

Saturday, August 23rd 2024

*Location: Keplersaal at Stuttgart Planetarium (please use the side entrance),
Willy-Brandt-Straße 25, 70173 Stuttgart*

08:30 Registration desk opens

If you haven't received your programme already on Friday, you can collect it now.

09:00 Opening Ceremony

*Dr. Uwe Lemmer, Director of Stuttgart Planetarium
Andreas Eberle, President of Stuttgart Observatory
Konrad Guhl, President of IOTA-ES*

Remembrance

Dr. Eberhard Bredner, IOTA-ES

Start of the separate programme for accompanying persons

Klaus Mayer, Dorothee Schäfer

ESOP Session 1 – chairman: Konrad Guhl

09:30 When the Stars Make Surprises

Anna Marciniak, Christian Weber

During stellar occultations by minor bodies, the occulted star can sometimes cause unexpected effects. Star binarity, stellar grazes and the diffraction effects will be described in this talk, based on the results from our own observations.

10:00 The occultation of UCAC4 440-126076 (11^m4) by Neptune and its rings on the 9th of October 2024

Dr. Wolfgang Beisker

The Neptune system will occult a 11^m4 star (UCAC4 440-126076) in the early morning of the 9th of October 2024. Because there is large magnitude difference between the target star and Neptune (around 3.5 mag) the observation is rather challenging. In the report different methods are discussed to clearly see the occultation. With a special CMOS camera with the chip IMX462C and a near infrared filter for wavelengths longer than 850 nm the broad Methane band in Neptunes atmosphere can be used to optimize the light drop to a value around 1 mag.

10:30 **Break**
coffee, tea, beverages

11:00 **An Occultation Event by Pluto at the IAS Observatory
Hakos/Namibia**
Karl-Ludwig Bath

Pluto is slowly moving away from the sun. Scientists would like to know how Pluto's atmosphere is thinning and slowly freezing out. This can only be measured if Pluto happens to pass in front of a star and gradually eclipses and releases it again. On Aug. 4, 2024, there was another such opportunity.

11:30 **Czech recent observations**
Jiří Kubánek

Several interesting observations of occultation by minor planets from September 2023 to August 2024 by Czech observers: 2 asteroid satellite discoveries ((5457) Queen's and (100624) 1997 TR28), 1 double star detection (UCAC 560-045206), observation of the annular occultation of Betelgeuse, graze occultation by (16583) Oersted, 1 occultation by Near Earth Asteroid ((1036) Ganymed) and 2 other interesting events (asteroids (6075) Zajtsev and (210) Isabella).

11:55 **Pleading: Do not forget about Lunar Occultations
– New Aspects – New Tools**
Dr. Eberhard Riedel

The research on lunar occultations has never come to an end. Many uncertainties and errors still exist concerning the precision of the lunar topography as well as the precision of reductions. Investigations need observing data from the amateurs.

The author will present a few new software features to serve as easy tools to prepare for upcoming lunar occultation events.

12:30 **Lunch break**
Sandwiches, coffee, tea, beverages

ESOP Session 2 – chairman: Dr. Stefan Benz

14:00 **Observation of the Betelgeuse occultation in Spain**
Carles Schnabel

Last December 12th, the occultation of Betelgeuse by the asteroid (319) Leona took place. The occultation path crossed the south of the Iberian Peninsula, so different European and North African groups were mobilized. In the presentation I will have the opportunity to explain the

preparations, which began with the occultation of another star by the same asteroid three months earlier, the observation, as well as some results. We have also been involved in the analysis of the observations in collaboration with the Instituto de Astrofísica de Andalucía and the Observatoire du Paris.

14:25

The Algerian participation in Spain for the Observation of Betelgeuse Occultation by Asteroid (319) Leona on December 12th, 2023

Djounai BABA AISSA, Ridha LASSOUED, Hicham Rayane, Mohamed Lamine ALLIK, Lazhari SACI and El-Hadi SEFAR REMALI

On December 12th, 2023, at 01:15 UTC, a rare astronomical event took place: the occultation of the bright star Betelgeuse in the constellation Orion by the asteroid (319) Leona. The occultation trajectory crossed regions such as Florida, the Atlantic Ocean, Portugal, Spain, the Mediterranean Sea, Italy, Greece, Turkey and Azerbaijan. Given the favorable weather conditions, Spain was the preferred observation location. The international astronomical community was mobilized, with teams from Germany, France, Poland, Japan, the United States, the United Kingdom and the Czech Republic. These teams were positioned along the occultation trajectory to collect as much data as possible to characterize the star's shape and understand its convection.

