



OGLE-BLG504.12.201843: A POSSIBLE EXTREME DWARF NOVA

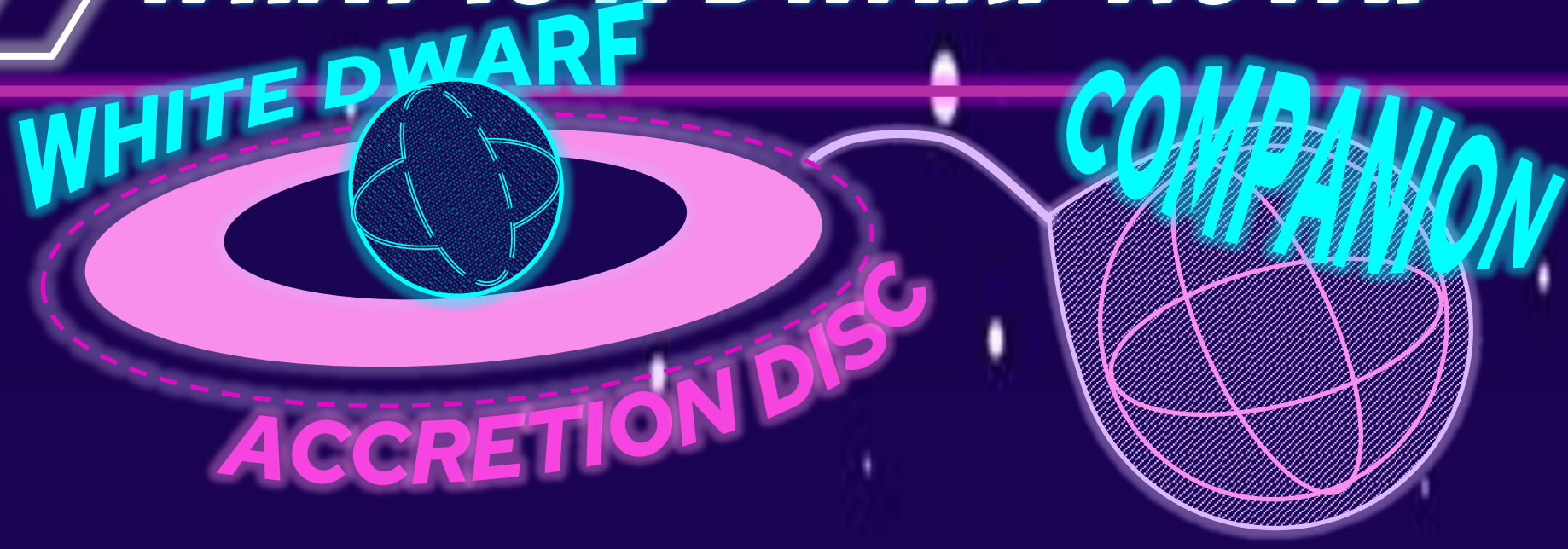
Camille Landri¹, Ondřej Pejcha¹ et al., 2022, MNRAS, 517, 2746

¹Institute of Theoretical Physics, Charles University, Prague, Czech Republic



FACULTY OF MATHEMATICS AND PHYSICS
Charles University

01 WHAT IS A DWARF NOVA?



Type of cataclysmic variable (CV), white dwarf accreting matter from a companion via an accretion disc.

Accretion disc undergoes semi-periodic outbursts, best explained by the Disc Instability Model (DIM, Smak 1982):

- Disc initially cold and stable.
- Disc temperature and surface density increase as mass builds up.
- Disc reaches critical conditions and local instability propagates: sudden rise in temperature and brightness (outburst).

Dwarf nova (DN) outbursts typically **last for a few days and recur every few weeks**.

03 PHOTOMETRY

Ellipsoidal modulations during quiescence. In outburst, one minima disappears, the other deepens.

