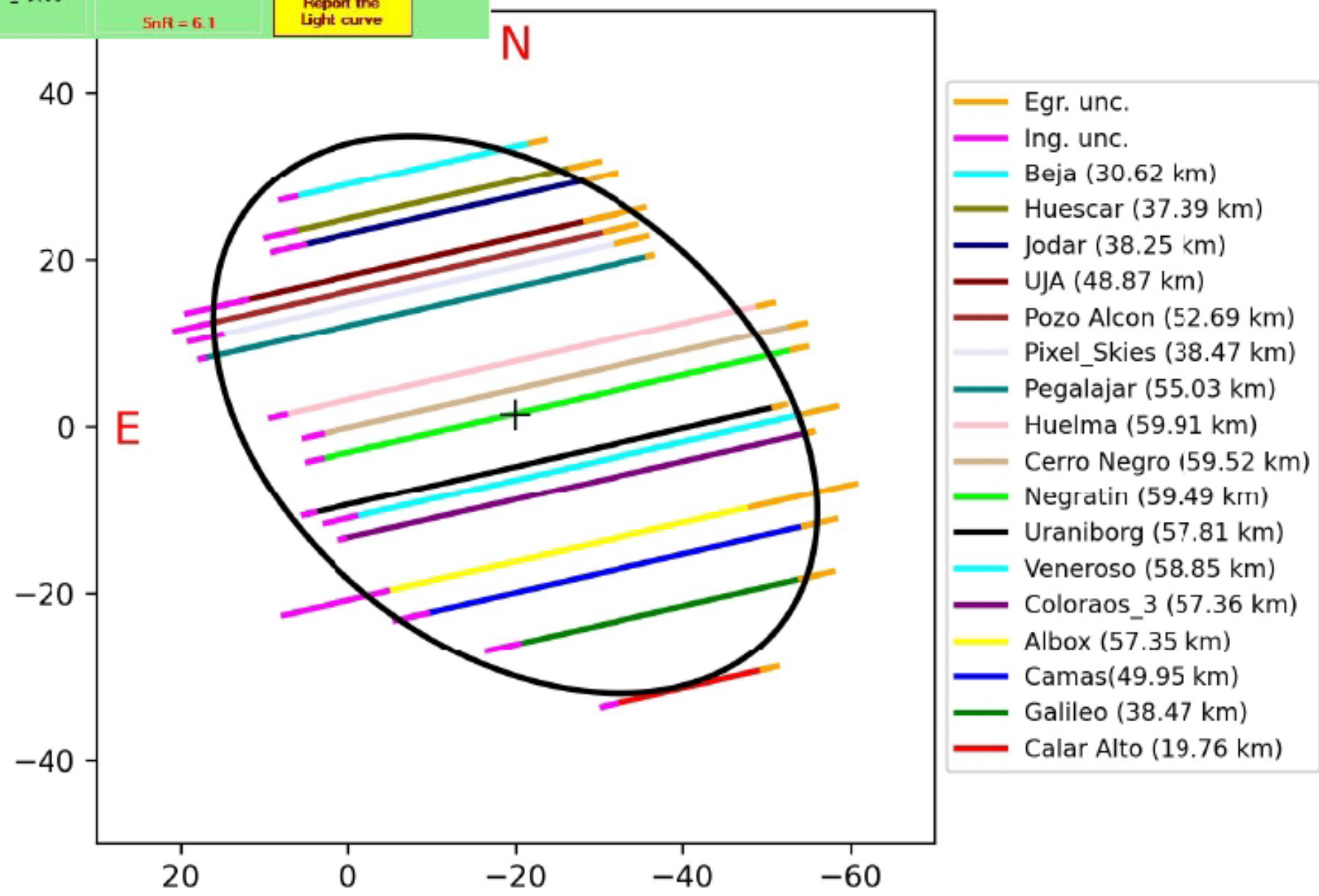
**1 events to analyse**

Set Event #1 as a non-event

View Report

Save Report

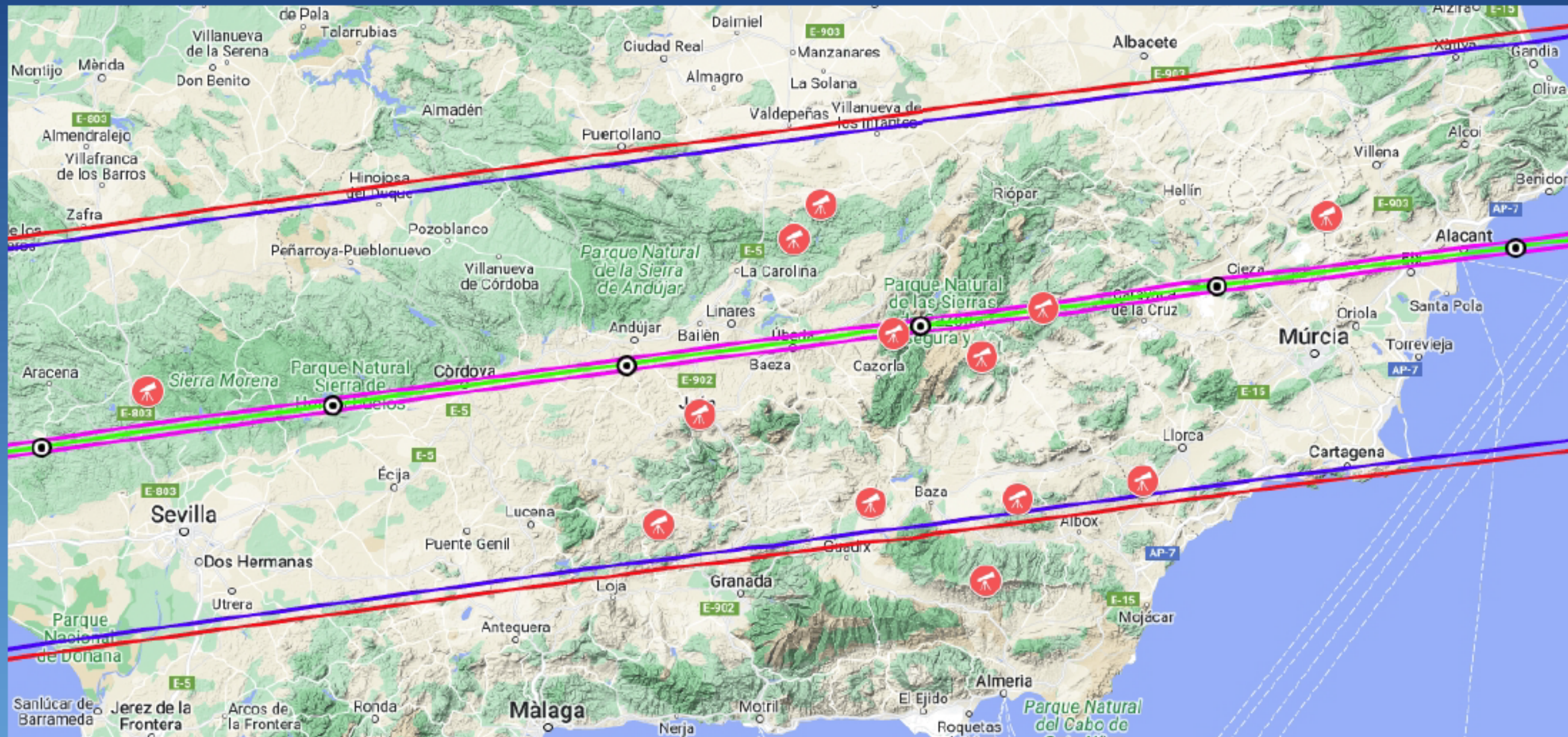
Report the Light curve



# Betelgeuse occultation on the night from 11 to 12 December 2023

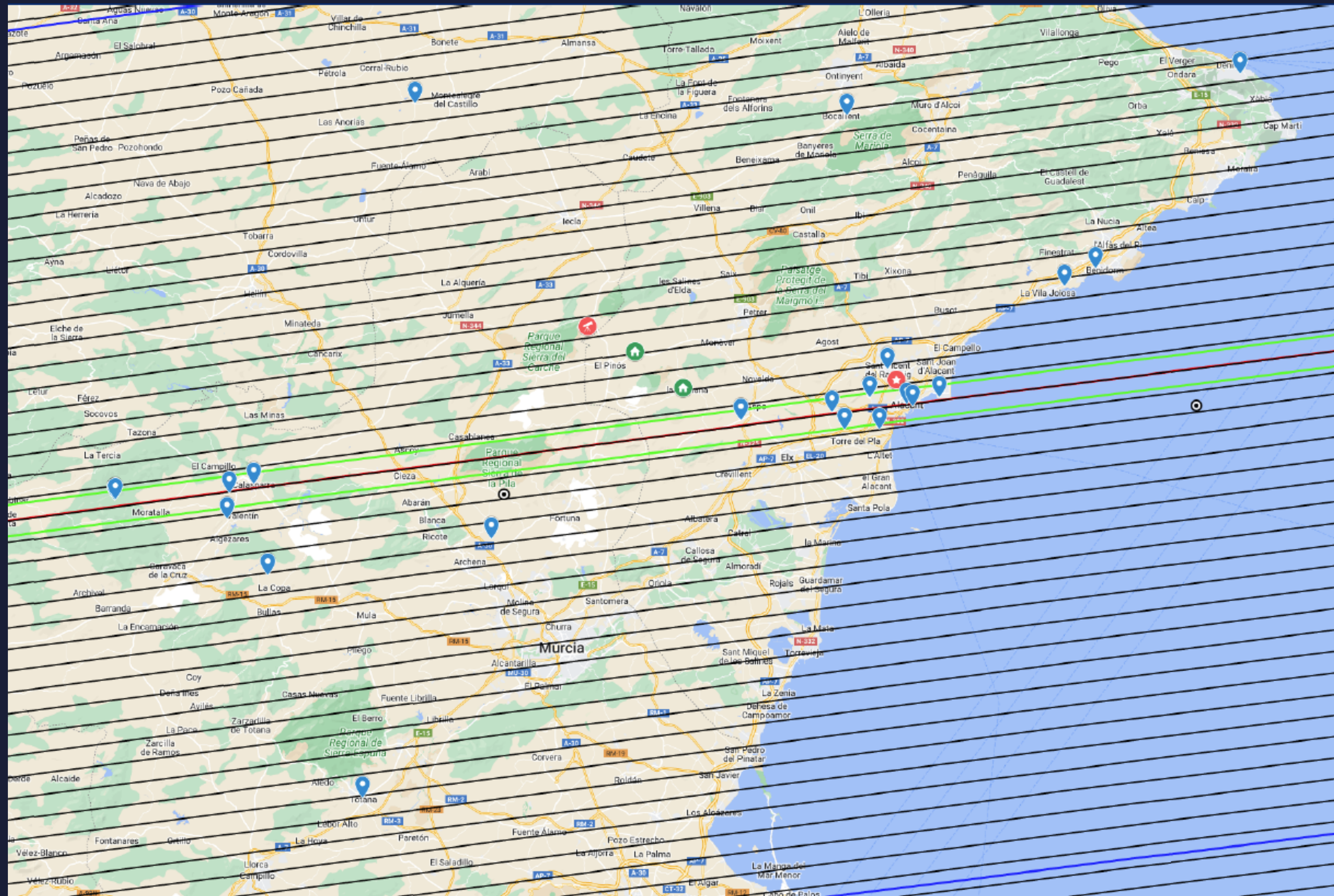
- The central green line is the center path of the eclipse.
- The nearby purple lines indicate a rough estimate of the limits of total eclipse.
- The blue lines indicate the limits of partial eclipse.
- The red lines indicate the uncertainty in the location of the partial limits.

The overall event duration on the central line will be around 12 seconds.



Link to the map: [https://www.google.com/maps/d/edit?mid=1litFRSEU6DuXqaaUhVdMqb-AWJQBlyM&usp=share\\_link](https://www.google.com/maps/d/edit?mid=1litFRSEU6DuXqaaUhVdMqb-AWJQBlyM&usp=share_link)



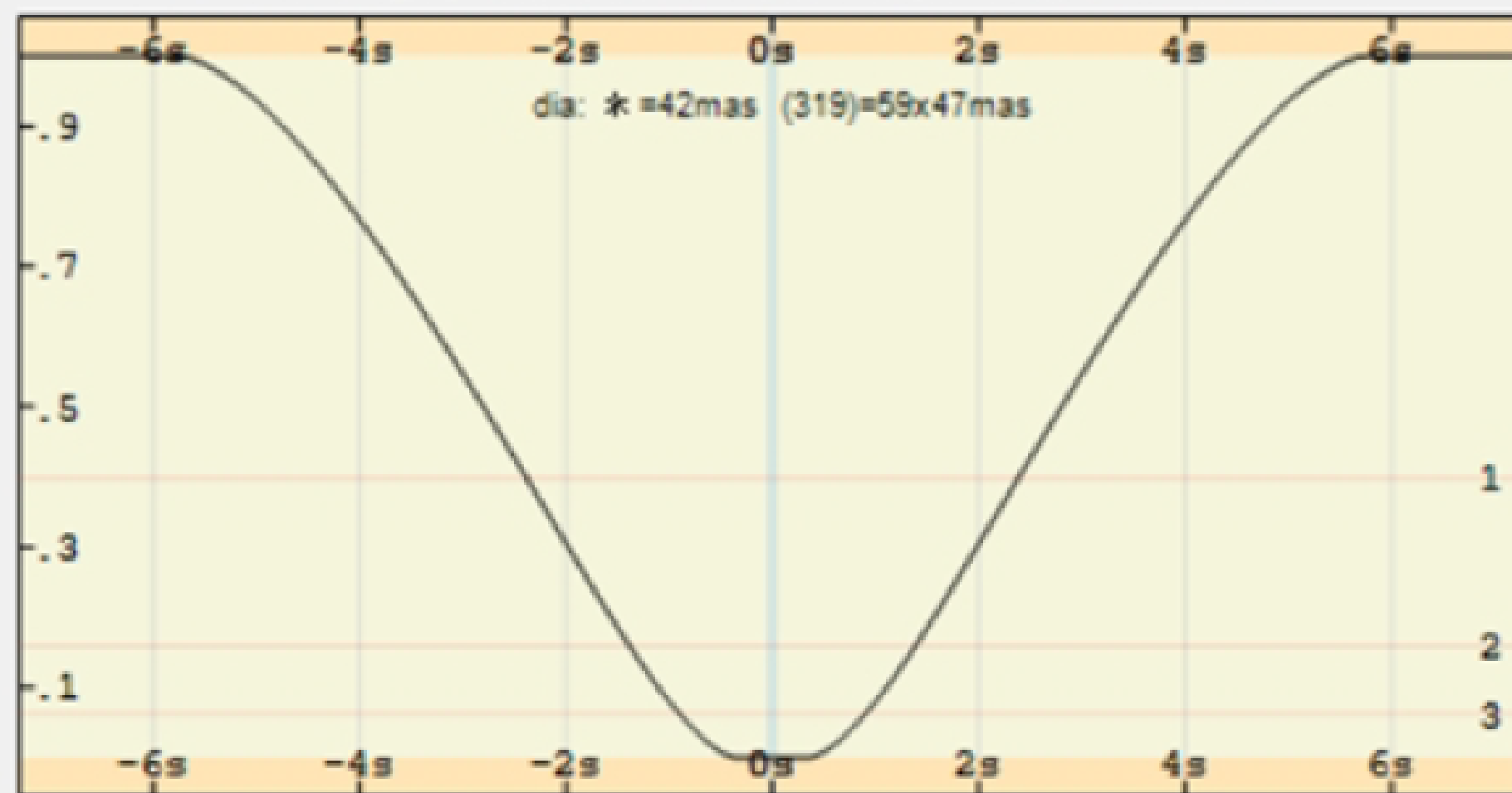


# 319 Leona occults HIP 27989 (Betelgeuse, $\alpha$ Ori), 2023 Dec 12

## Across-path



## Along-path, at Across-path location



### Plot parameters

Asteroid motion  mas/sec

Maximum duration 12.4 secs

- show Light level lines
- show Magnitude lines
- show Distance & Time lines
- distances as Topocentric

### Star details

Diameter (mas)

Limb Darkening

Magnitude

### Asteroid details

Model  Ellipse  Rectangle

Major axis  km =  mas

Minor axis  km =  mas

Major axis PA°  Sky-plane values PA of path

Parallax (mas)