The Algerian team, composed of Djounai Baba Aissa, astronomer from the Algiers Observatory (CRAAG) and 5 amateur astronomers, travelled to Alicante, Spain, to observe the event. Unlike point sources of light, Betelgeuse, relatively close (460 light-years) with a large diameter (800 million km), had a large apparent diameter. The asteroid Leona, with a similar apparent diameter (~50 milliarcseconds), caused an annular eclipse rather than a total eclipse, resulting in a noticeable temporary dimming of Betelgeuse's light for a few seconds. Consequently, this occultation will allow us to study the outer layers of this star at the end of its life.

During the occultation, the Algerian team used a 127 mm-diameter Maksutov telescope on a motorized altazimuth mount lent by our colleagues of the Sabadell Observatory of Spain, a WATEC 910 HX/RC camera with IOTA VTI inset, and 5 Canon DSLR cameras on tripods. Observers were spread over a 10-kilometer strip around the city of Alicante.

The team obtained 6 positive light curves from the Betelgeuse's occultation, showing a clear drop in the star's light for a well-defined period depending on the observation locations.

There was a high signal-to-noise ratio in the curves, as their acquisitions were made under foggy skies. In addition, the 5 sensors of the cameras used were not as sensitive as those of CCD cameras such as the Watec, which is used for astronomical purposes, and this was due to the high photon noise.

The result confirms that the asteroid occulted Betelgeuse, but did not totally eclipse it, which explains why the star's brightness did not diminish to the point of being invisible to the naked eye.

The duration of the occultation corresponded to the theoretical work carried out by Ortiz and al.

The choice of cameras was based on the fact that they were the only ones available to us.

We used data reduction techniques to reduce noise, in this case averaging, filtering and smoothing to extract the signal and obtain a good drop at the moment of occultation.

Finally, the team's scientific objectives were achieved, contributing to six independent positive measurements as part of this international collaboration, the results of which are currently being processed for publication.

14:45 Observing the Betelgeuse-Leona occultation from Spain and Portugal

Alex Pratt

Observers from the UK and Ireland travelled to Spain and Portugal to observe this once-in-a-lifetime event. This presentation discusses the work of two small groups – the simple equipment they selected and tested, the choice of observing locations and their experiences of observing the occultation, then the task of submitting their data to the Occultation Portal and SODIS.

15:00 Multi color video observations of the Betelgeuse occultation on 12.12.23

Bernd Gährken, Peter Slansky

I would also like to submit a presentation together with Peter Slansky about the occultation of Betelgeuse by (319) Leona, which we were able to realize together with three other German amateurs on December 12th, 2023 at three observation points in southern Spain. The focus of our excursion was multi-spectral video recordings, from which photometric/colorimetric curves in red, green, blue and near infrared. The presentation will explain the used recording techniques. The presentation will also provide insights into the sometimes unusual boundary conditions of the expedition.

15:40 Discussion: How to interest new observers to do occultation work

Andreas Eberle

We took the opportunity to use the ESOP as ignition spark to build up a local occultation observing community. We'll report on our experiences and possible developments for the future.



- 16:00** **Break**
Pastries, coffee, tea, beverages
- Rejoining with the participants of the programme for accompanying persons**
- 16:30** **Visit of the planetarium show: „Zeitreise – vom Urknall zum Menschen“ (Time travel – Big Bang to humankind)**
The show is in german, audioguides in english are available.
- 17:30** **Group foto**
followed by travel to stuttgart television tower
- 18:30** **visit ot the stuttgart television tower**
- 19:30** **social dinner**

Sunday, August, 24th 2024

*Location: Keplersaal at Stuttgart Planetarium (please use the side entrance),
Willy-Brandt-Straße 25, 70173 Stuttgart*

08:30 Lecture hall opens

09:00 IOTA/ES Annual General Meeting
Konrad Guhl, President of IOTA-ES

Vorläufige Tagesordnung / Provisional agenda:

1. Bericht des Vorstandes für 2023/2024 /
Report of the members of the board for 2023/2024
2. Bericht des Schatzmeisters für 2023/2024 /
Report of the treasurer for 2023/2024
3. Bericht der Kassenprüfer für 2023/2024 /
Report of the cash auditors for 2023/2024
4. Entlastung des Vorstandes für 2023/2024 /
Exoneration of the members of the board for 2023/2024
5. Projekte / projects 2024/2025
6. Next ESOPs
7. Verschiedenes / Miscellaneous

10:30 Break
coffee, tea, beverages

ESOP Session 3 – chairman: Andreas Eberle

11:00 Results from Asteroid Shape Modelling Driven by Archival Stellar Occultation Data

Julia Perła, Adam Mickiewicz University in Poznań, Poland

Stellar occultation databases gather many well-covered results of occultation phenomena. This data is a wealth mine of knowledge and is a great foundation for determining physical properties of asteroids. One of the applications of results from stellar occultation observations by asteroids is their aid in shape reconstruction and size determinations. While conventional approaches to shape modelling focus on specific asteroid families or other special groups of targets, this presentation explores an alternative methodology: selecting those asteroids with rich occultation data and trying to reconstruct their shapes and determine their sizes. This approach allowed the wasting potential of rich stellar occultation data to be used.