- **The outbursts come from an accretion disc.**

Disc brightness hides orbital modulations

Companion hides part of the disc

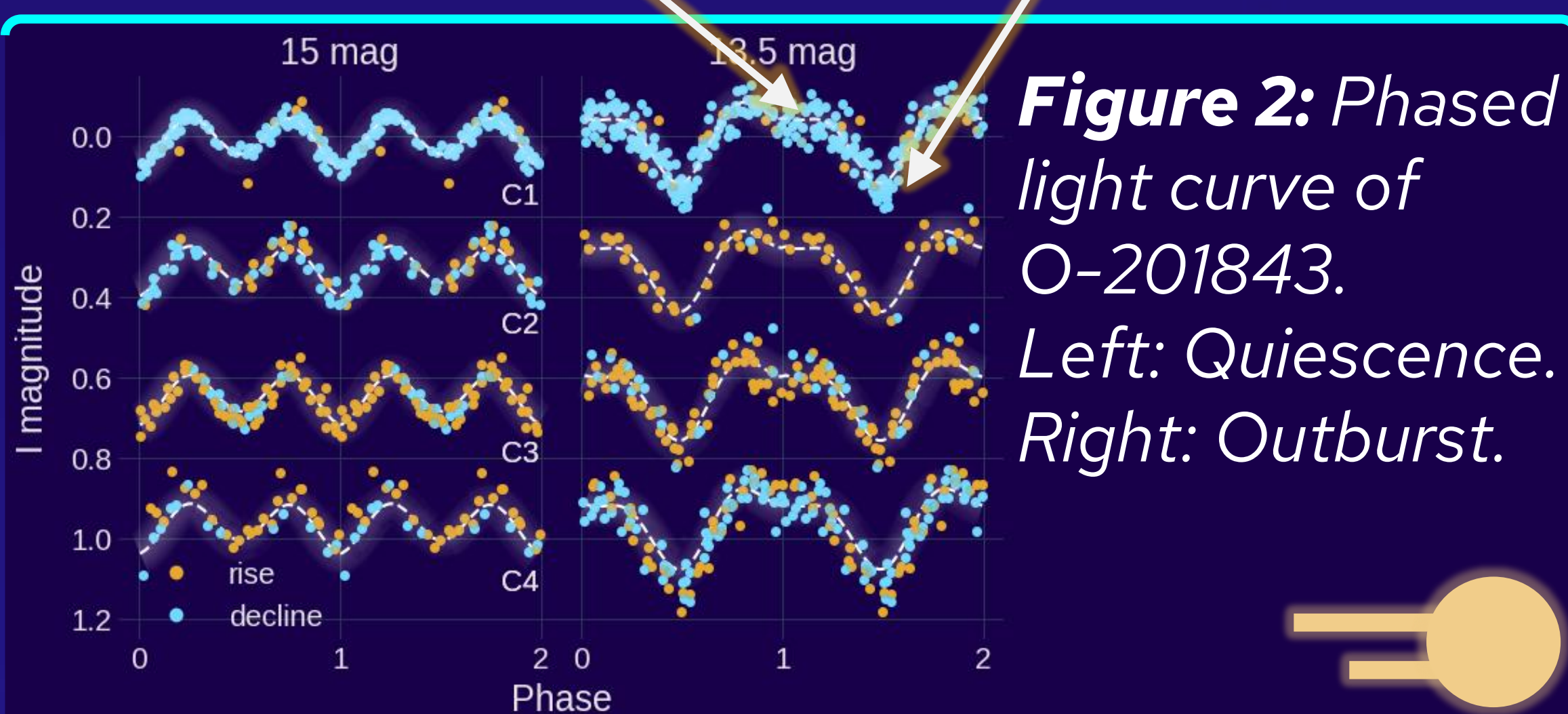


Figure 2: Phased light curve of O-201843. Left: Quiescence. Right: Outburst.

04 SPECTROSCOPY

Balmer absorption lines:

- early F-type companion and/or accretion disc.

He II **emission lines** during outbursts.

No common features of DNe:

- Double peaked lines.
- Emission in quiescence becoming absorption in outburst.

Spectra consistent with **cold accretion discs** modelled with the DIM (Idan 2010).

