



Gaia18aen

First symbiotic star discovered by Gaia

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 - Observational data
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- **Conclusions**



References:

Gaia Collaboration, 2016, A&A

doi: 10.1051/0004-6361/201629272

- **European** space observatory (ESA)
 - launched in **2013**
 - designed for **astrometry**
 - most **precise** 3D map of the Milky Way

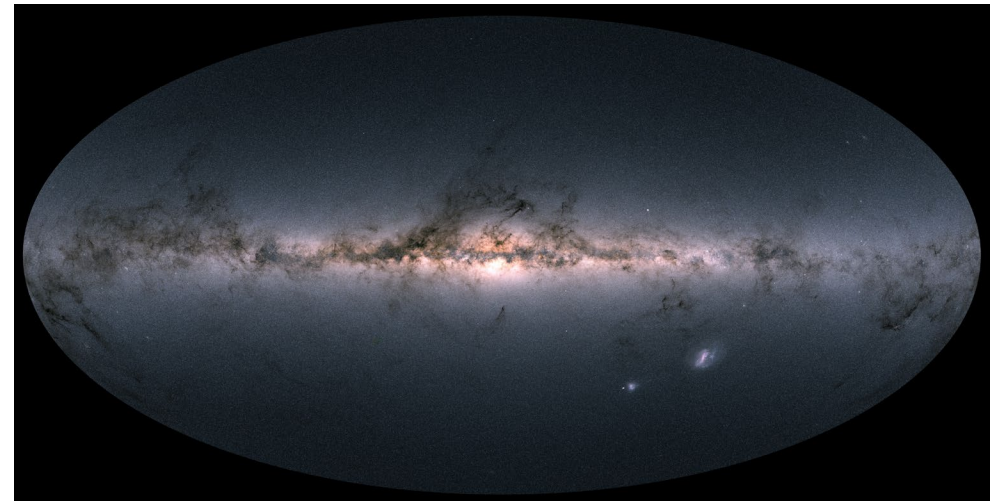


Figure: Gaia's all-sky view of the Milky Way.

- all-sky photometric **transient survey?**
 - **repeated** high-precision measurements

Gaia18aen

Introduction

References:

Merc et al., 2020, *Astronomy & Astrophysics*
doi: 10.1051/0004-6361/202039132

Delgado et al., 2018,
Transient Name Server Discovery Report 84

Kruszyńska et al., 2018,
The Astronomer's Telegram 11634

Wray, 1966, PhD thesis

- at the beginning of 2018, *Gaia* detected the **brightening of Gaia18aen**
 - announced by the **Gaia Science Alert** on January 17, 2018 (Delgado et al., 2018)
 - referred to as a „**bright emission-line star** in Galactic plane which brightened by 1 magnitude“
 - previously classified as an emission line star (Wray, 1966)
- soon classified as a **‘nova?’** (Kruszyńska et al., 2018)
 - spectrum obtained by VLT/X-Shooter

Gaia18aen

Observational data

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Merc et al., 2020, *Astronomy & Astrophysics*
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- low-resolution spectroscopic observation using the **Liverpool Telescope** at La Palma (PI: Hodgkin)
- medium-resolution spectrum from **VLT/Xshooter** (PI: Wyrzykowski)
- photometry from ***Gaia***, and the **follow-up network**
 - LCO 0.4-m, PROMPT 0.6-m, Terskol 0.6-m, and PIRATE robotic telescope
- ASAS-SN, OGLE IV, ATLAS, Bochum Survey of the Southern Galactic Disk

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Symbiotic classification

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- spectra satisfy the conditions for the symbiotic classification
 - presence of the **late-type giant**
 - **emission lines** of ions with an ionization potential of **at least 35 eV**
 - emission lines of **Raman-scattered OVI**