Magnitude



## Sunny Vista team

Carlos Perelló  
Aarón de la Casa  
Carles Schnabel  
Jordi Juan

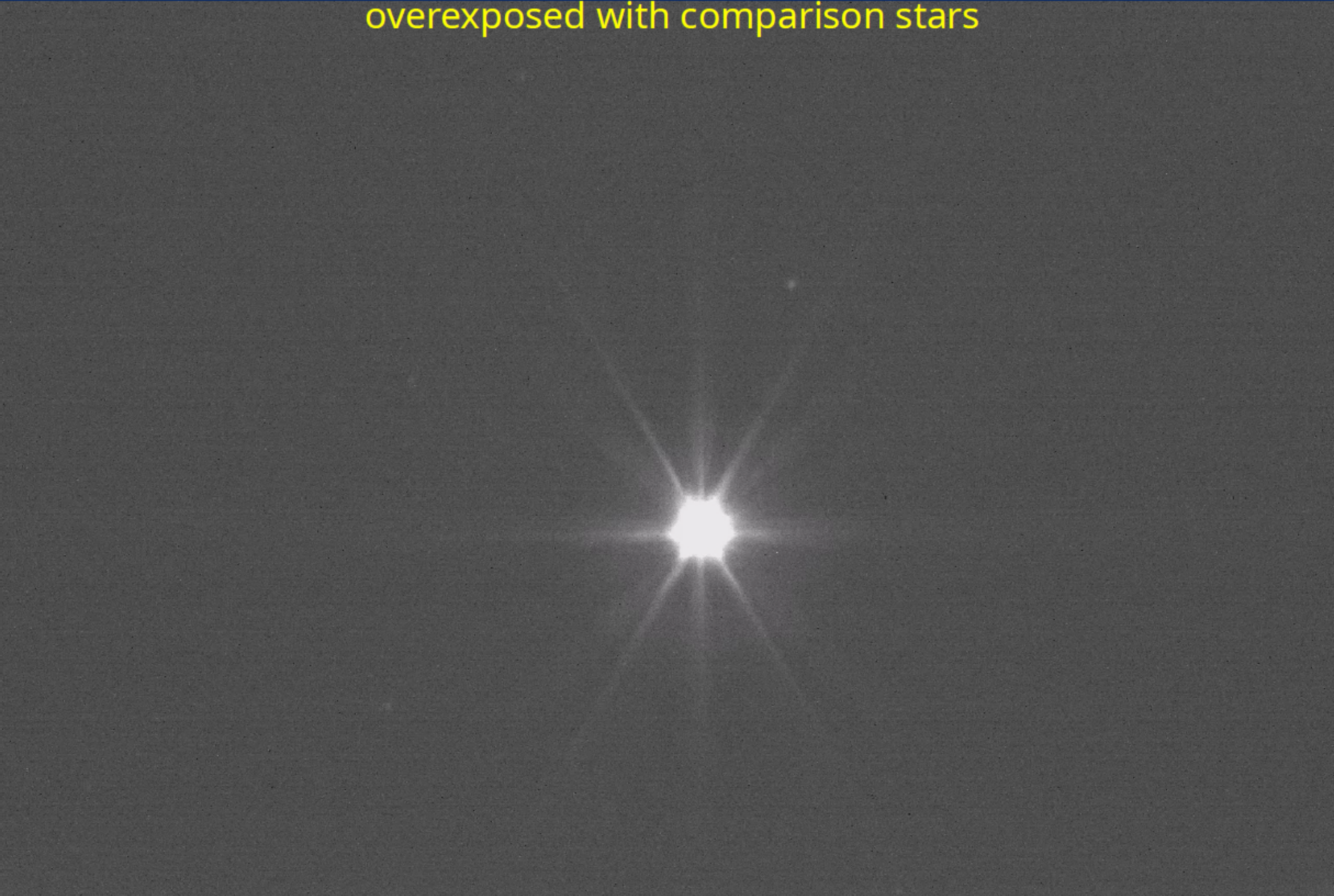


## Casa Pasemee team

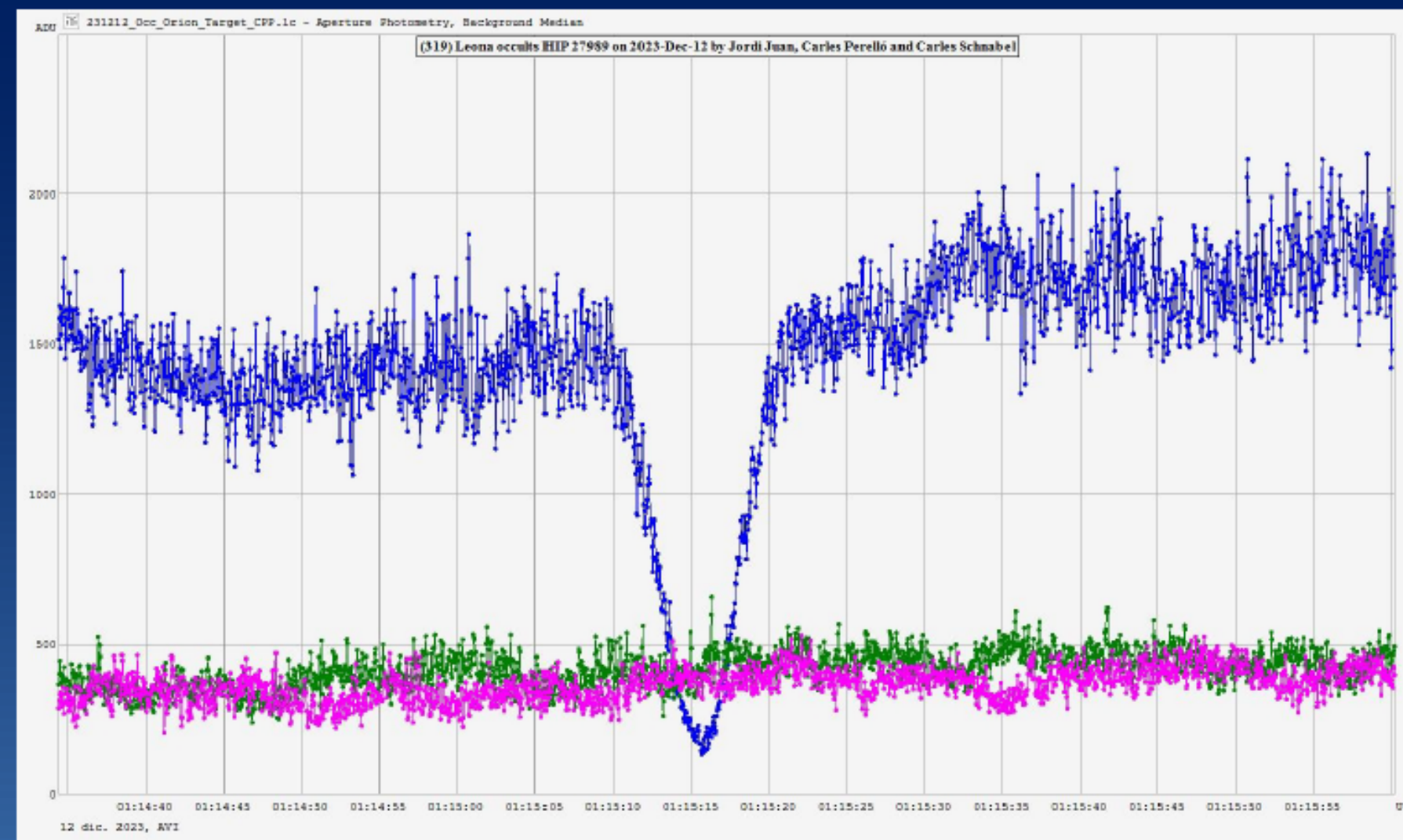
Josep Masalles  
Rafael Quiles  
Antoni Selva



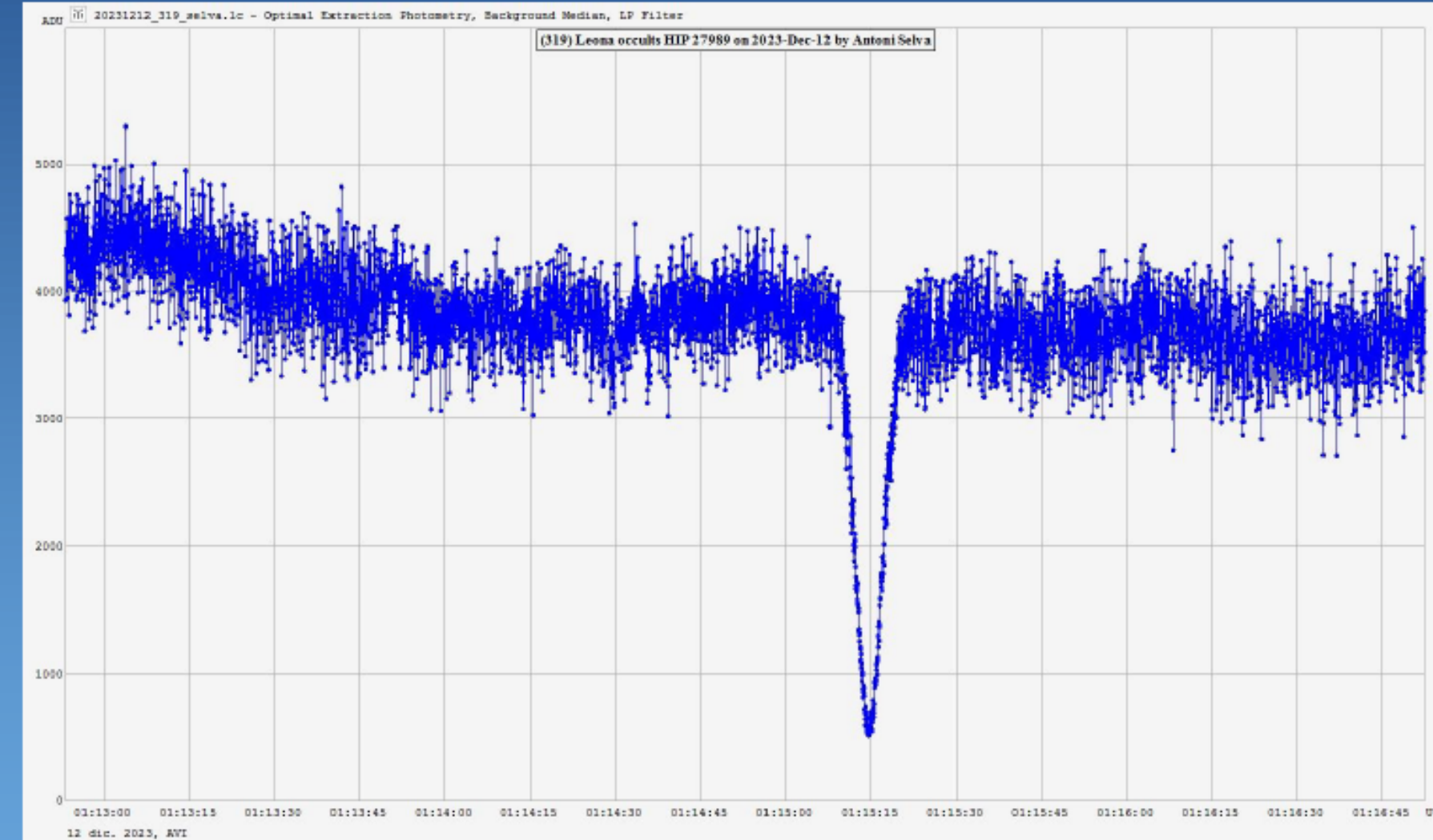
**Betelgeuse occultation at Sunny Vista**  
overexposed with comparison stars



## Lightcurve at Sunny Vista



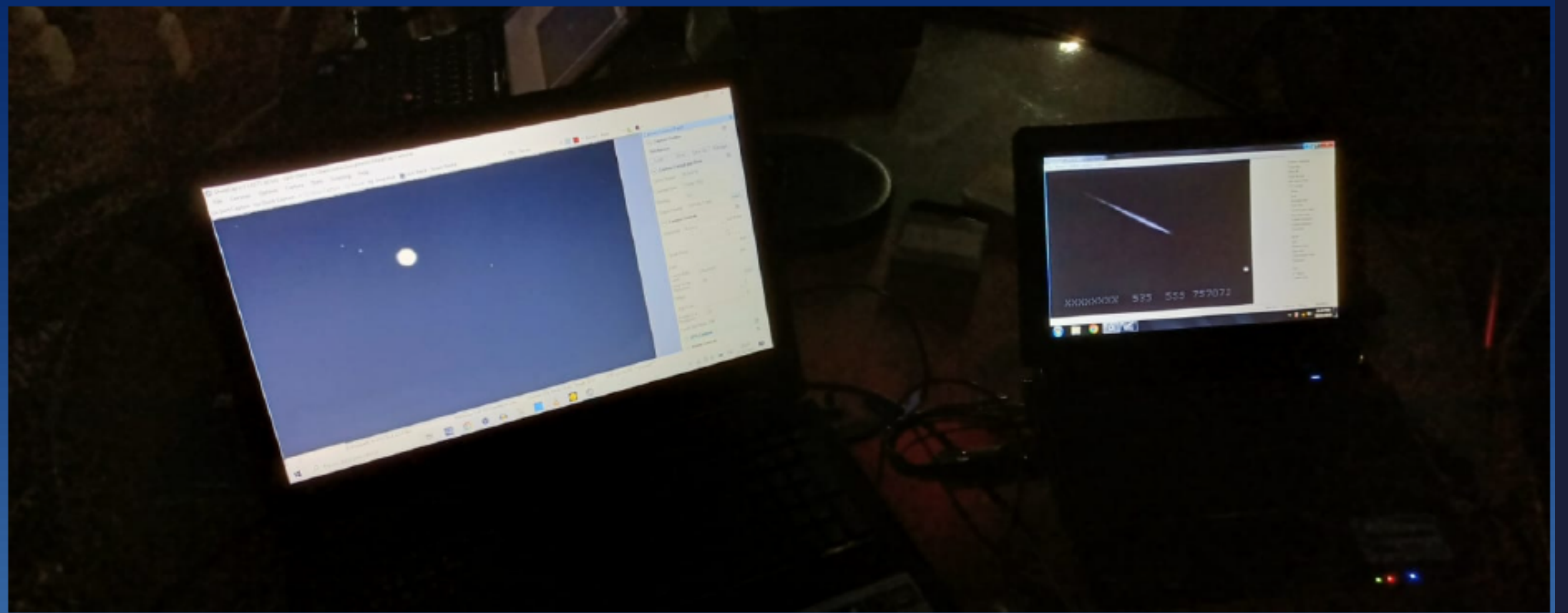
## Lightcurve at Casa Pasemee



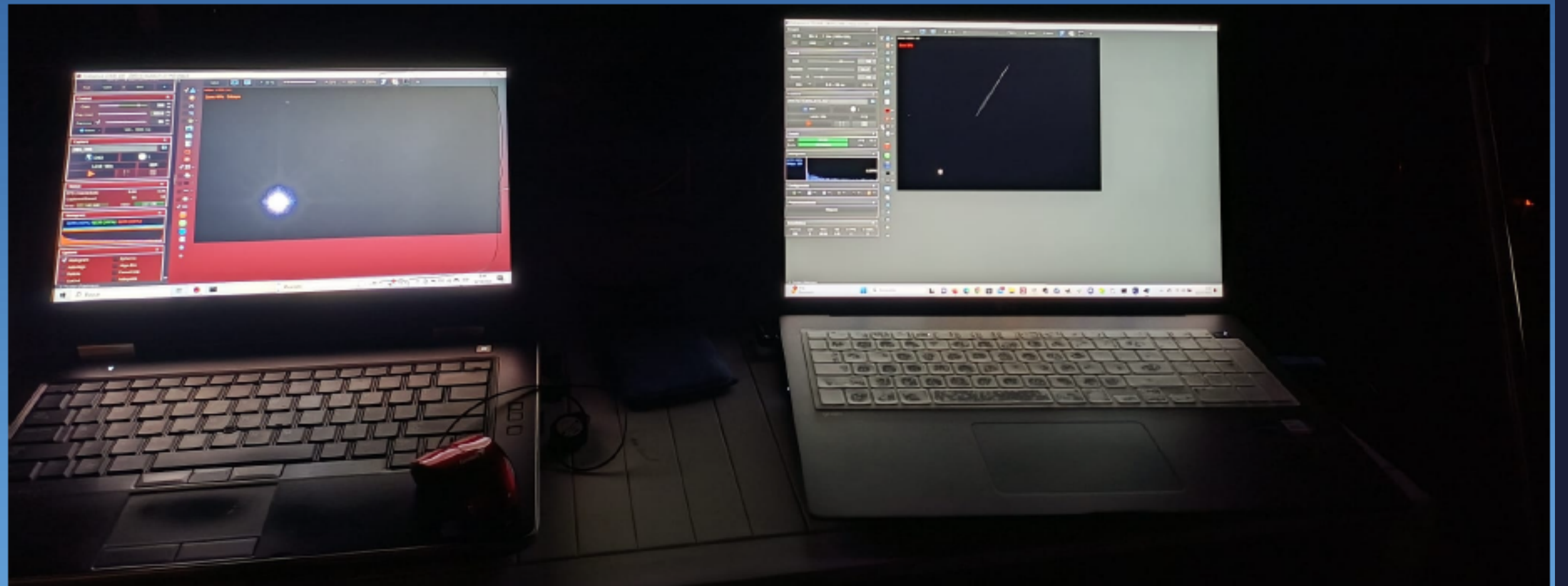
## Widefield recording at Casa Pasemee (J Masalles)



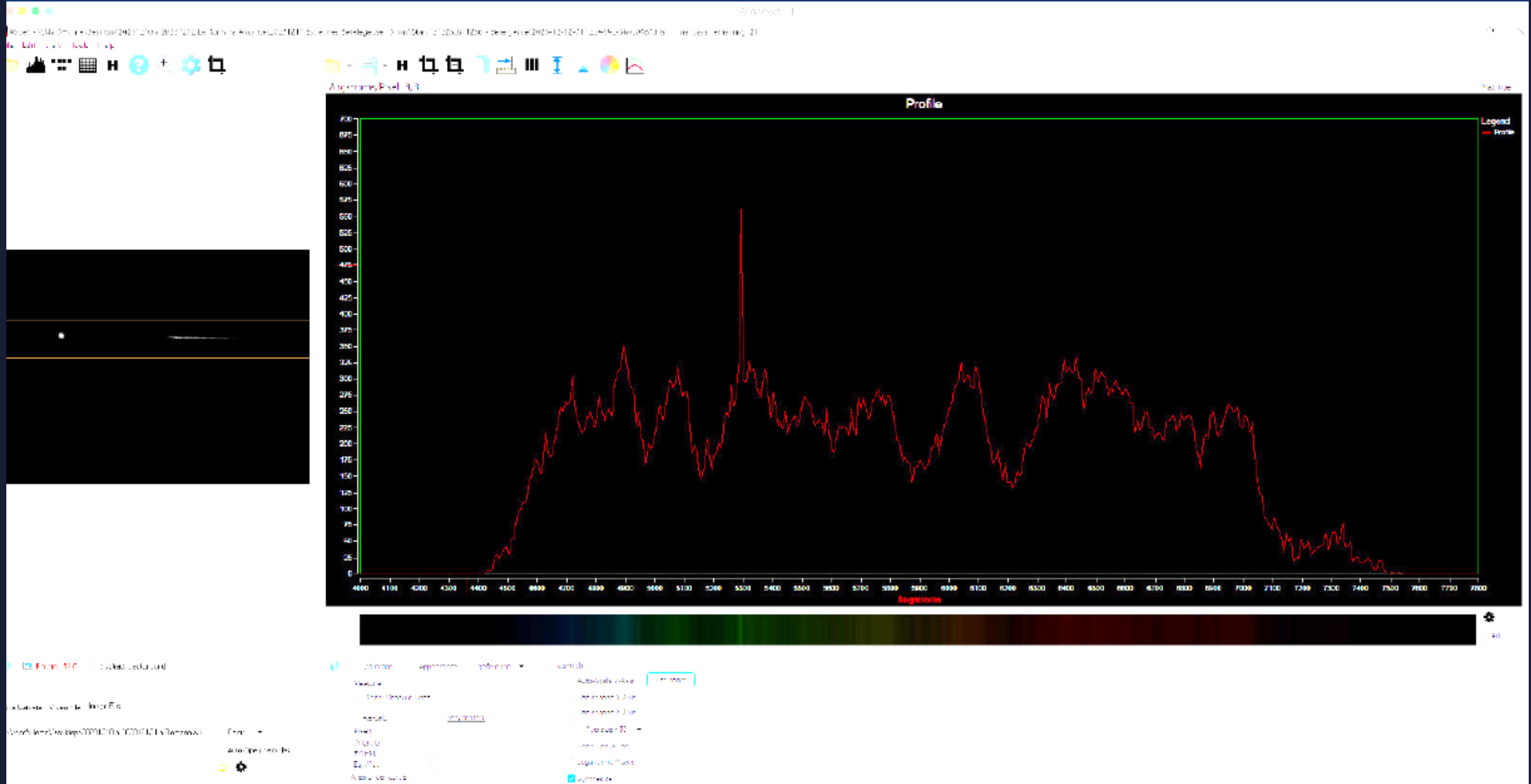
**Spectroscopy  
with  
Star Analyzer  
100  
at Sunny Vista**



**Spectroscopy  
with  
Star Analyzer 100  
at Casa Pasemee**



# Betelgeuse spectrum *before* the occultation (J Masalles)





# Acknowledgments

- José Luis Ortiz & Mike Kretlow – Instituto de Astrofísica de Andalucía
- Miguel Montargès & Josselin Desmars – Paris Observatory
- Dave Herald - Occult
- IOTA/ES