In this presentation, we discuss results of the author's master's thesis defended this year. In the thesis, the target asteroids were observed for lightcurves in their additional apparitions. This was a crucial step, as the

lack of such data was the reason for the absence of asteroid shape models. Asteroids were modelled using the convex inversion method and then scaled with rich stellar occultation results. This approach permitted the precise determination of the asteroid diameters, narrowing the range of diameters determined by the infrared studies.

11:20

VAMOR to select and scale 3D models*Konrad Guhl, Frank Schaffer*

The project VAMOR (Validation of Asteroid Models by Occultation) was presented in JOA 2/2022 and by Frank Schaffer on ESOP 2023. The results are 3D-coordinates for occultation measuring points, created by a 3D-Design-program. This data can be calculated and displayed together with the 3D model of the asteroid in virtual space. By scaling the dimensions of the 3D asteroid model, the best match between the measuring points and the model can be determined. This makes it possible to select a model with a double solution or to scale 3D models that have no dimensional data. The authors show results for the minor planets (357) Hippo, (357) Ninina and (500) Selinor).

11:45

Astronomical scintillation – causes, effects and possible mitigation*Robert Purvinskis*

Scintillation is an important source of noise in astronomical observations. Modern measurement techniques are under development to reduce the impact on photometry time series. A brief introduction to this noise will be given, with suggestions how this may be useful for occultation observing in certain cases.

12:30

Lunch break

Sandwiches, coffee, tea, beverages

ESOP Session 4 – chairman: Dr. Wolfgang Beisker

14:00

Stellar occultations by the Unistellar network of citizen astronomers*Josef Hanus, Franck Marchis, Ryan Lambert, Tom Esposito, Josef Durech*

The Unistellar's eVscopes and eQuinox telescope owners (~10,000) represent the largest worldwide network of potential citizen astronomers. I will describe the network and show examples of observations of stellar occultations by asteroids.

14:45 A short update about the Swiss DVTI+CAM project*Andreas Schweizer, Stefan Meister*

In this presentation we will show some of the highlights that have been added to the camera software since the last ESOP and give a preview of what we are currently working on. We will also show some examples of events captured with the camera. At the end of the presentation, we would like to collect feedback and ideas from people who are already using the camera and give everyone the opportunity to ask questions.

15:30 Development of an Autonomous, Open-Source Observation Unit for Occultation and Variable Stars*Konrad Guhl, Herwig Diessner, Ansgar Schmidt*

This proposal presents a novel concept for a fully automated, optical observation unit specifically designed for the straightforward acquisition of data on occultations and variable stars. The project aims to create a cost-effective, flexible, and scalable solution accessible to both experienced amateur astronomers and professional researchers. Existing solutions are often expensive, complex, or require extensive manual intervention. Our goal is to develop an open-source platform that enables anyone to participate in autonomous photometric monitoring. The contribution will show first ideas for a solution and open a discussion.

15:50 Break

Pastries, coffee, tea, beverages

16:20 ASE 14.10.2023 : Unfiltered annularity from the edge of path*Jörg Schoppmeyer*

During the annular solar eclipse on October 14, 2024, the author observed from the northern edge of the annularity zone and used a well-known technique that had not been used for annular solar eclipses to capture the maximum of the solar eclipse in a 4K-resolution film without filtering. The data from this movie was used by Luca Quaglia and his team to determine the exact diameter of the sun. The presentation shows how this observation was made and the results.

16:50 100 years of Sternwarte Stuttgart**– 100 years of Occultation Astronomy***Dr. Stefan Benz*

Sternwarte Stuttgart on Uhlandshöhe hill close to Stuttgart's city center is one of the oldest public observatories in southern Germany: In 2022 it celebrated its 100th anniversary.

Since its early days those volunteer enthusiasts running the observatory did not only promote astronomy by giving sky tours to the public or by undertaking other public outreach activities, but ever since they also



participated in scientific research, occultation astronomy being one major element.

This presentation gives a brief overview over 100 years of history of Sternwarte Stuttgart, with a particular focus on occultation astronomy at Uhlandshöhe.

17:20 Invitation to ESOP 44

Anna Marciniak

We will be glad to welcome everyone to ESOP 44, which will be held in Poznan (Poland) from 22. till 26. August 2025.

17:30 Closing ceremony

followed by Walk to stuttgart city centre

18:30 Diner at Carls Brauhaus

Preliminary programme, errors and omissions excepted