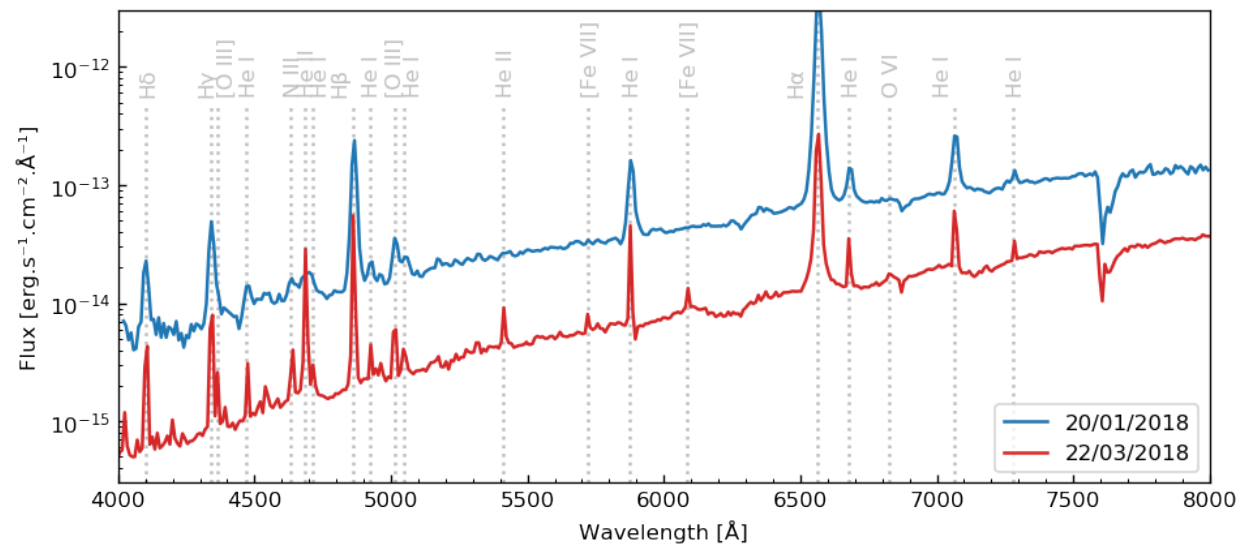


Figure: The optical spectra of Gaia18aen.

Gaia18aen

Photometric behavior

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Merc et al., 2020, *Astronomy & Astrophysics*
doi: 10.1051/0004-6361/202039132

- **series of outbursts in 2018**
 - **0.5 – 3.3 mag**
 - amplitude and their duration resemble the behavior of typical **classical symbiotic stars**
 - **no brightening** detected before (2010 – 2018)
 - now in **quiescence**

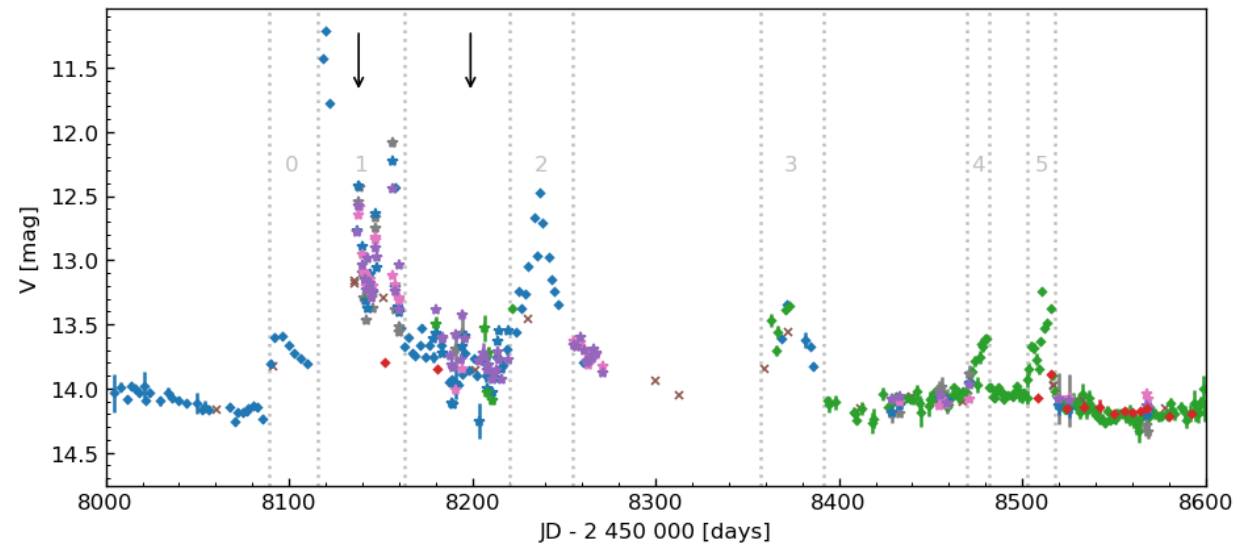


Figure: The light curve of Gaia18aen.

Gaia18aen

Photometric behavior

References:

Merc et al., 2020, *Astronomy & Astrophysics*
doi: 10.1051/0004-6361/202039132

- **several minima** in quiescent light curves
- tentative **orbital period of 487 d**
- red giant might be **filling the Roche lobe**
- large scatter may be due to **short-term variations (50 – 200 d)**