**Great success! Thanks !**



**Josep Masalles, Carlos Perelló, Jordi Juan, Carles Schnabel, Antoni Selva**

## Preliminary results of the Betelgeuse occultation

Carles Schnabel – IOTA/ES & Agrupació Astronòmica de Sabadell

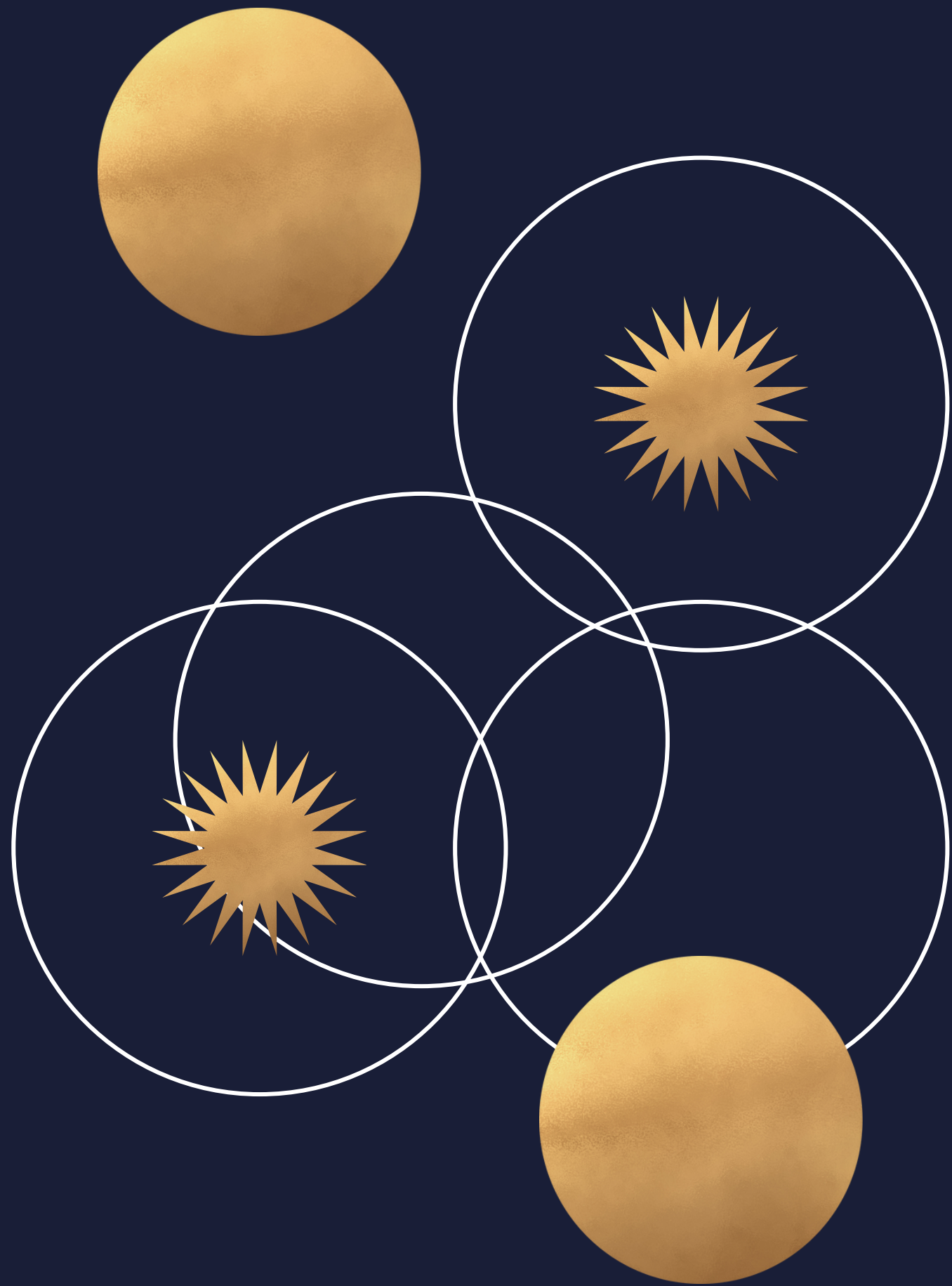
The occultation of Betelgeuse (a Ori) by the asteroid (319) Leona, which took place on December 12, could be observed not without certain difficulties caused by mostly high clouds. Visually, Betelgeuse did not disappear completely, remaining for a very brief seconds below the brightness of Bellatrix (the opposite shoulder of Orion), probably around magnitude 4. It was truly spectacular to see how one of the brightest stars in the sky oscillated in luminosity in an interval of just over of 10 seconds, almost becoming invisible. The good fit between prediction and observation was also surprising. Although the occultation path apparently moved about 5 km to the north, it can be considered a very tight difference. The position and shape of the asteroid were known with remarkable precision, thanks to previous occultation campaigns, but there remained a significant uncertainty about the position of the star.

Let us not forget that the star is a red giant, with an apparent diameter close to 50 milliseconds of arc (mas). The asteroid is oblong with the largest diameter oriented significantly from north to south at the time of the occultation. As confirmed by observations, this major axis completely covered the star's disk, but not the minor axis. For this reason, the star did not disappear completely at any time even from the central chord of the occultation, although it was for a couple of seconds, at most, below the brightness of Bellatrix.

The phenomenon was observed by more than 100 observers from the Iberian Peninsula, the islands of Ibiza and Sardinia, southern Italy, and northern Greece and Turkey. The occultation path ended above the Florida Peninsula, in the United States and Mexico, but from these places bad weather or the low height of the star above the horizon prevented people from seeing anything.

Right now, professionals and amateurs are working together to extract photometry from all the very diverse records. These data will be used not only to model the asteroid, but also to make a detailed image of the star: shape, dimensions, surface areas of different brightness, degree of limb darkening, etc. Some teams also obtained spectra, which add to the data that will allow us to better understand the star. Surely years of work await us to extract all the science from what happened during those few seconds.

If you want to read some preliminary results, we recommend downloading the IOTA Occultation Astronomy magazine at <https://www.iota-es.de/>



# OBSERVATIONS FROM ANDALUCIA SPAIN

José M. Díaz  
Úbeda, Spain



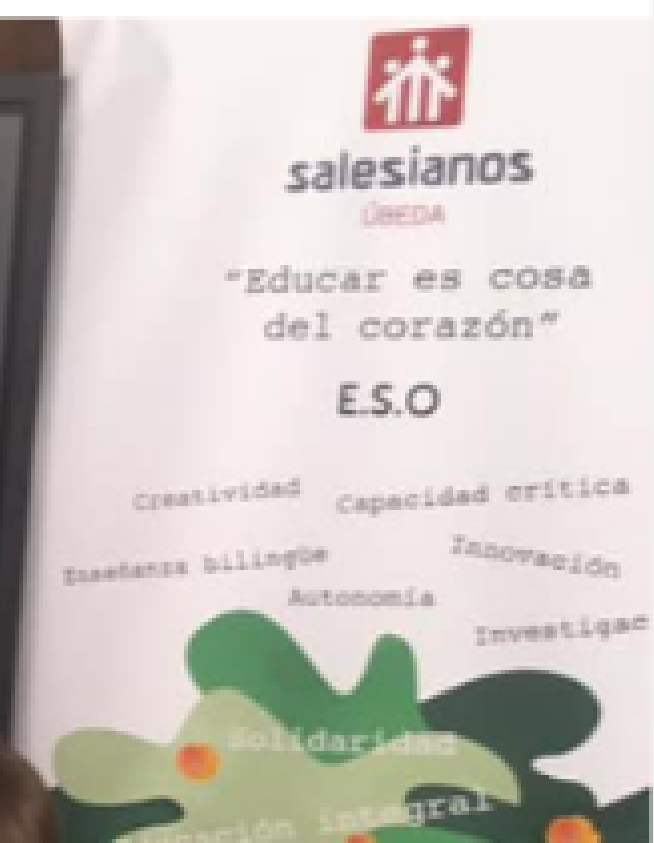
# Workshop “Remembering Jay”

José María Díaz Fuentes

ÚBEDA, December 16th, 2023

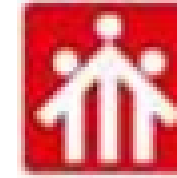




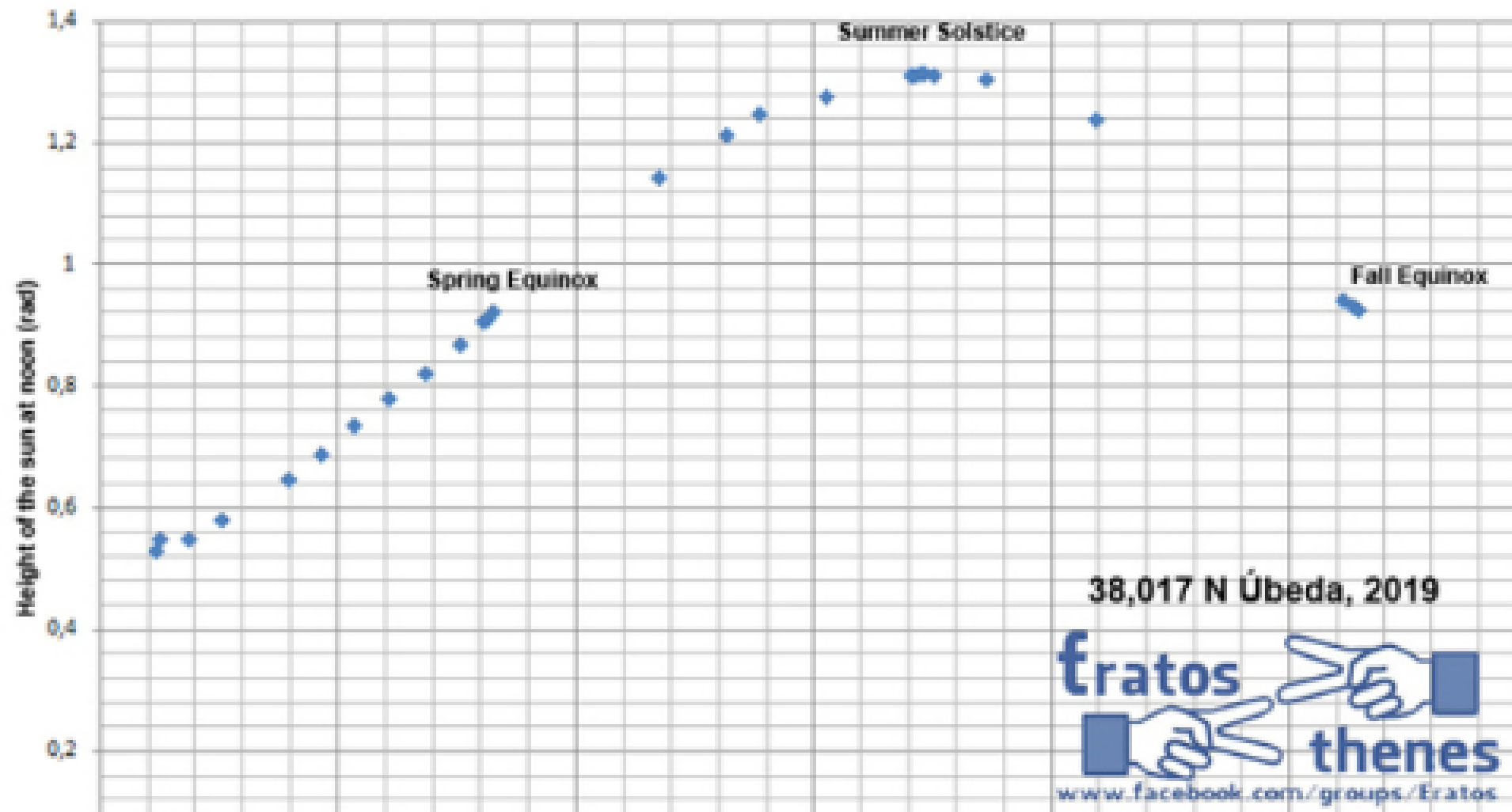
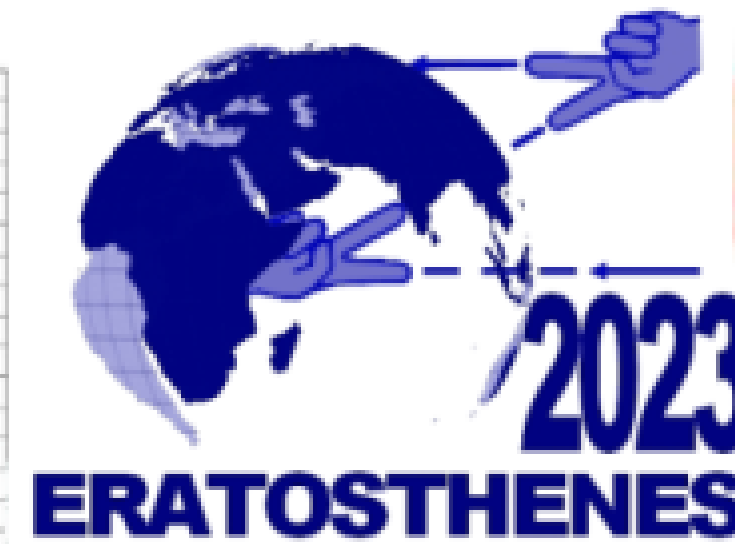








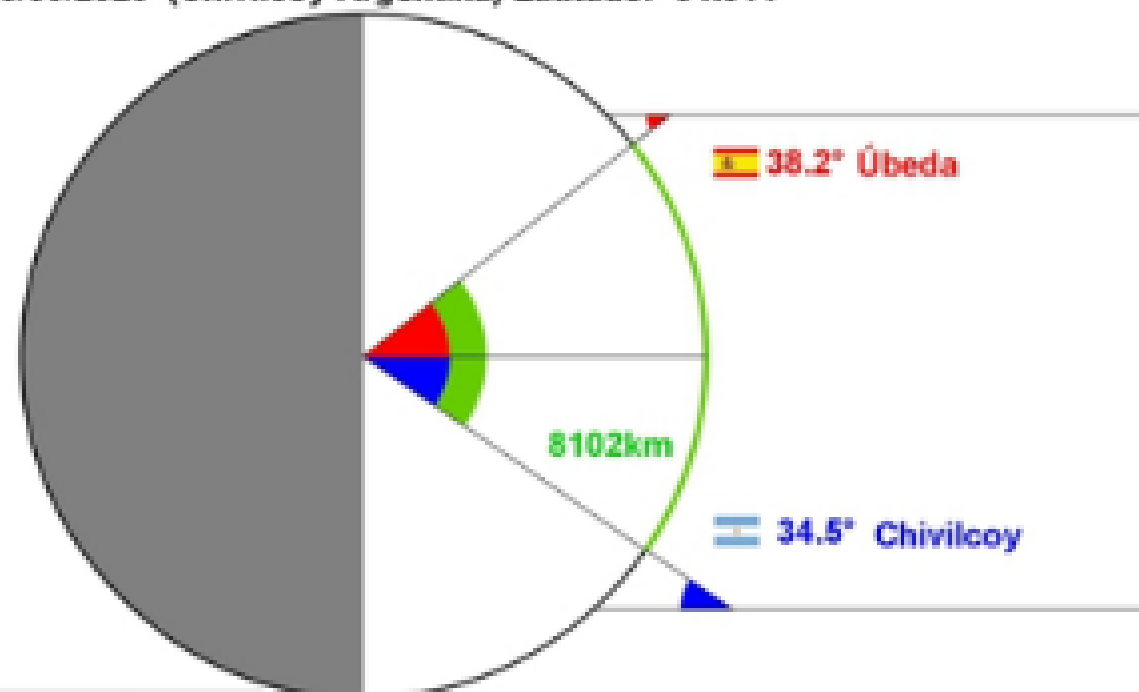
**salesianos**  
ÚBEDA



23/09/2020 (Úbeda-Spain) Latitude: 38.017°  
 23/09/2020 (Chivilcoy-Argentina) Latitude: -34.911°

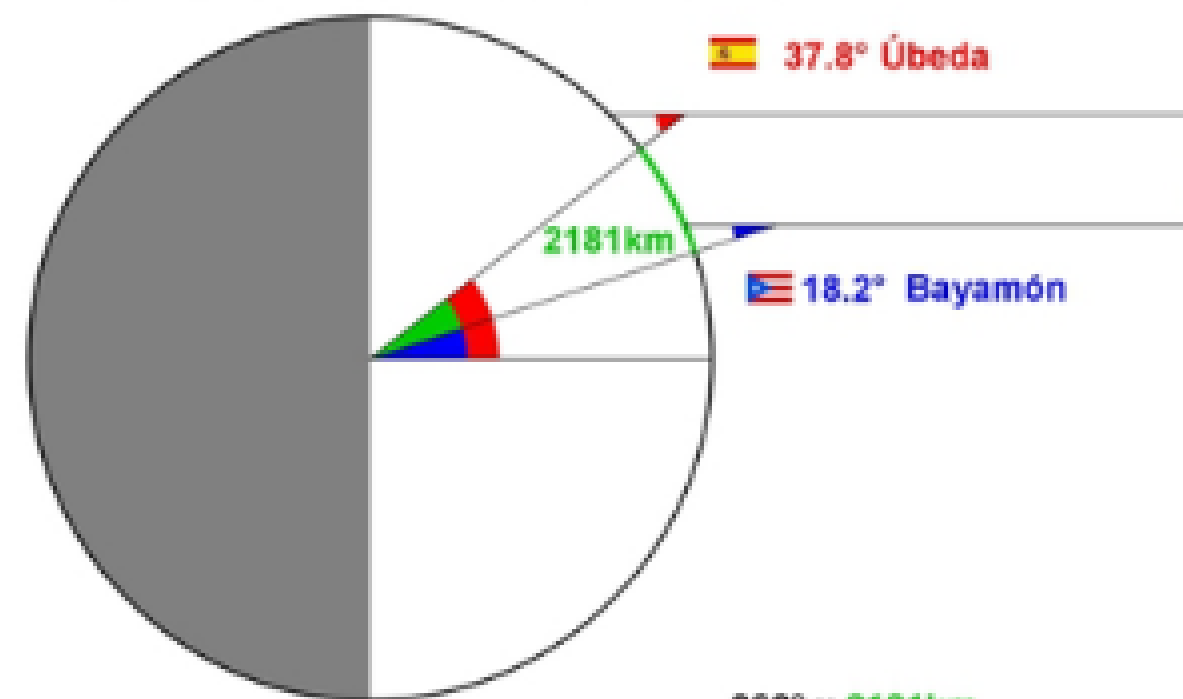
22/09/2020 (Úbeda-Spain) Latitude: 38.017°  
 22/09/2020 (Bayamón-Puerto Rico) Latitude: 18.383°

200 August



| Distance      | Angle         |
|---------------|---------------|
| circumference | 360°          |
| 8102km        | 38.2° + 34.5° |

circumference =  $\frac{360^\circ \times 8102\text{km}}{38.2^\circ + 34.5^\circ} = 40120 \text{ km}$



| Distance      | Angle         |
|---------------|---------------|
| circumference | 360°          |
| 2181km        | 37.8° - 18.2° |

circumference =  $\frac{360^\circ \times 2181\text{km}}{37.8^\circ - 18.2^\circ} = 40059 \text{ km}$

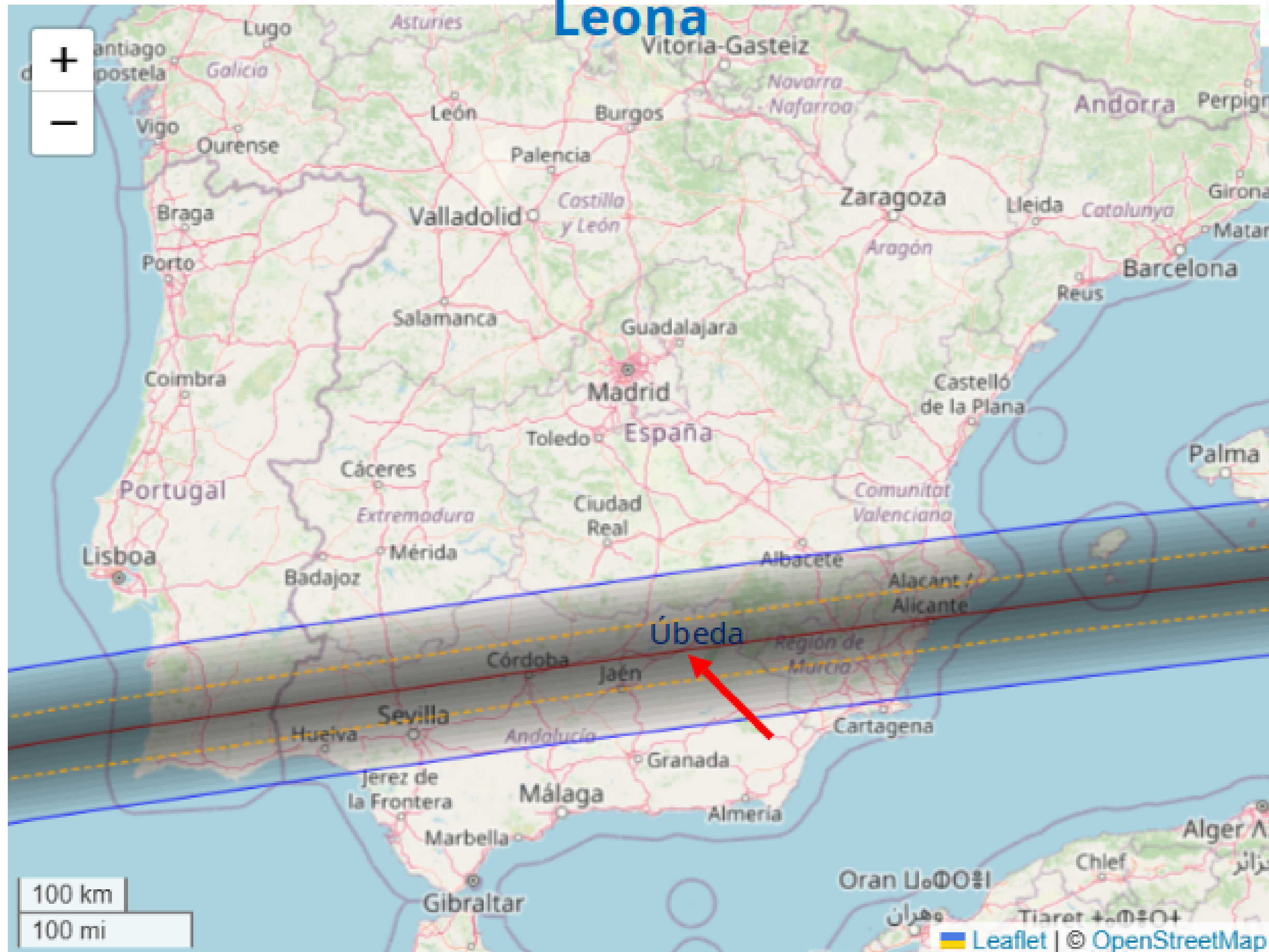


**salesianos**  
ÚBEDA



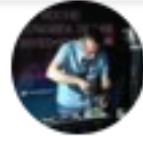
# Occultation of Betelgeuse by asteroid 319

**Leona**





Asociación Astronómica Quarks



Antonio Herrera

Administrador · 15 de noviembre · 🌐

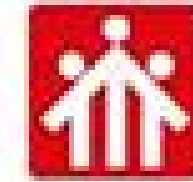


+2



Salesianos Úbeda

14 de noviembre · 🌐



salesianos

ÚBEDA

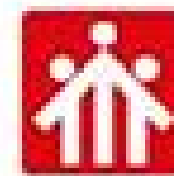
December 11, 2023, 20:30 h



**salesianos**  
ÚBEDA

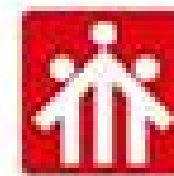


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**salesianos**  
ÚBEDA





**salesianos**  
ÚBEDA





December 12, 2023, 02:13 h

Real



Fake





Real video by Sofía M A

ÚBEDA, December 12th, 2023



Network for  
Astronomy  
School  
Education



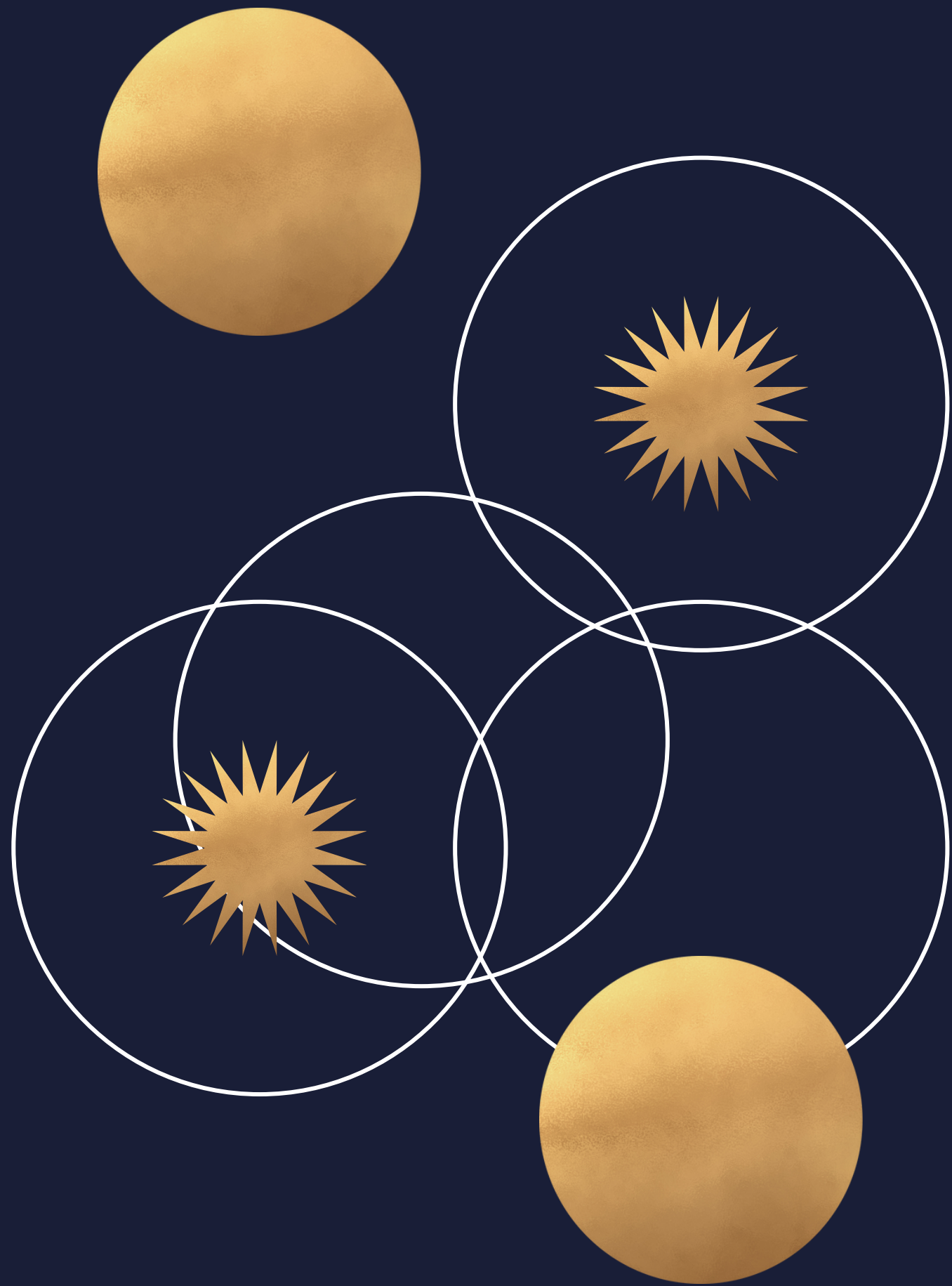
**salesianos**  
ÚBEDA

Thank you for your time!



AMBASSADOR

**SCIENTIX**  
The community for science  
education in Europe



BETELGEUSE  
OCCULTATION,  
JAY'S INVITATION  
TO GREECE

Margarita Metaxa  
Athens, Greece

# September 13, 2022



Workshop "Remembering Jay"  
December 16, 2023



2001, Kariba lake, Zambia



Joe Kornblum, Jay Pasachoff, Jim Pollack, and the Harvard College Observatory/US Air Force eclipse camera, 1963, Quebec, Canada (first Jay's eclipse).



2017, Patagonia, Argentina

....

My friend and  
colleague Margarita  
Metaxa can probably  
organize more  
telescopes around  
Greece...

Jay



Still, the much more common occultations of faint stars are worthwhile events. In recent decades, professional and amateur astronomers have been turning their attention to asteroid/star occultations. The events supply precise information that lead to a more accurate determination of the sizes and orbital positions of asteroids.



----- Forwarded message -----

Από: **Jay Pasachoff** <[jmp@williams.edu](mailto:jmp@williams.edu)>

Date: Πέμ 15 Σεπ 2022 στις 12:46 μ.μ.

Subject: Re: Asteroid Leonia occults Betelgeuse: 12 Dec. 2023 (in 15 months)

To: Dr. Margarita Metaxa <[marmetaxa@gmail.com](mailto:marmetaxa@gmail.com)>

Cc: Aris Voulgaris <[arisvoulgaris@gmail.com](mailto:arisvoulgaris@gmail.com)>, **Jay** Pasachoff <[Jay.M.Pasachoff@williams.edu](mailto:Jay.M.Pasachoff@williams.edu)>, Naomi Pasachoff <[npasacho@williams.edu](mailto:npasacho@williams.edu)>, Andrea Dupree <[adupree@cfa.harvard.edu](mailto:adupree@cfa.harvard.edu)>

Great.

**Jay**

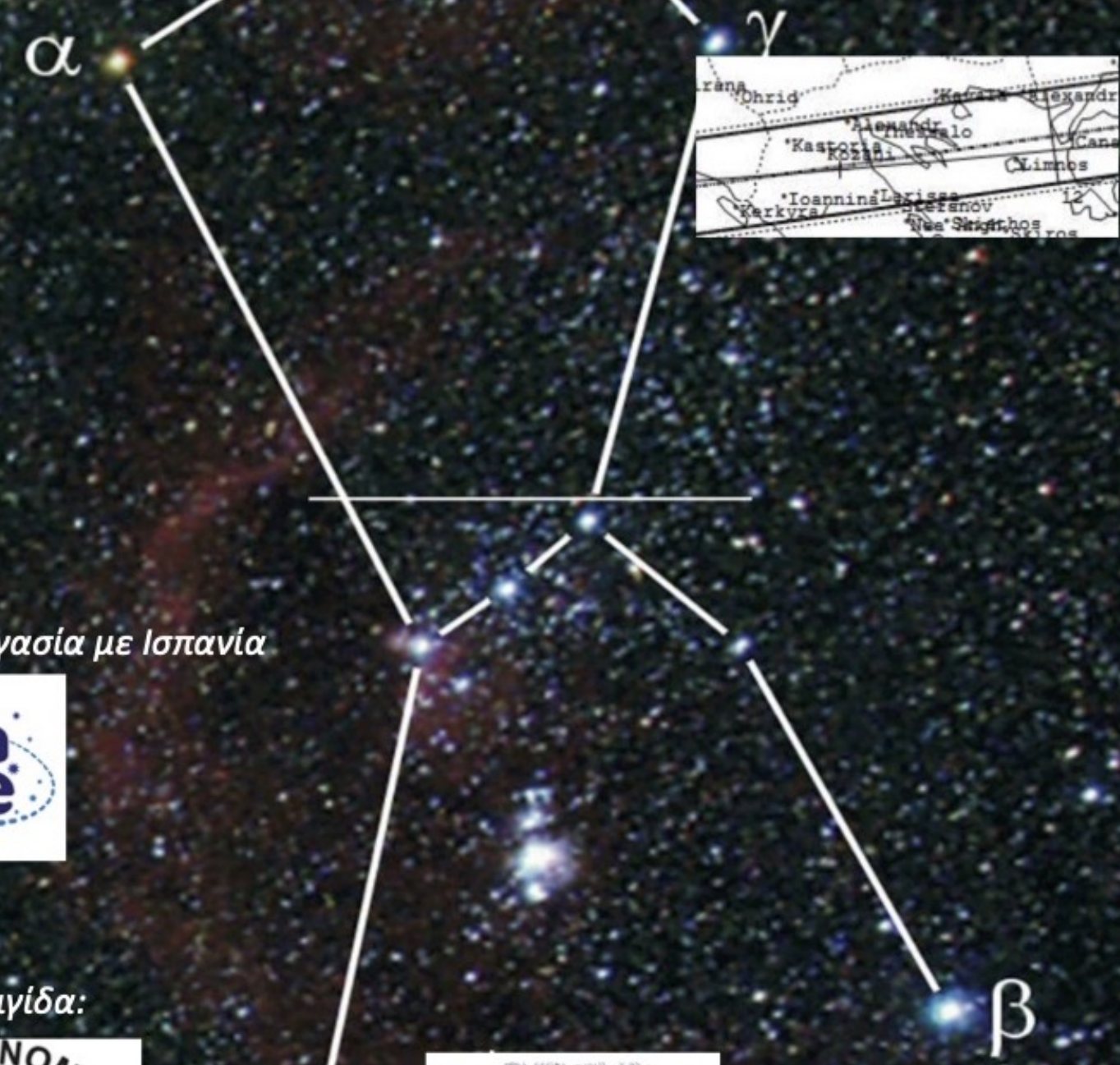
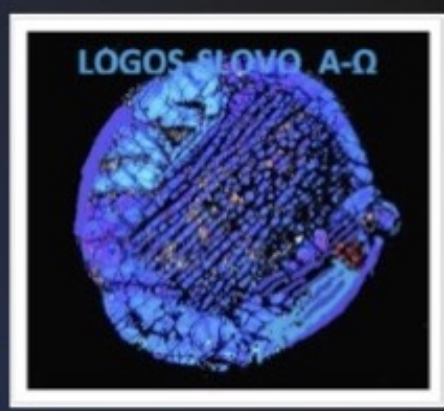
Cc:Naomi

On Sep 15, 2022, at 3:38 AM, Dr. Margarita Metaxa <[marmetaxa@gmail.com](mailto:marmetaxa@gmail.com)> wrote:



# Η επιπρόσθηση του Betelgeuse από τον αστεροειδή Leona 319

στη μνήμη του Καθ. Jay Pasachoff  
12 – 12 – 2023, 03:12 το ξημέρωμα  
Παρατήρηση: KERDOS OBSERVATORY, Γρεβενά



Εκδήλωση στο Ελληνικό Μουσείο Μετεωριτών

Τετάρτη 13 Δεκεμβρίου 2023  
20.00 – 21.15

Κεντρικός ομιλητής: κος Τάκης Θεοδοσίου

Συντονιστής για την Ελλάδα ASTEROID DAY

«Η επιπρόσθηση του Beltegeuse από τον αστεροειδή Leona 319»

σε συνεργασία με Ισπανία



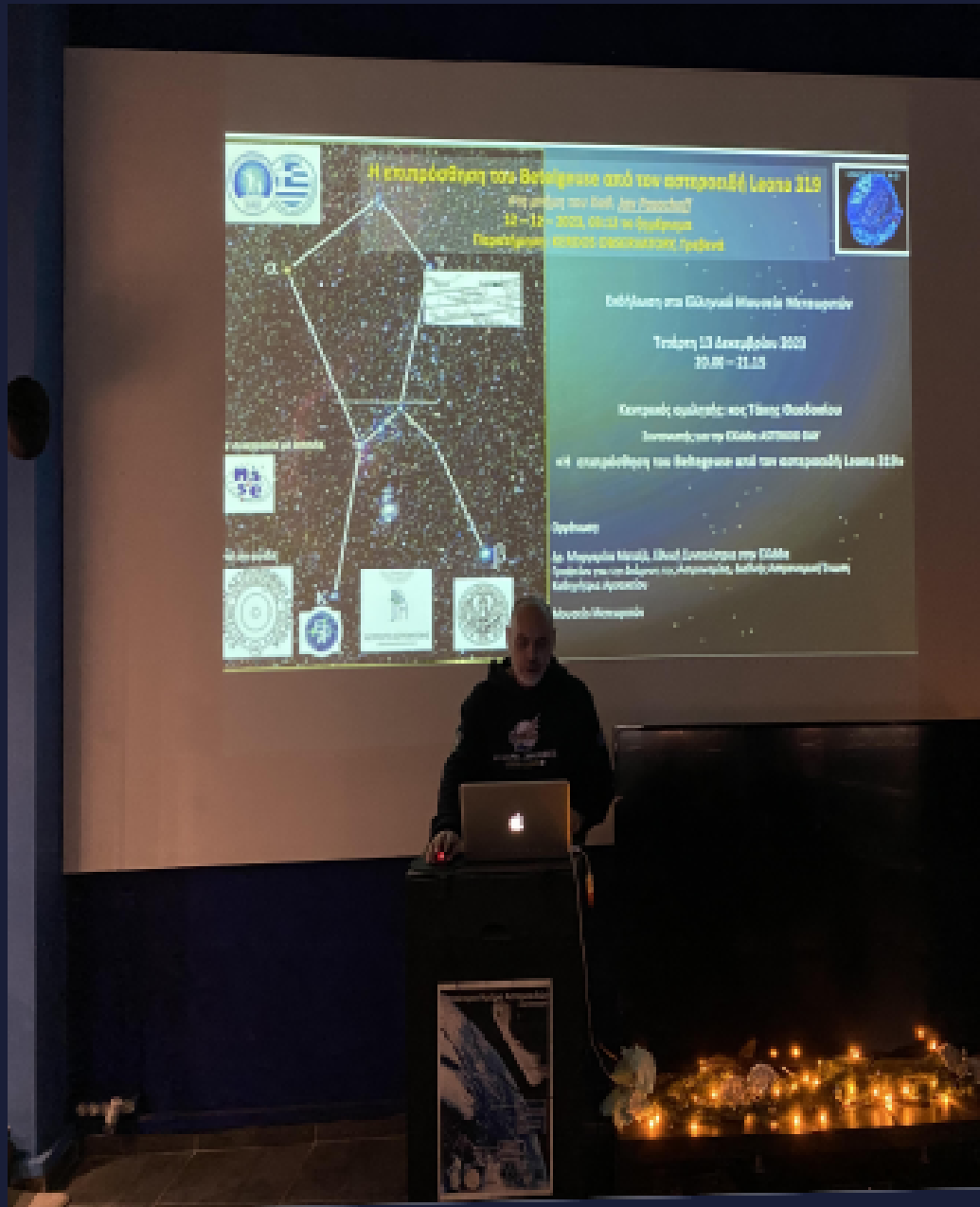
Οργάνωση:

Δρ. Μαργαρίτα Μεταξά, Εθνική Συντονίστρια στην Ελλάδα  
Γραφείου για την Διάχυση της Αστρονομίας, Διεθνής Αστρονομική Ένωση  
Καθηγήτρια Αρσακείου

Μουσείο Μετεωριτών

Υπό την αιγίδα:





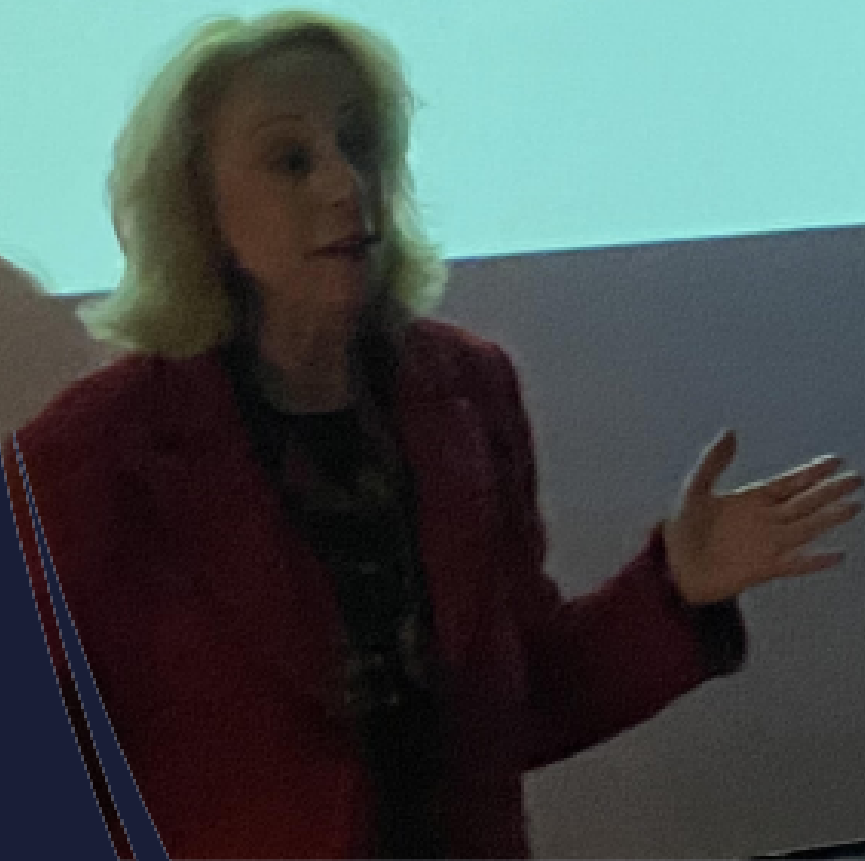
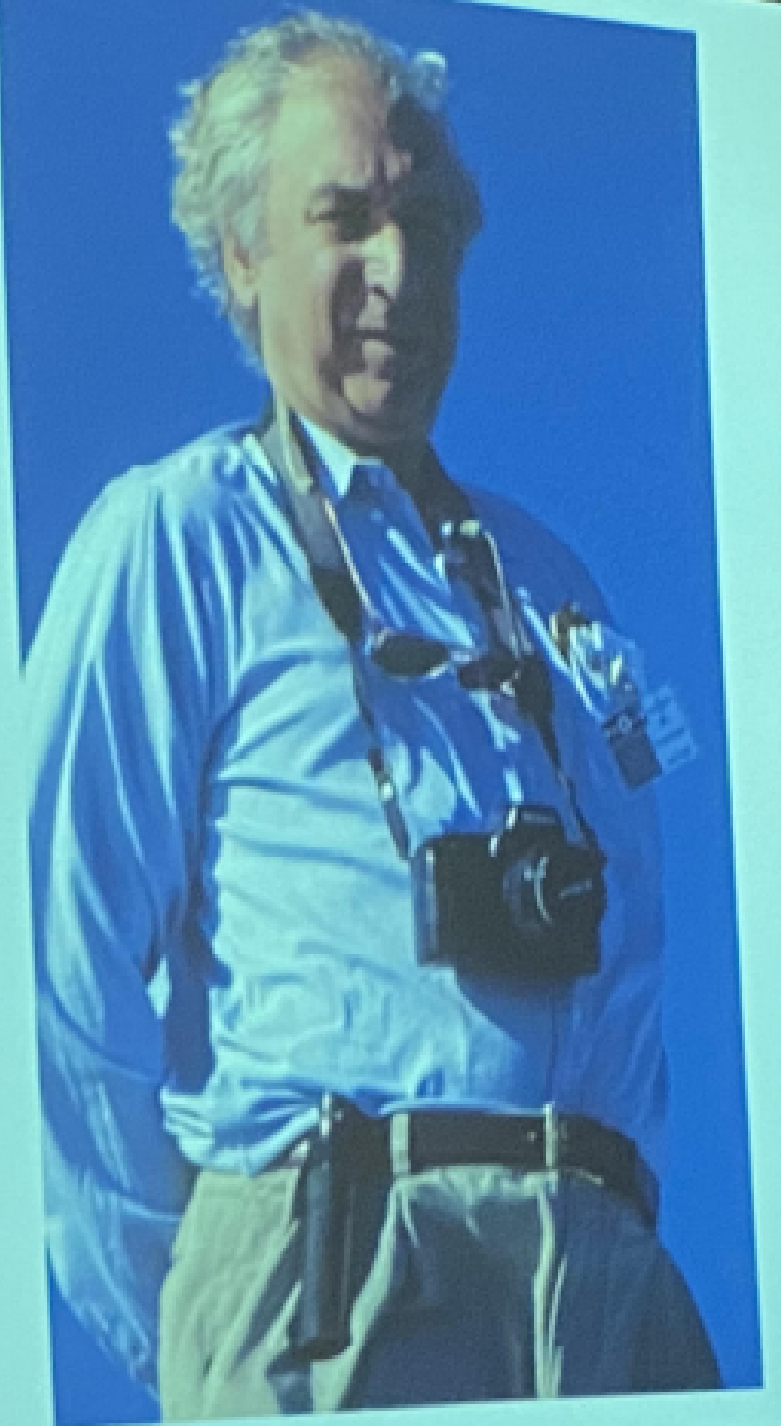


- [https://www.facebook.com/i\\_oannis.kedros](https://www.facebook.com/i_oannis.kedros)

- [https://www.facebook.com/groups/462558191017477/?multi\\_permalinks=1381896829083604&ref=share](https://www.facebook.com/groups/462558191017477/?multi_permalinks=1381896829083604&ref=share)

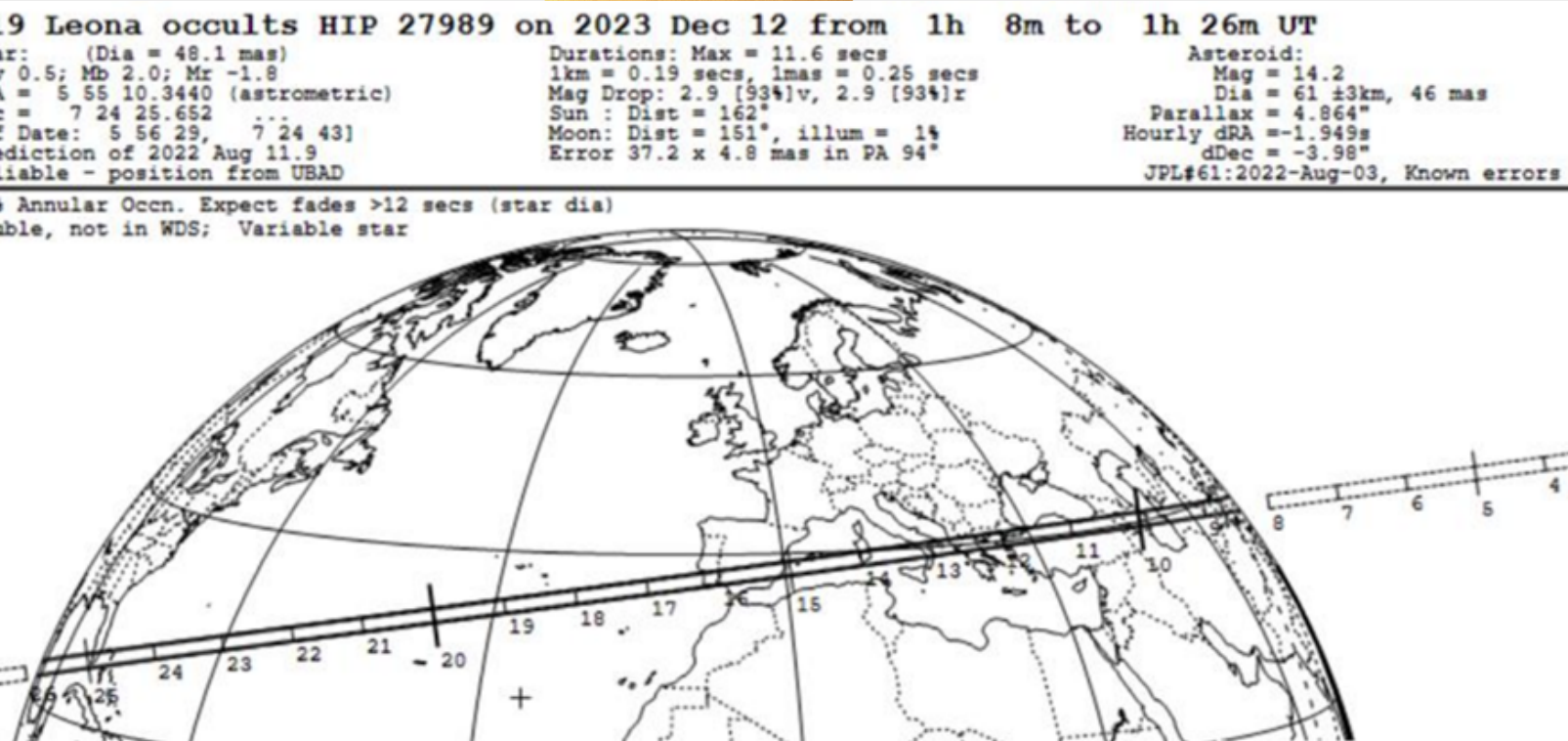
η ΤΟΥ

Pasachoff



# Navigating this Meeting

## Part 2 : Jay Pasachoff's profile



15:00 - 15:05 “Jay as my friend”, Zhongquan Qu.

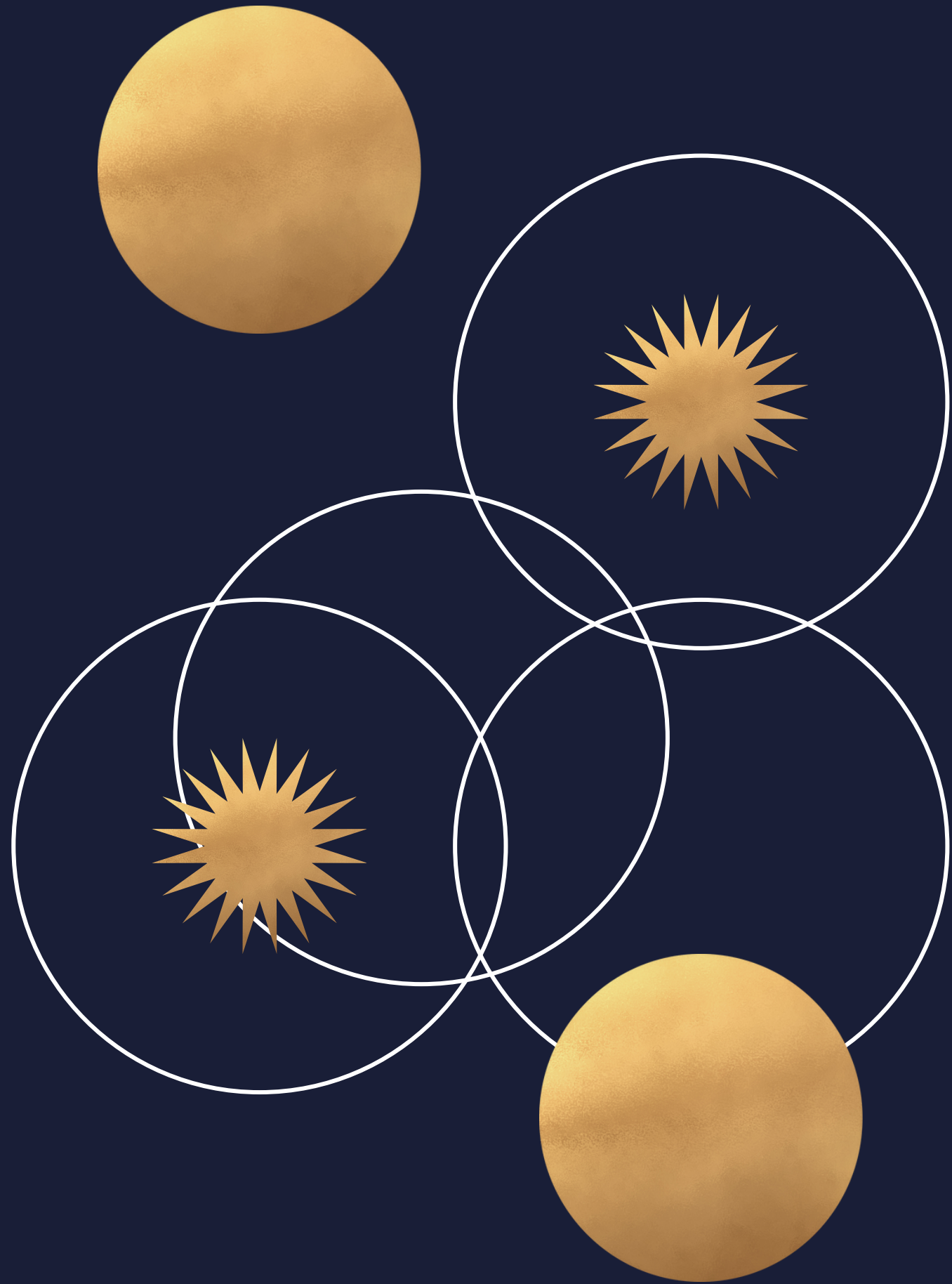
15:05 - 15:10 "A friend in need", Jagdev Singh.

15:10 - 15:15 “Generosity”, Fred Espenak.

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15:20 - 15:50 Jay Pasachoff, his general career...his ideas, how he organized his life.

15:50 - 16:00 Closing session, Rosa M. Ros & Beatriz García. →



# JAY AS MY FRIEND

Zhongquan Qu

Chair of IAU Working Group  
on Solar Eclipses

It is an honor for me to present a talk for commemorating Prof. Dr. Jay Pasachoff, our ex-chair of the IAU Working Group on Solar Eclipses.

My personal communications with Jay did not last long since I began to do solar eclipse observations late in my career, but they stay in my memory.

Although we were so close, it was a pity that I did not meet Jay due to our busy preparation during the observations of the total solar eclipse on 2008 August 1 at Jinta county, Gansu province, China. That was my initial solar eclipse observation and fortunately we succeeded.

Our first but short meeting occurred on 2009 July 22 in Tianhuangping reservoir, Anji county, Zhejiang province, China. But only a short face-to-face gathering was arranged.

The 2013 Gabon total solar eclipse was the onset for us to do cooperation. We arrived at Gabon before his group, and reminded him to pay attention to the chaos caused by the local custom inspection. We kept contact about the weather information via mobile phone, and enjoyed the success after the observation. I met him and had a cheerful talk at Libreville, the capital of Gabon.



Our next meeting was in 2017, before the Grand American Total Solar Eclipse occurred. We decided to carry out the observations at Dallas, Oregon according to Jay's suggestion instead of Lincoln city. We met at the reception lobby of the hotel where they stayed, then we inspected their observational site together, not far away from ours. I gave the last talk after his in SPD annual meeting at Portland, Oregon after the eclipse.

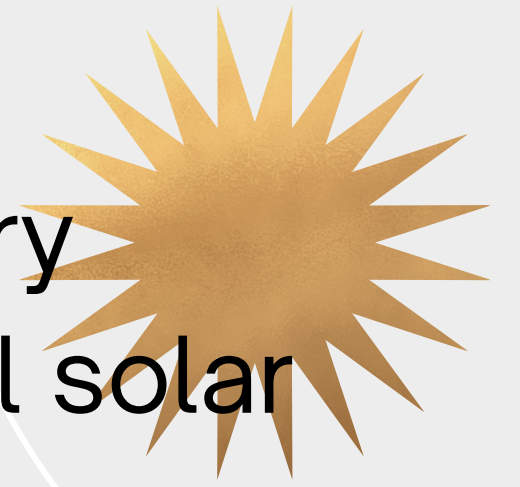
The 2019 total solar eclipse made us together again in Chile, where we shared the same observational site as he proposed, and details were discussed about the scientific goals. He introduced our observation in a later IAU symposium.



Here, I would like to thank Jay for his trust. Before he submitted his review paper entitled Heliophysics at total solar eclipses to the Nature Astronomy journal, he sent me the manuscript and asked for my suggestions and comments. Later, I became the referee for this paper. It is really a wonderful summary of the solar eclipse observational results.

I still remember our idea exchange process for shaping the triennial report of the working group during the IAU Assembly in Vienna in 2018, and a short meeting for discussing 2019 total solar eclipse observations and accepting new members of the Group.

When I just wanted his comments on description of our discovery obtained from analysis of data acquired during 2013 Gabon total solar eclipse, the heartbreaking news arrived at me.



What a pity!

I did feel alone when we did total solar eclipse observation on April 20 of this year in East Timor, because that Jay could not lead his group to do it with mine!

Finally, thanks to Jay for his contribution to the solar corona physics, and he is a model in chasing the solar eclipses to reveal the secrets of solar corona in that I am engaged.

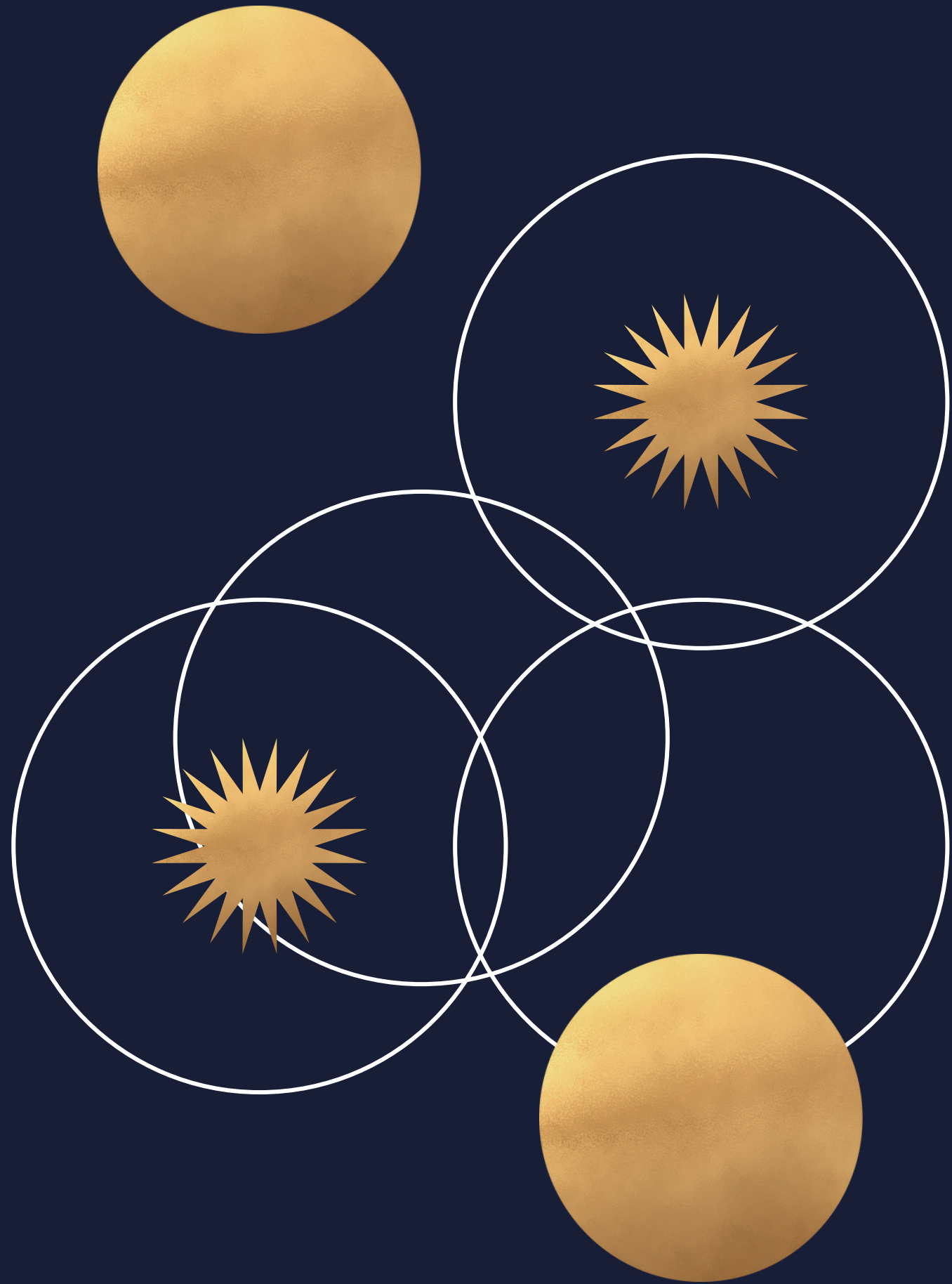


His scientific influence maintains, as evidenced by this  
occultation of Betelgeuse experiment!