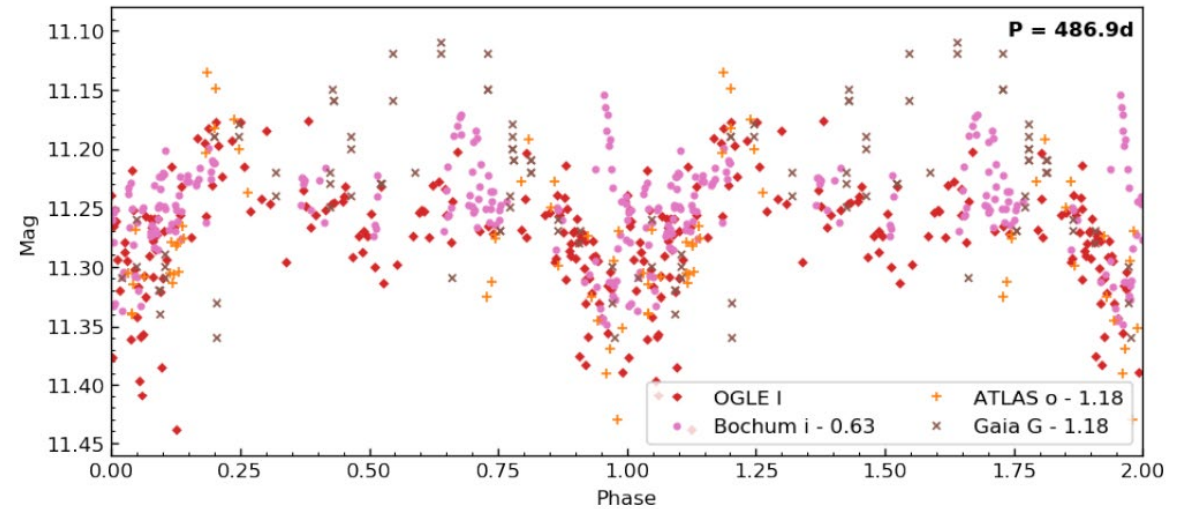


Figure: Light curves in selected filters phased with the period of $P = 486.9$ days.

Gaia18aen

Cool giant

References:

Merc et al., 2020, *Astronomy & Astrophysics*
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- VLT/X-Shooter spectrum of Gaia18aen was used to derive **atmospheric parameters**
 - $T_{\text{eff}} = 3500 \text{ K}$, $\log g = 0.0$, $[\text{Fe}/\text{H}] = 0.25$
 - for $d \sim 6 \text{ kpc}$: $R \sim 230 R_{\odot}$, $L \sim 7400 L_{\odot}$
 - one of the **brightest symbiotic giants**

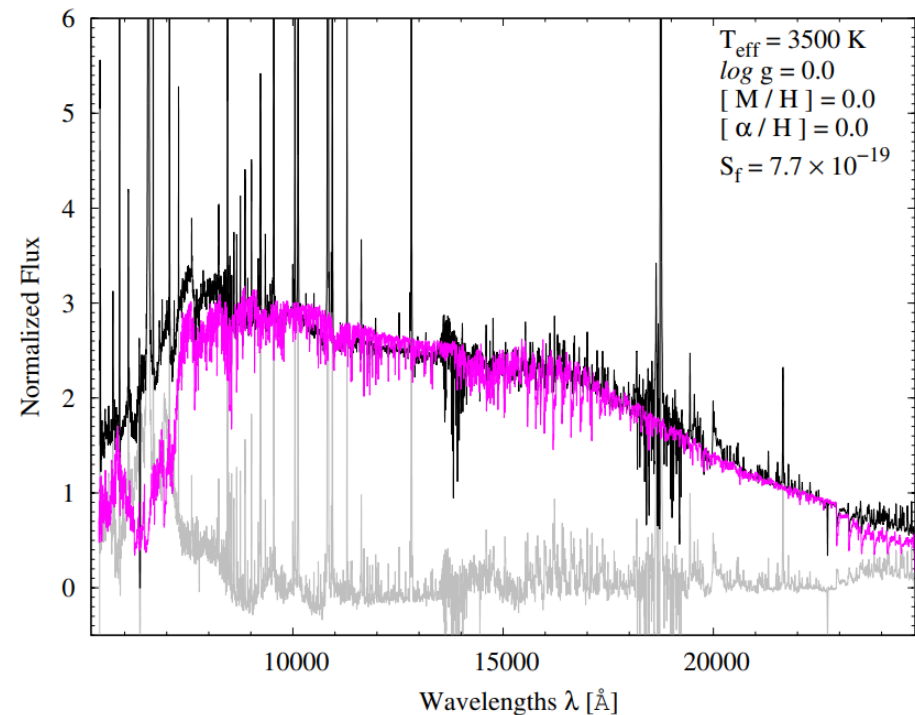


Figure: Comparison of the VLT/X-Shooter spectrum and the synthetic model.

Conclusions

Thank you for
your attention.

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- Gaia18aen is the **first** classical symbiotic star discovered by ***Gaia* satellite**
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- Gaia18aen experienced an **outburst of 3.3 mag in 2018**, followed by several rebrightenings
- outburst was accompanied by changes in **emission spectral lines** typical for classical symbiotic stars
- the cool component is an **M giant**, one of the **brightest symbiotic giants**

Astronomy
&
Astrophysics

A&A 644, A49
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