He enjoyed the solar eclipses, and so do I and the other group  
members. This is our common values.

We will forever miss Jay, the eclipse hunter! May him be happy in  
Heaven and continue to be the hunter!





# A FRIEND IN NEED

**Jagdev Singh**

Indian Inst of Astrophysics

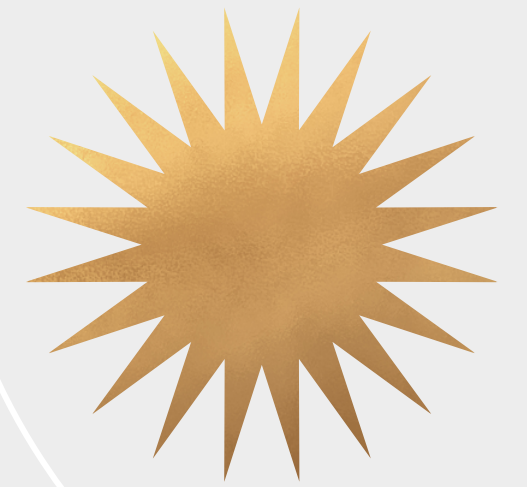
II Block Koramangala

Bangalore, Karnataka

India

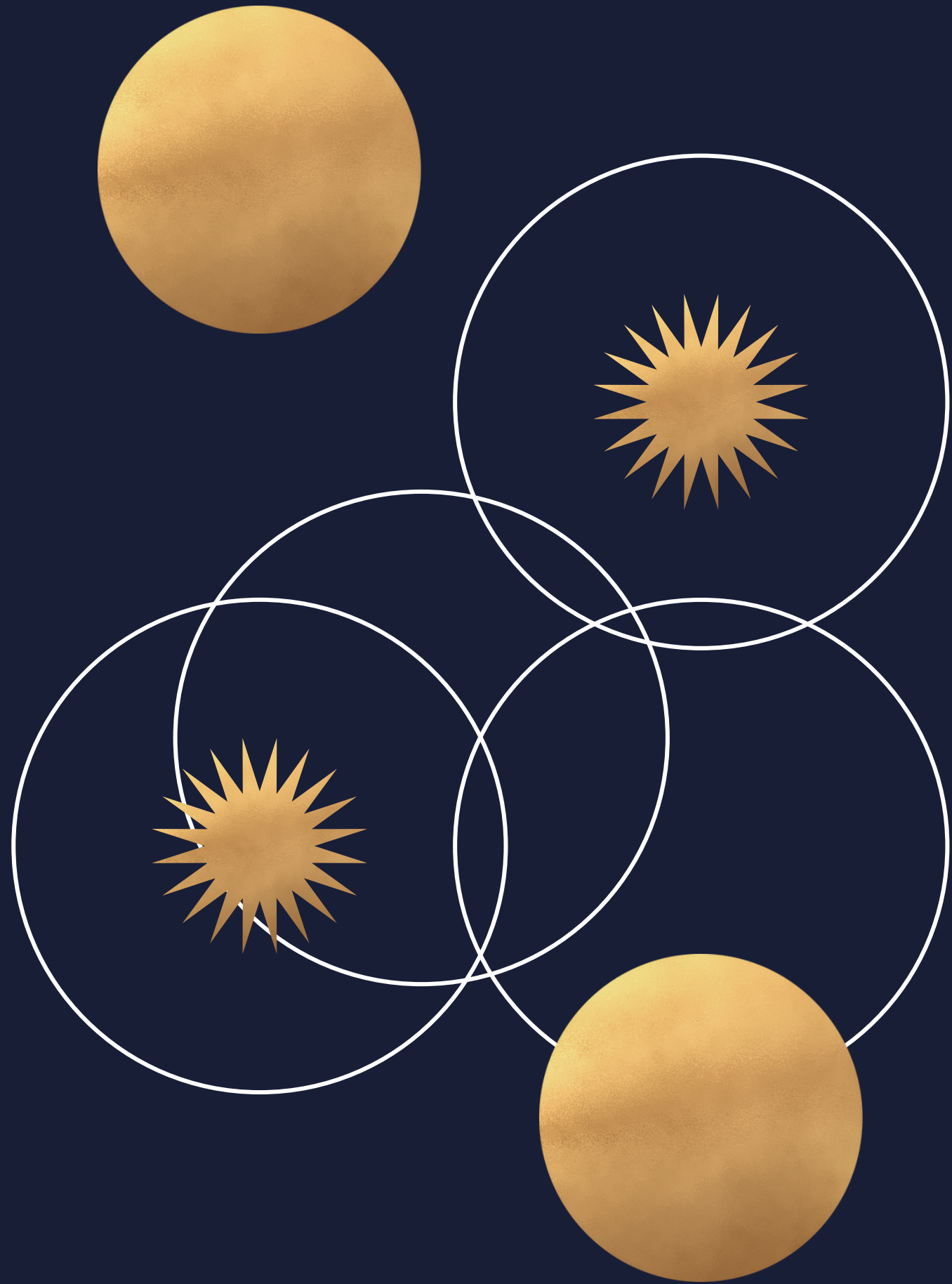
I had interaction with Jay Pasachoff for about 40 years. I first met him in Indonesia where NSF has put up big camp for the scientists of USA to make observations during the total solar eclipse of June 11, 1983. We also put up a small camp by the side of American camp for the Indian team. He was very helpful and provided updates of the eclipse and weather parameters to us during that period. I mention below some of events to show nature of help and generosity.

In 1991, a total solar eclipse occurred at Big Island, Hawaii. He provided all the details about the Hawaii, arranged our stay a resort and a convenient location to install our equipment. He had also installed their instruments at a short distance from us. We had lot of interaction about our experiments and the science one can do from the observations made during the total solar eclipses. Encouraged by his experiment to study the high frequency intensity oscillations in the solar corona, we performed high frequency photometric observation of the solar corona in the continuum during the total solar eclipse of October 24, 1995. We found the existence of multi-periods in the range of 0.2 to 0.02 Hz in the coronal intensity.



Then we made observations during number of total solar eclipses and continued our interaction. Then came the total solar eclipse of 2010 in Easter Island, a remote place. We had all the preparations to make observations during this eclipse. But, we were not getting the air tickets from Santiago to Easter Island and back. Also, we had difficulty in arranging our stay at Easter Island. Jay came to our rescue. He told us to contact his travel agent who arranged our air tickets and accommodation. We had good observations and enjoy our stay in the company of Jay and his team at Easter Island.

Jay had a desire to visit Kodaikanal observatory which has been making observations of the sun since 1899. He has visited India number of times but did not visit Kodaikanal observatory. The annular eclipse of the sun in 2019 occurred in India, which provided opportunity to visit Kodaikanal observatory. The annular eclipse was visible from a place about 60 Km away from Kodaikanal observatory. Jay had a plan to observe this annular eclipse from Coimbatore, about 200 Km from Kodaikanal observatory. Then, I suggested to him that we can observe the annular eclipse from the foot-hills of Kodaikanal observatory and then visit Kodaikanal observatory after the eclipse. The place chosen earlier happened to be cloudy during the eclipse but we had a clear view of the annular eclipse at the Foot-hills. After the eclipse, Jay, Naomi and we all went to Kodaikanal observatory. He had health issues at that time. In spite of these issues, he visited various facilities of Kodaikanal observatory, gave a talk and interacted with the staff and students. He had a great dedication to work and popularize the occurrences of eclipses. He will always be remembered for his dedications by the eclipse chasers and solar physicists in general.



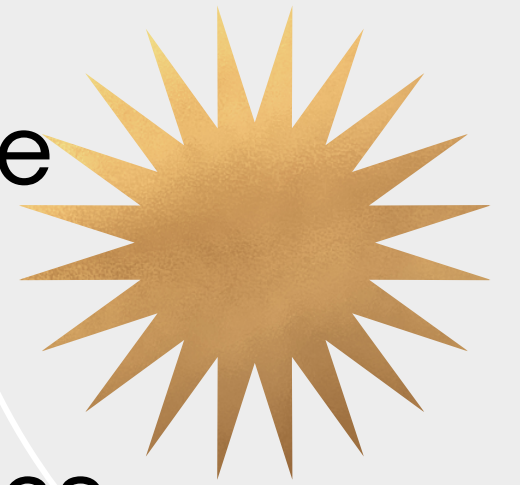
# GENEROSITY

Fred Espenak

Retired emeritus astrophysicist at the  
Goddard Space Flight Center.

[MrEclipse website](#)

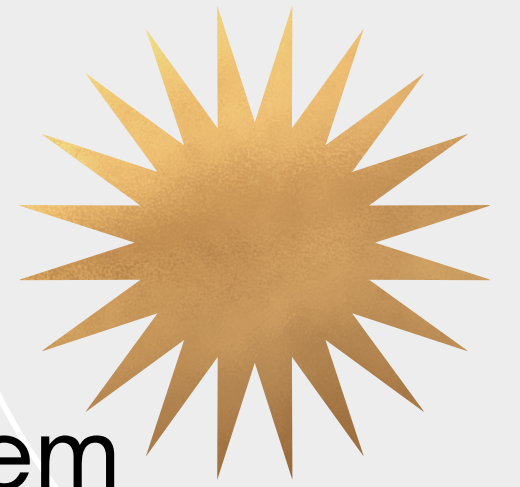
I knew Jay for more than three decades and was fortunate to share his company at several solar eclipses.



When I began writing the NASA Eclipse Bulletins in the 1990s, it was difficult to get funding for this work at the agency. Jay wrote invaluable letters of recommendation for my proposals and helped me continue with this activity at NASA. He invited me to join the International Astronomical Union's Working Group on Solar Eclipses, which validated my eclipse work with the agency.

Over the years, Jay contributed some of his best eclipse images for "Totality", the eclipse book I co-authored with Mark Littmann. In fact, our most recent edition contains a spectacular image of the 2017 corona shot by Jay and his team.

Speaking of which, Jay was instrumental in the early careers of a number of young scientists by enlisting their help in operating experiments on many of Jay's eclipse expeditions, often taking them to distant and exotic corners of the world.



With every upcoming eclipse, Jay was eager to share his passion with the media and the general public, participating in countless interviews and zoom presentations. He was a firm believer that everyone should see a total solar eclipse at least once in their life.

I was honored to maintain a world map for Jay that showed the location of all of his solar eclipse expeditions. I doubt if anyone will exceed his record for number of eclipses anytime soon.

The last eclipse we spent together was in Argentina in 2017.

My wife Pat and I fondly remember time spent with Jay and Naomi on that trip.

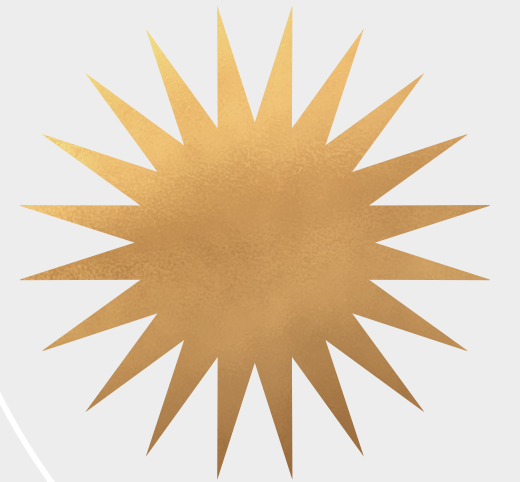
In the summer of 2022, my granddaughter was applying to colleges and she wanted to visit Williams College. The Pasachoff's generously arranged a tour of Williams Observatory for her as well as a visit to their home, even though Jay was undergoing aggressive medical treatments.

During the visit, Jay gave an autographed copy of his Field Guide to Weather to my wife to bring home. When Pat told him I was working on a Bulletin for the 2024 total eclipse, he emailed me offering to proof-read the manuscript. After receiving helpful comments and corrections from Jay, the 2024 Bulletin was published in October.

A month later, he was gone.







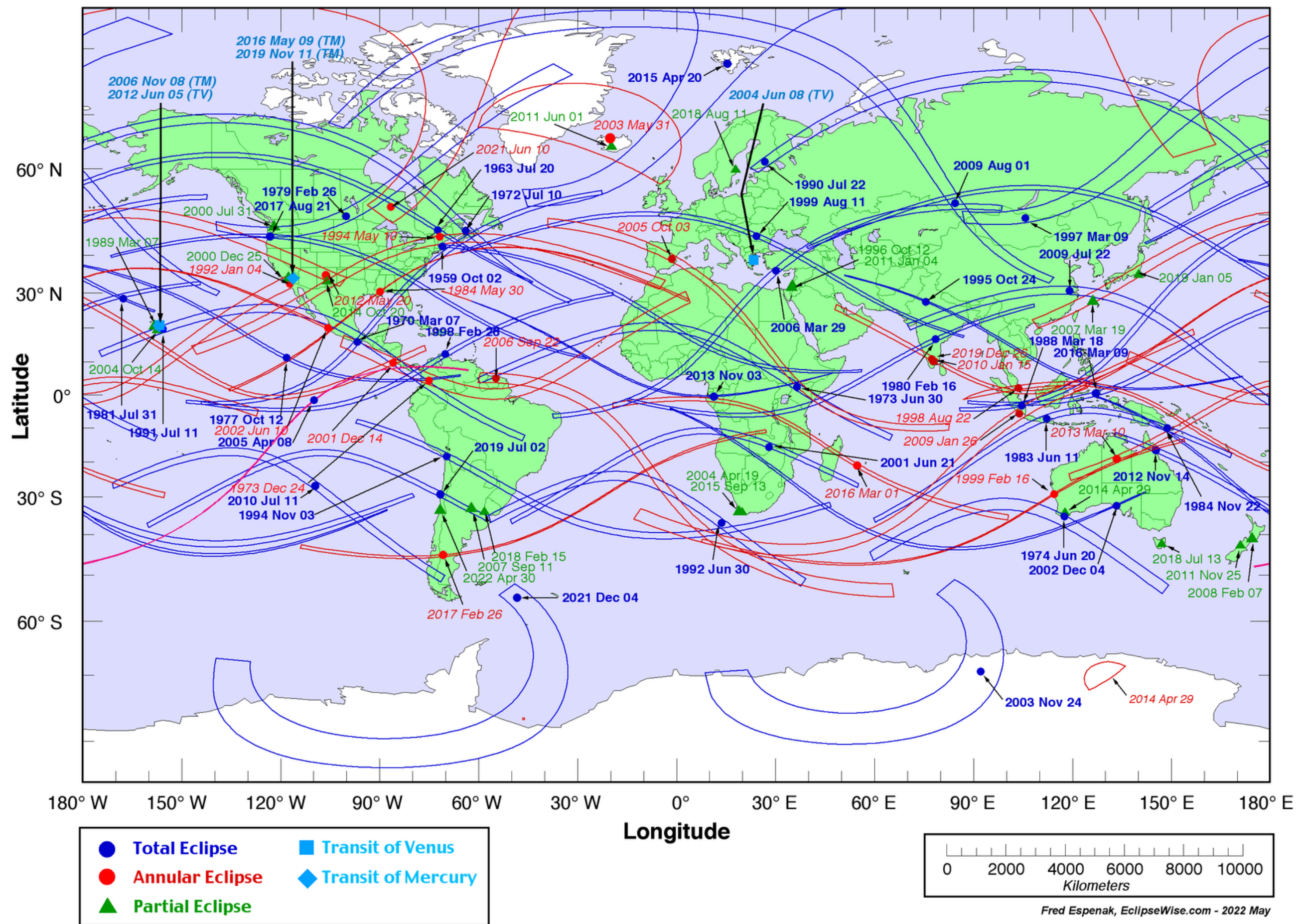
Jay's accomplishments in solar physics and astronomy are well known to all, and the name Pasachoff is synonymous with eclipses of the Sun. But his generosity, kindness, and enthusiasm for eclipses, the time he invested in educating all of us about them are what I will remember and miss the most.

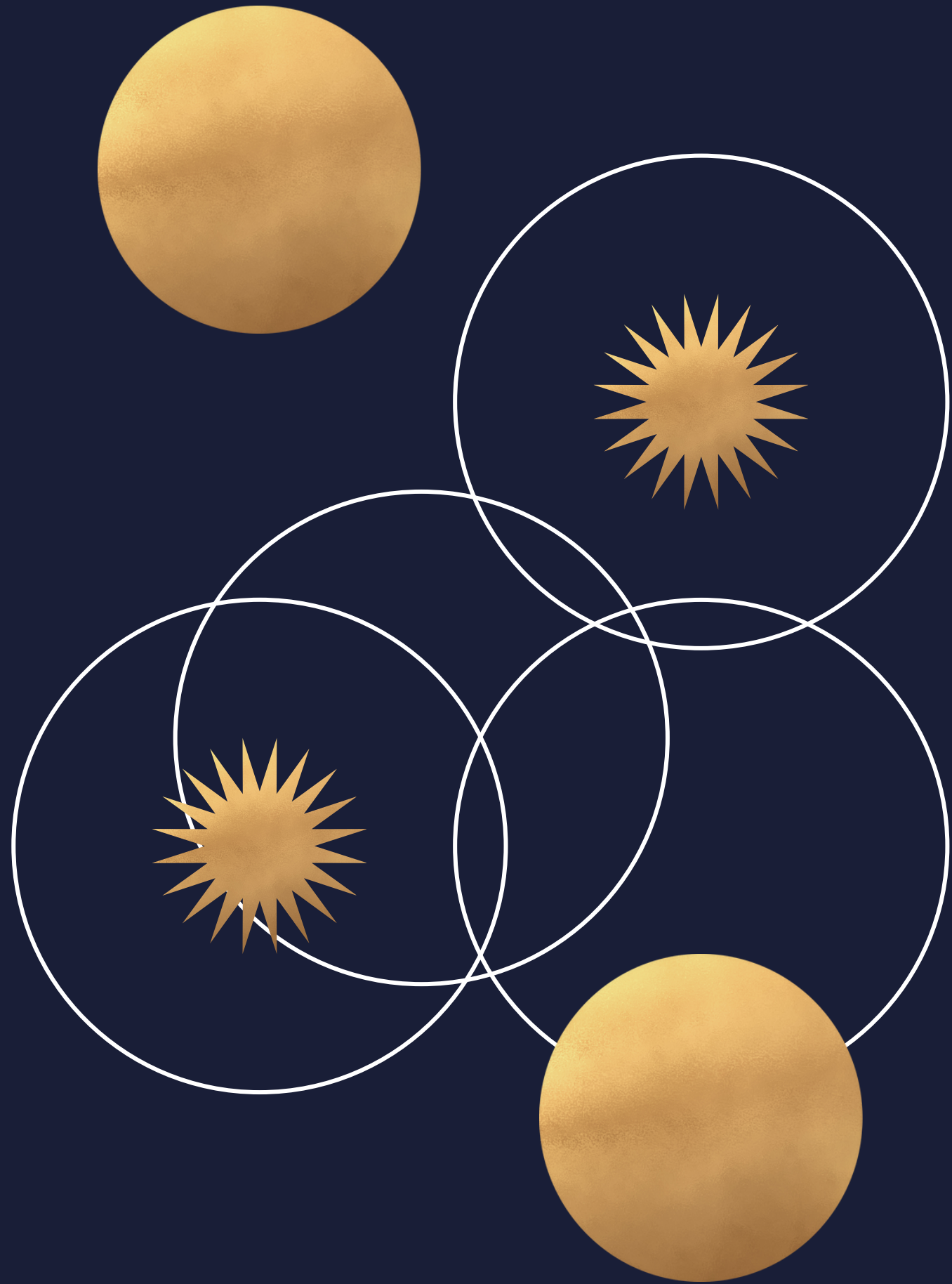
Farewell my friend.

- Fred Espenak

For many years, Fred Espenak maintained a world map for Jay Pasachoff that showed the location of all of his solar eclipse expeditions (as well as Mercury and Venus transits). In the figure on the right, is the last version of it, a great tribute for an Eclipse follower.

### Solar Eclipses Observed by Jay M. Pasachoff: 1959 – 2022



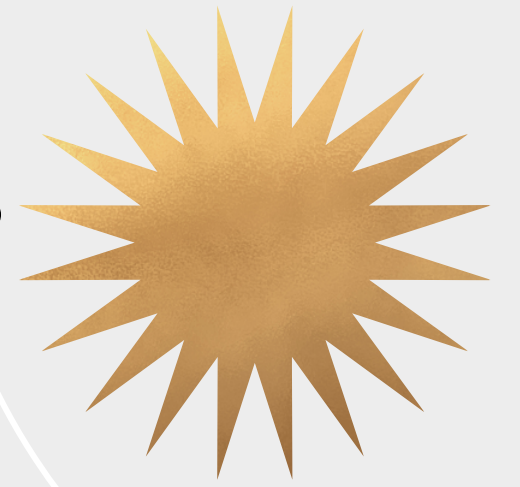


# OUT OF AGENDA

**John Percy**

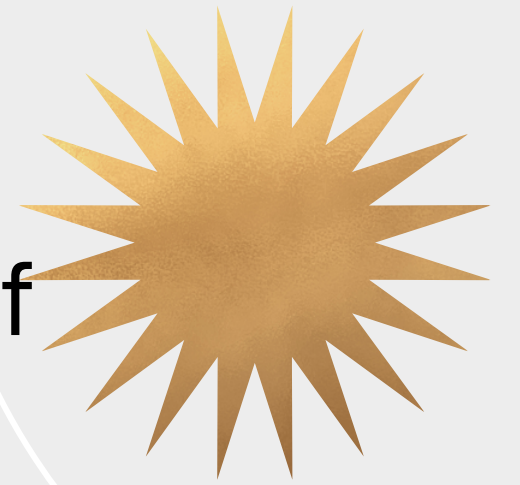
Professor Emeritus, Department of Astronomy &  
Astrophysics, University of Toronto

I joined IAU Commission 46 (The Teaching of Astronomy) in 1973. Soon after, I became National Representative for Canada. Jay was National Representative for the US. He was very active, very efficient, and very multi-talented, so I learned a lot from him.

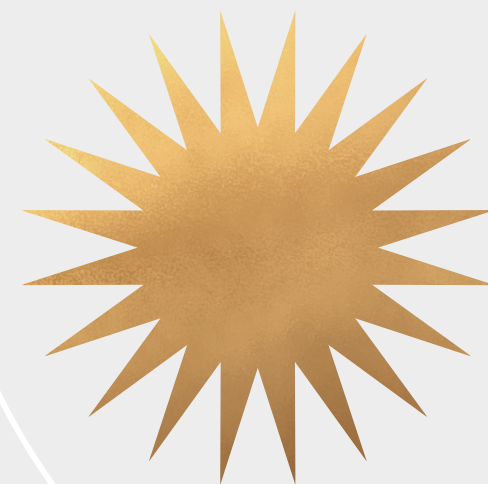


In 1988, we co-organized the first IAU conference on astronomy education, 26-30 July, at Williams College, Jay's home institution in Williamstown MA. It was exciting; our "kindred spirits" from all over the world were there. We co-edited the proceedings, *The Teaching of Astronomy*, Cambridge University Press, 1990, see illustration below. From that experience, I learned even more; as an author and editor, Jay's standards were impeccable. We co-organized several subsequent discussion groups, meetings and conferences, and co-edited another proceedings in 2006 (*Teaching and Learning Astronomy*, Cambridge University Press, 2006).

Jay was an Honorary Member of the Royal Astronomical Society of Canada (RASC), one of only a dozen from around the world. In 2023, I had the sad honour of writing his obituary for the Journal of the RASC (117, 46-7 (2023)).

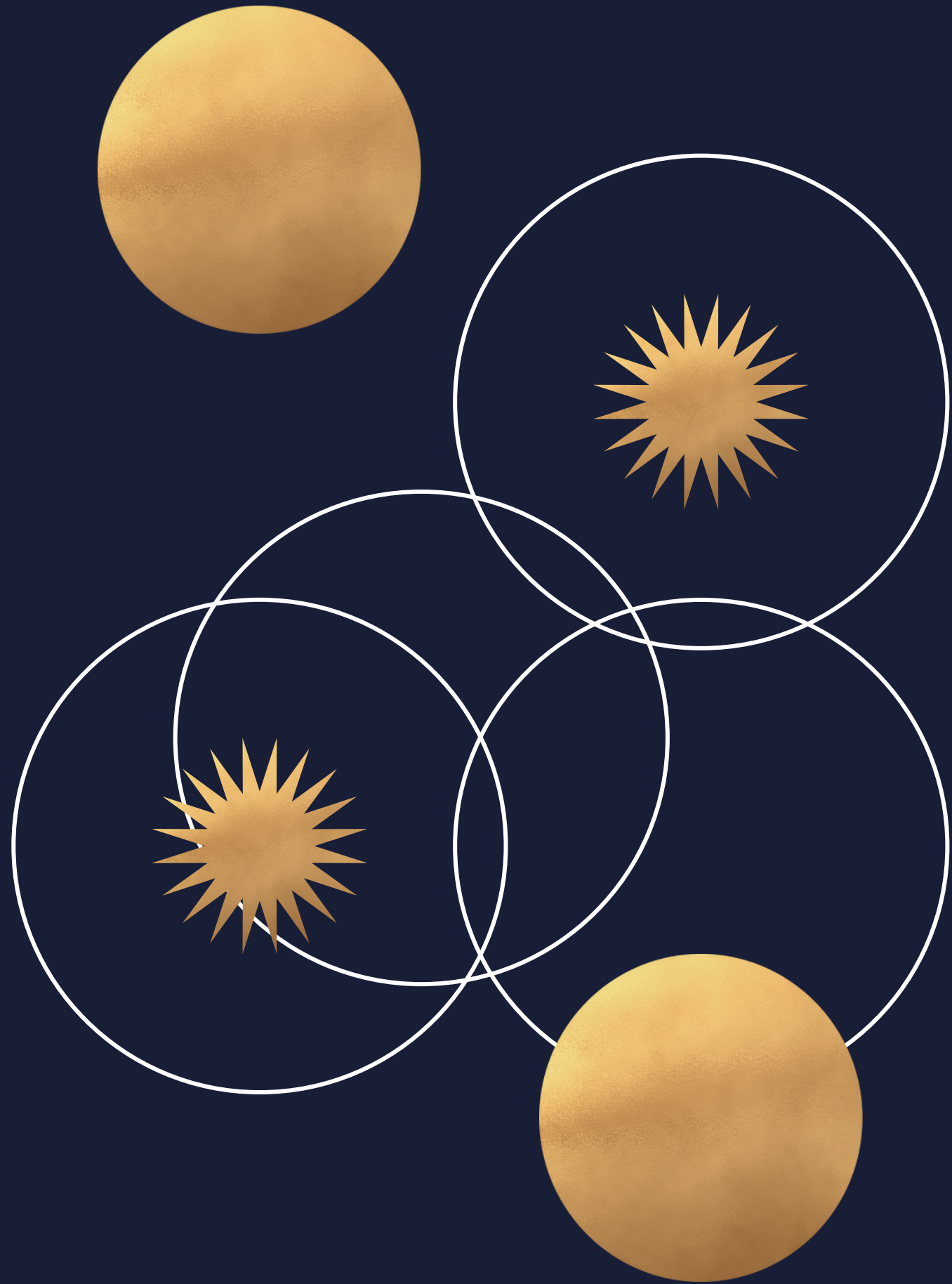


In May 2023, the University of Toronto hosted AstroEdu-2023, another international conference on astronomy education. It had been postponed from 2021 by the pandemic. I hoped that Jay would be there but, by the time of the conference, he had passed away.



I contribute a regular column in JRASC called John Percy's Universe. My October 2023 column was on Astronomy Education around the World (JRASC, 117, 205-6 (2023)) It was inspired by Jay, and by AstroEdu-2023, which took place exactly 50 years after I first joined IAU Commission 46.

I have fond memories of Jay, and I will miss him very much.



# OUT OF AGENDA

**Donald Lubowich**

Senior Research Associate and Coordinator of Astronomy  
Outreach

Director Astronomy Festival on the National Mall

Director Music & Astronomy Under the Stars

Hofstra University

- Jay was my friend, colleague, and collaborator for 35 years. He was kind and generous to all and was beloved by his students and colleagues.
- Jay loved astronomy education and was the evaluator for my NASA-funded outreach for sick kids and their families grant. Jay brought Williams college students to learn about astronomy outreach at outdoor music concerts
- Jay was the 21<sup>st</sup> century recipient of both the AAS Education Prize and ASP Award for science education and public understanding of astronomy (following Carl Sagan and Sir Fred Hoyle).



- **Jay was an excellent radio astronomer. Jay's published search for deuterium in the Galactic Center inspired me to become a "deuteronomer" and I have continued this research.** With our collaborators and students, we detected D in The Galactic Center (in DCN), the Extreme Outer Galaxy (in DCO<sup>+</sup>) and completed searches for D in B stars, the Orion Nebula, Seyfert Galaxies, and SNRs.
- We used the VLA, NRAO 12-m (Kitt Peak), Giant Meterwave Radio Telescope (India), Nobeyama Radio Observatory (45 m and mm-array, Japan), IRAM 30-m (Spain), National Solar Observatory McMath Solar Telescope (Kitt Peak), the Arecibo 300m radio telescope, and the NOAO Coude Feed (Kitt Peak) and brought undergraduate students to learn about astronomical observations.

Answering audience questions at large outdoor concert for 5000 people

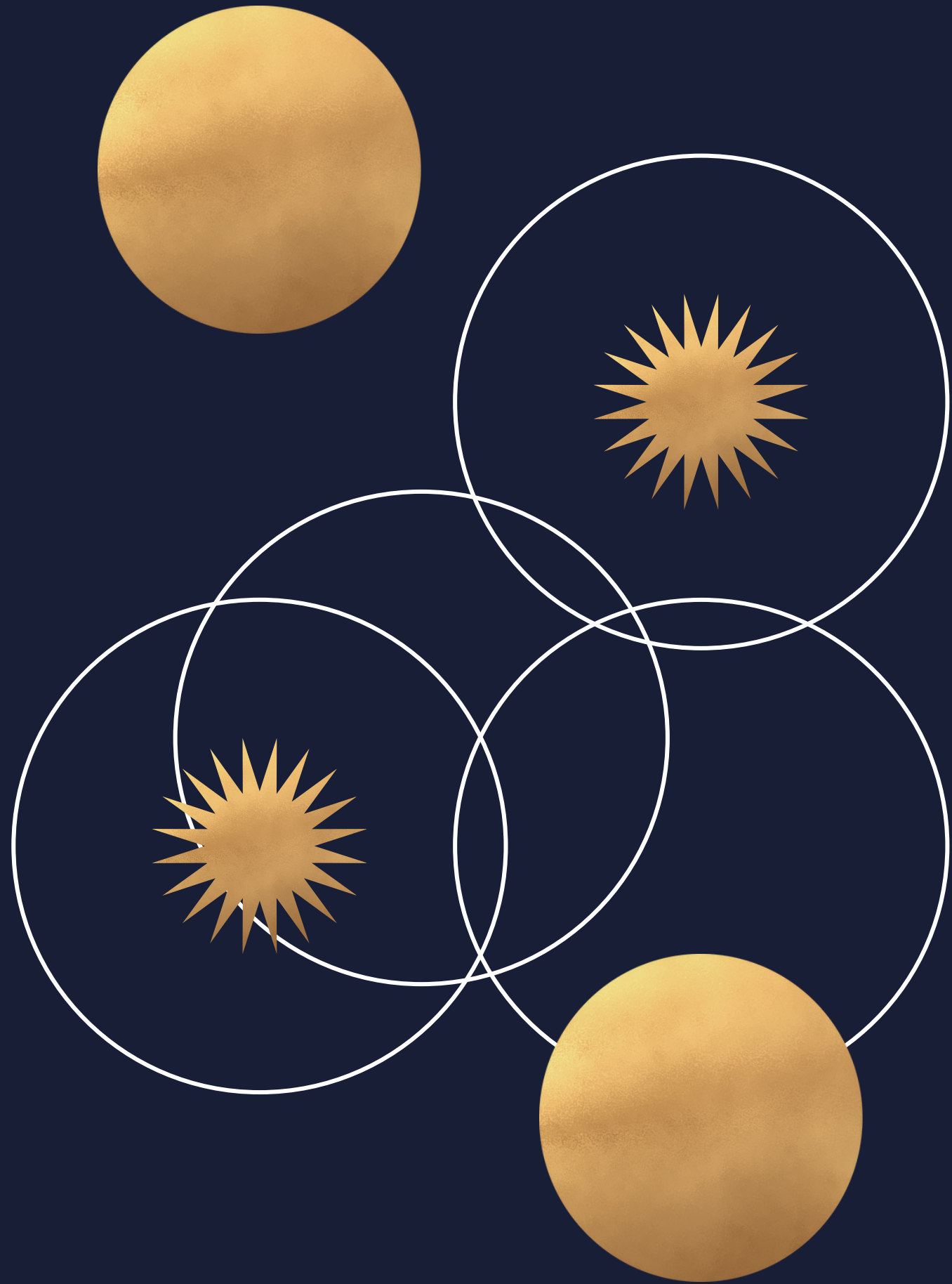


Jay and Williams College students at the Tanglewood Music Festival



# IAU Vienna 2018





# OUT OF AGENDA

**Noorali T. Jiwaji**

Open University of Tanzania  
Faculty of Science Technology  
and Environmental Studies

I first saw Jay's name in a new edition Peterson's Field Guide to Stars and Planets which I had been using of Donald Menzel only. In 1990 I had the opportunity to go to Zambia to see the Total Solar Eclipse over Lusaka where I learned that Jay's team was there. I visited their camp and asked to meet him. I was stunned by how he welcomed me so warmly even though I was complete stranger to him. I was able to view the eclipse from near his team's set up and was able to appreciate the true magnificence of the solar corona.

We continued to communicate and he shared pictures of the eclipse especially the the corona. He also guided me in my Astronomy outreach work. When I visited my son in the US he connected me with astronomers in Boston and I was privileged to be invited with my family to visit his home where I met Naomi and he gifted us some of his Astronomy books.

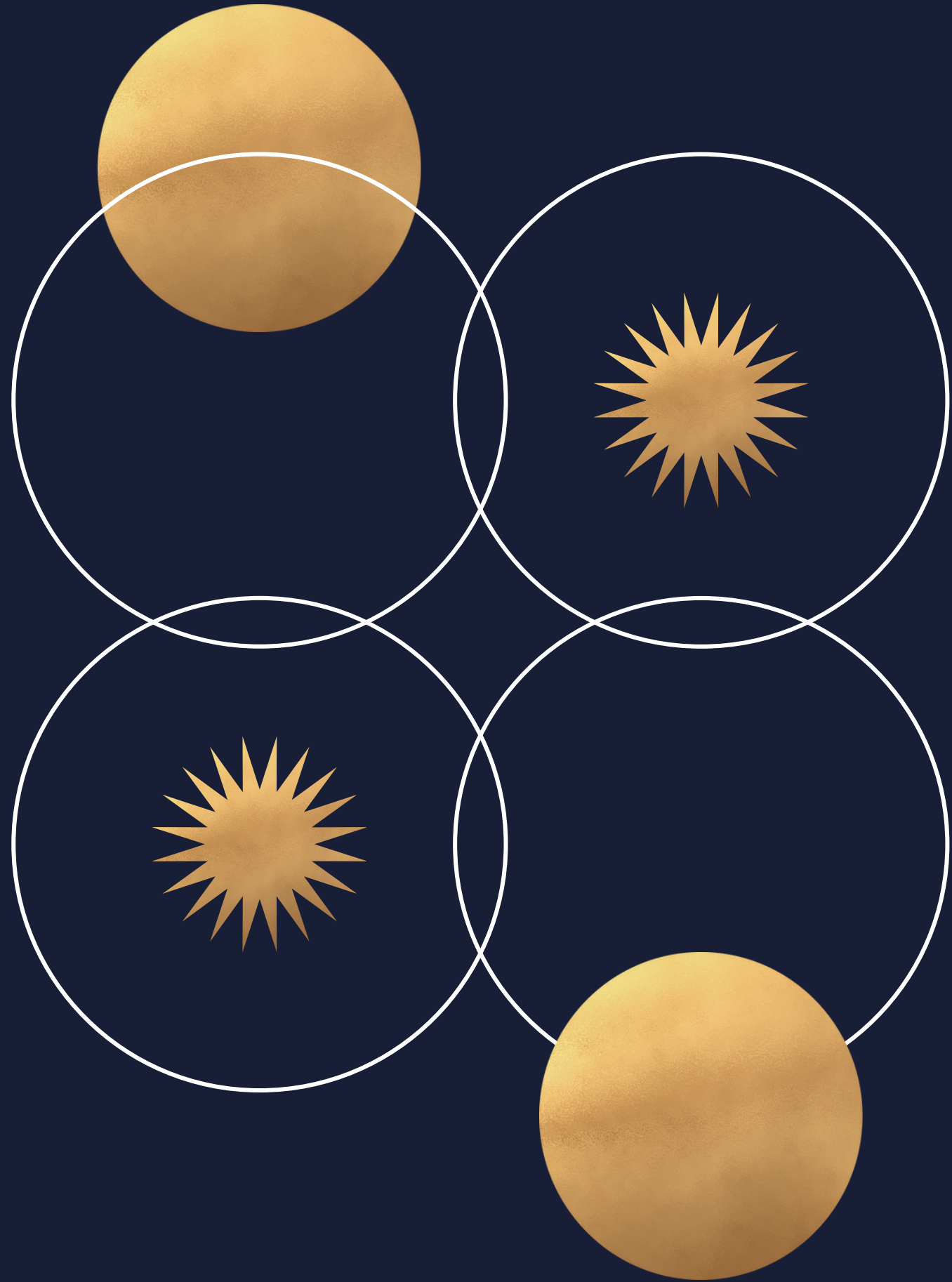


The meeting with Prof Pasachoff built a life long relationship both professionally and personally from his very approachable nature and resulted in his inviting me to join his team to view the Partial Solar Eclipse from the most southern tip of Africa at Cape Agulhas on September 13, 2015.



During the 2016 eclipse I invited Jay to join us in the path of full angularity in southern Tanzania, and though our plans were finalized he cancelled the trip due to difficulty in accommodating Naomi's needs and instead he observed the event from the Madagascar site.

Each end of year during the holiday season and new year Jay shared personal greetings sharing the joys of close family members. Indeed Jay was huge in heart to have given so much that he has left a permanent mark in me.

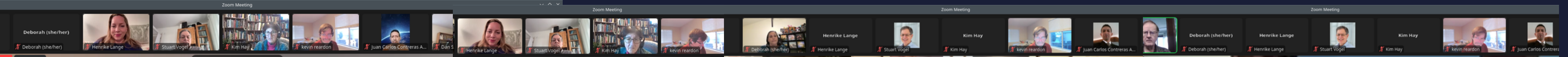


# IMAGE GALLERY

*Rosa María Ros*

[Access to Galery\\_1](#)

[Access to Galery\\_2](#)



Naomi Pasachoff



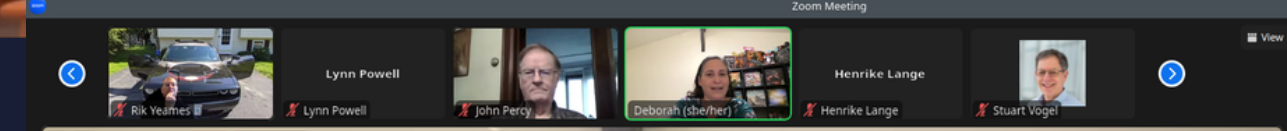
Zhongquan Qu



Fred Espenak



John Percy



Deborah Pasachoff



Participants (49)

- robertlucas (Guest)
- Stephen Bedingfield, Canada (Guest)
- Stuart Vogel (Guest)
- Svitlana Kolomiets (Guest)
- Terry Cuttle (Guest)
- Tomita, Akihiko - NAEC Japan (Guest)
- Xavier (Guest)
- Yoichiro Hanaoka (NAOJ) (Guest)

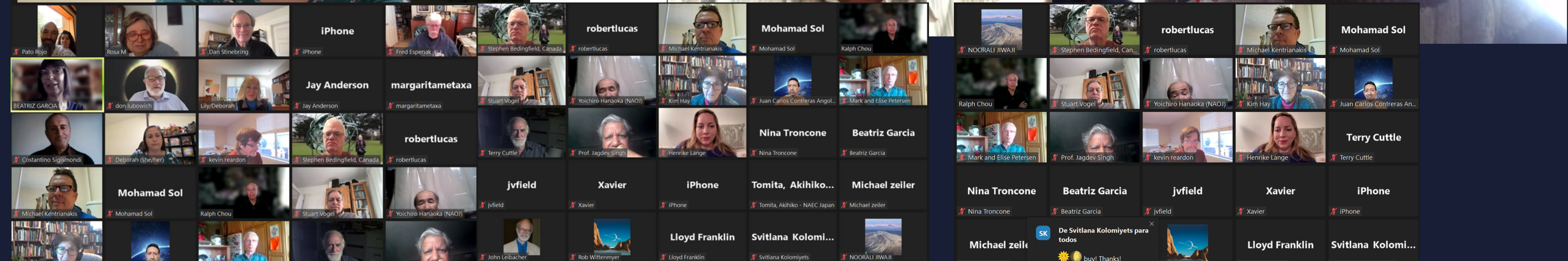
Meeting Chat

- You received a new emoji. Install the emoji library to view it.
- Jagdev Singh is very much there
- Is here
- please unmute him
- Now his mike is on

Noorali Jiwaji



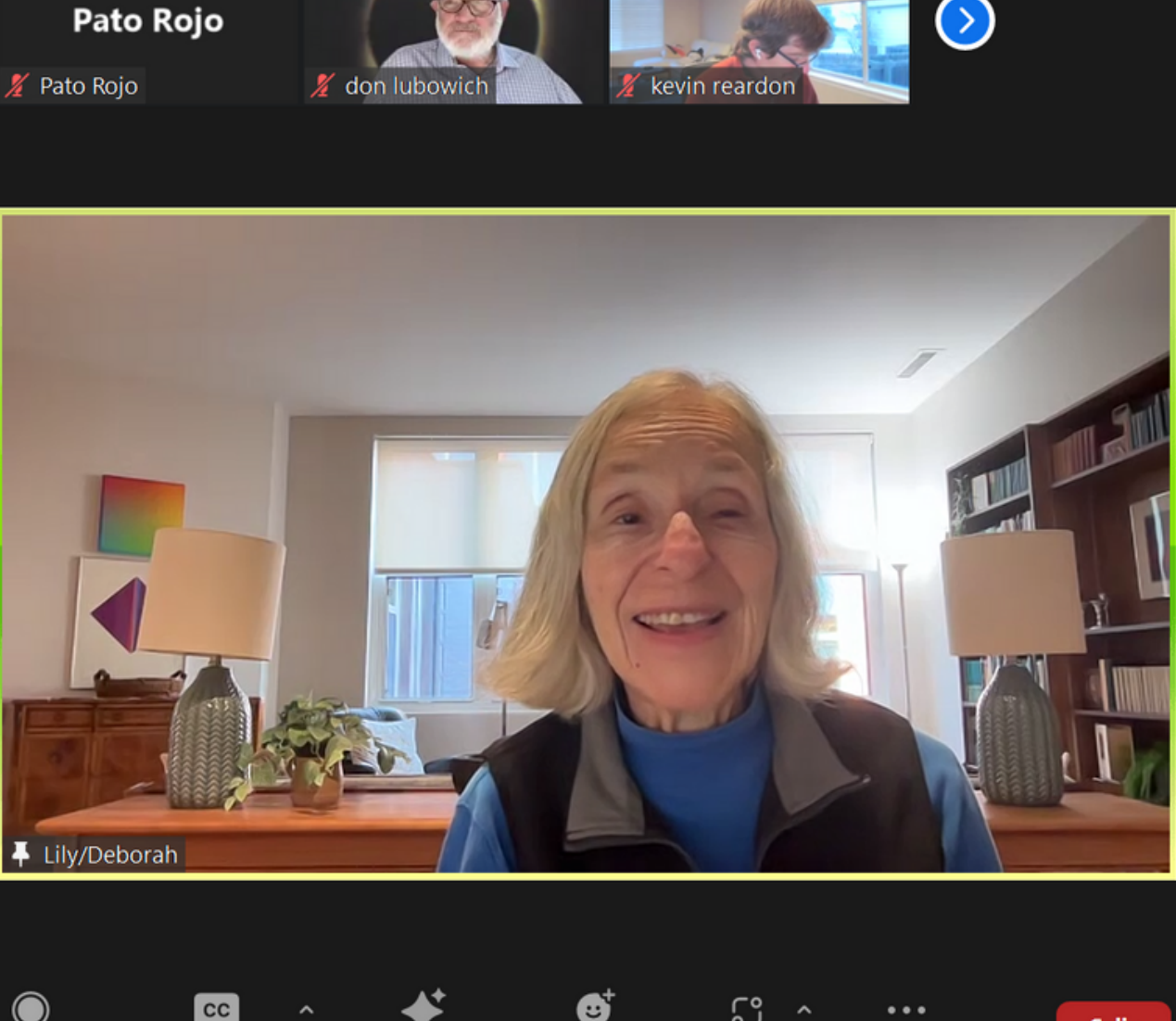
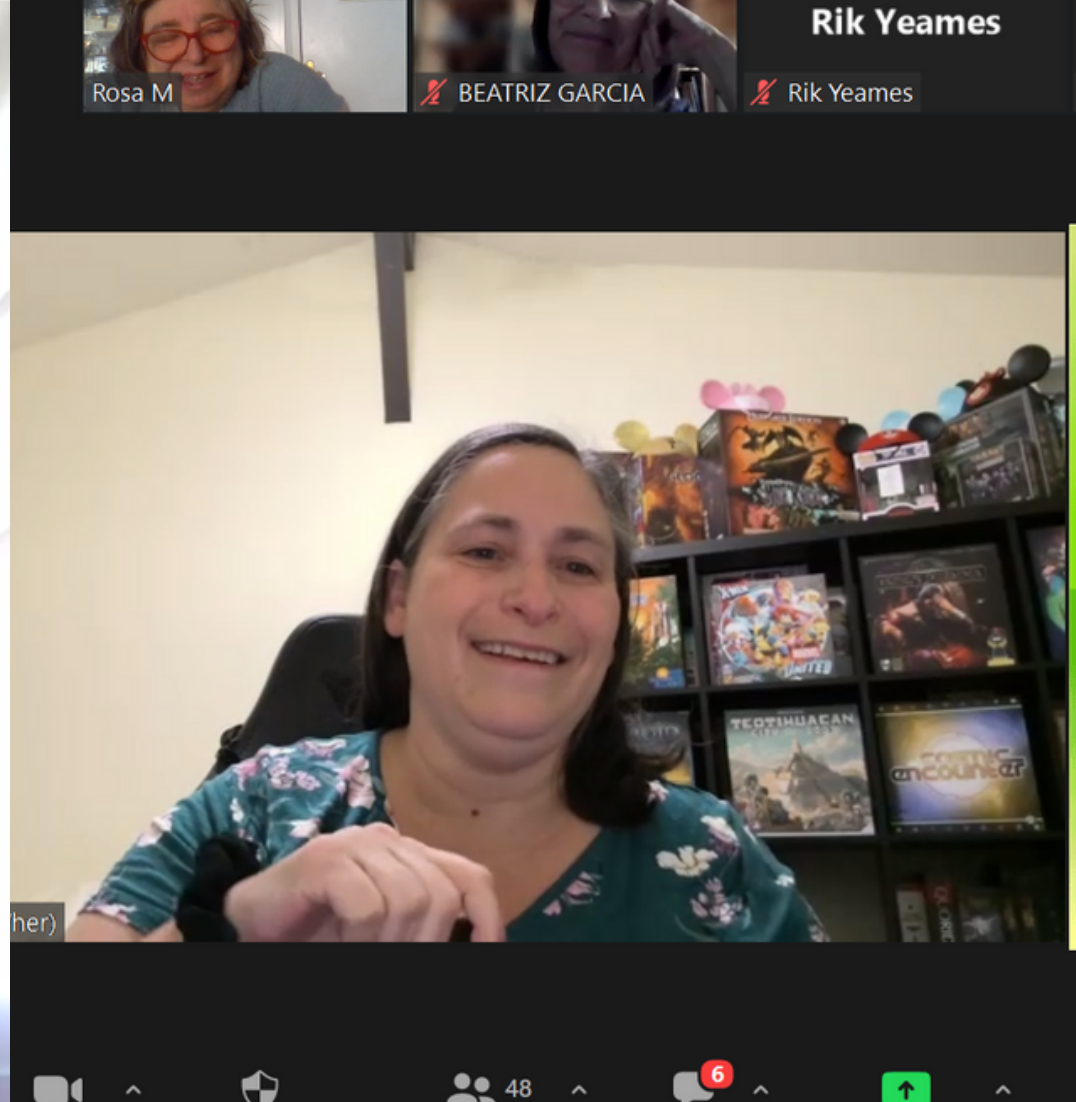
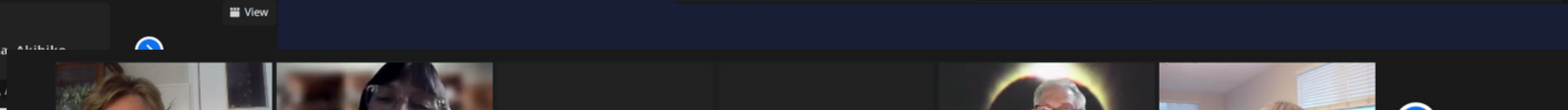
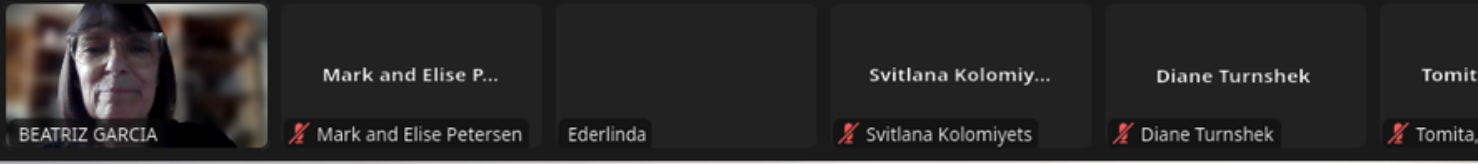
José María Díaz



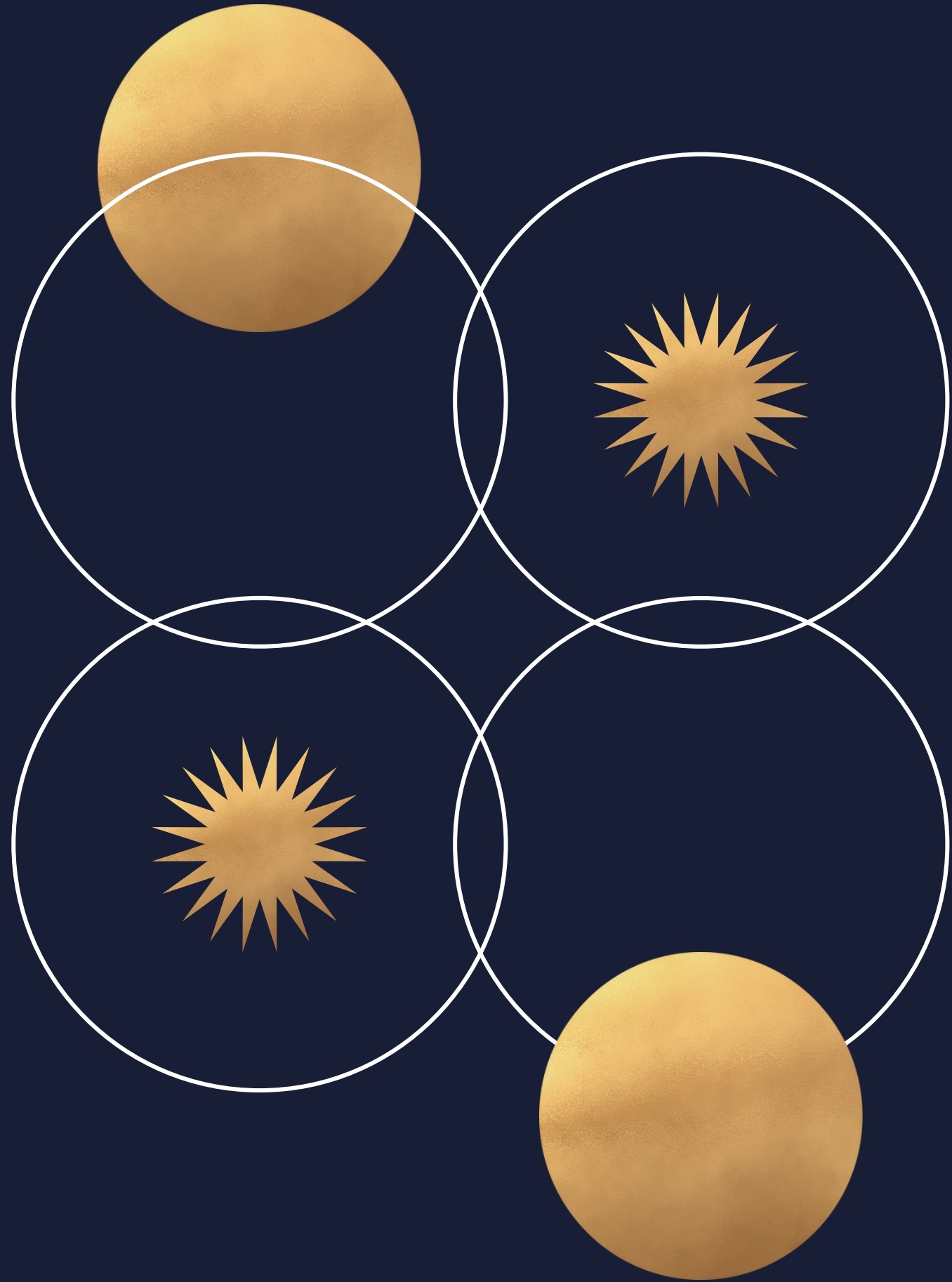


Answering audience questions at large outdoor concert for 5000 people

Donald Lubowich



A large grid of video conference participants, each with a name and a small profile picture or video thumbnail. The names are: Pato Rojo, BEATRIZ GARCIA, Svitlana Kolomiets, Lloyd Franklin, Ralph Chou, Dan Stinebring, John Leibacher, Nina Tronccone, Michael zeiler, Mark and Elise Petersen, iPhone, Rob Wittenmyer, Deborah (she/her), Henrike Lange, Stuart Vogel, Tomita, Akihiko -..., iPhone, Xavier, Fred Espenak, Pato Rojo, Kim Hay, Kevin reardon, Juan Carlos Contreras Angola - Centro..., Dan Stinebring, John Leibacher, Costantino Sigismondi, Mohamad Sol, don lubowich, Yoichiro Hanaoka (NAOJ), margaritametaxa, Nina Tronccone, Michael zeiler, Mark and Elise Petersen, Tomita, Akihiko -..., iPhone, Michael Kentrianakis, Terry Cuttle, Prof. Jagdev Singh, jvfield, Stephen Bedingfield, Canada, Xavier, Fred Espenak, Costantino Sigismondi, Mohamad Sol, don lubowich, Jay Anderson, robertlucas, Rosa M, Lily/Deborah, Beatriz Garcia, Pato Rojo, Rosa M, Dan Stinebring, iPhone, Fred Espenak, NOORALI JIWAJI, Stephen Bedingfield, Can..., robertlucas, Michael Kentrianakis, Mohamad Sol, BEATRIZ GARCIA, don lubowich, Lily/Deborah, Jay Anderson, margaritametaxa, alpha Chou, Stuart Vogel, Yoichiro Hanaoka (NAOJ), Kim Hay, Juan Carlos Contreras An..., Costantino Sigismondi, Deborah (she/her), NOORALI JIWAJI, Stephen Bedingfield, Can..., robertlucas, Michael Kentrianakis, Prof. Jagdev Singh, Kevin reardon, Henrike Lange, Terry Cuttle, Michael Kentrianakis, Mohamad Sol, Ralph Chou, Stuart Vogel, Yoichiro Hanaoka (NAOJ), Nina Tronccone, Beatriz Garcia, jvfield, Xavier, iPhone, Kim Hay, Juan Carlos Contreras An..., Mark and Elise Petersen, Prof. Jagdev Singh, Kevin reardon, Michael zeiler, De Svitlana Kolomiets para todos, Lloyd Franklin, Svitlana Kolomi...



# CLOSING REMARKS

*Rosa María Ros*

One of the projects that would surely have excited him is the observation of the occultation of Betelgeuse by the asteroid 319 Leona on December 12th, 2023, this workshop was a tribute to his idea, the observation, which was carried out by colleagues along the path of the occultation, as well as to Jay's personality, focusing on different aspects of his work and life, as recounted by a few of his close colleagues and family members.  
Thank you very much for sharing this journey!



# REMEMBERING JAY PASACHOFF

BETELGEUSE OCCULTATION

*An IAU NASE + Eclipse WG workshop*

[https://www.youtube.com/live/kC1vcdy8N\\_k?si=bCu\\_6alH\\_NybkXny](https://www.youtube.com/live/kC1vcdy8N_k?si=bCu_6alH_NybkXny)