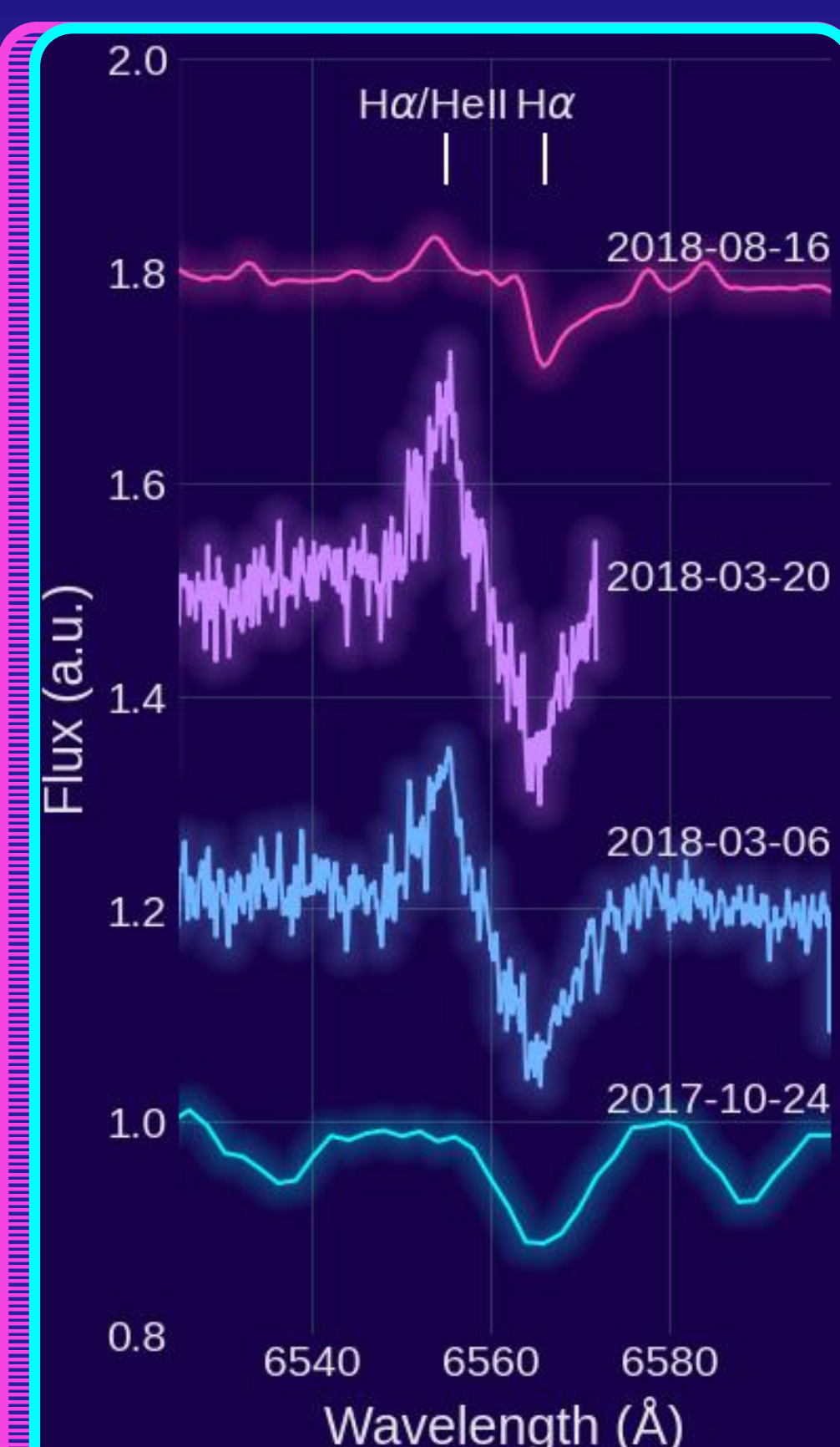


Figure 3: Evolution of the H α /H β lines during an outburst.

02 OGLE-BLG504.12.201843

CV discovered with OGLE (Udalski 2015) by Mróz (2015).

Peculiarities:

- **300 days long outbursts** recurring every **1000 days**,
- **slow brightening** before outburst,
- **small recurring flares** in quiescence.

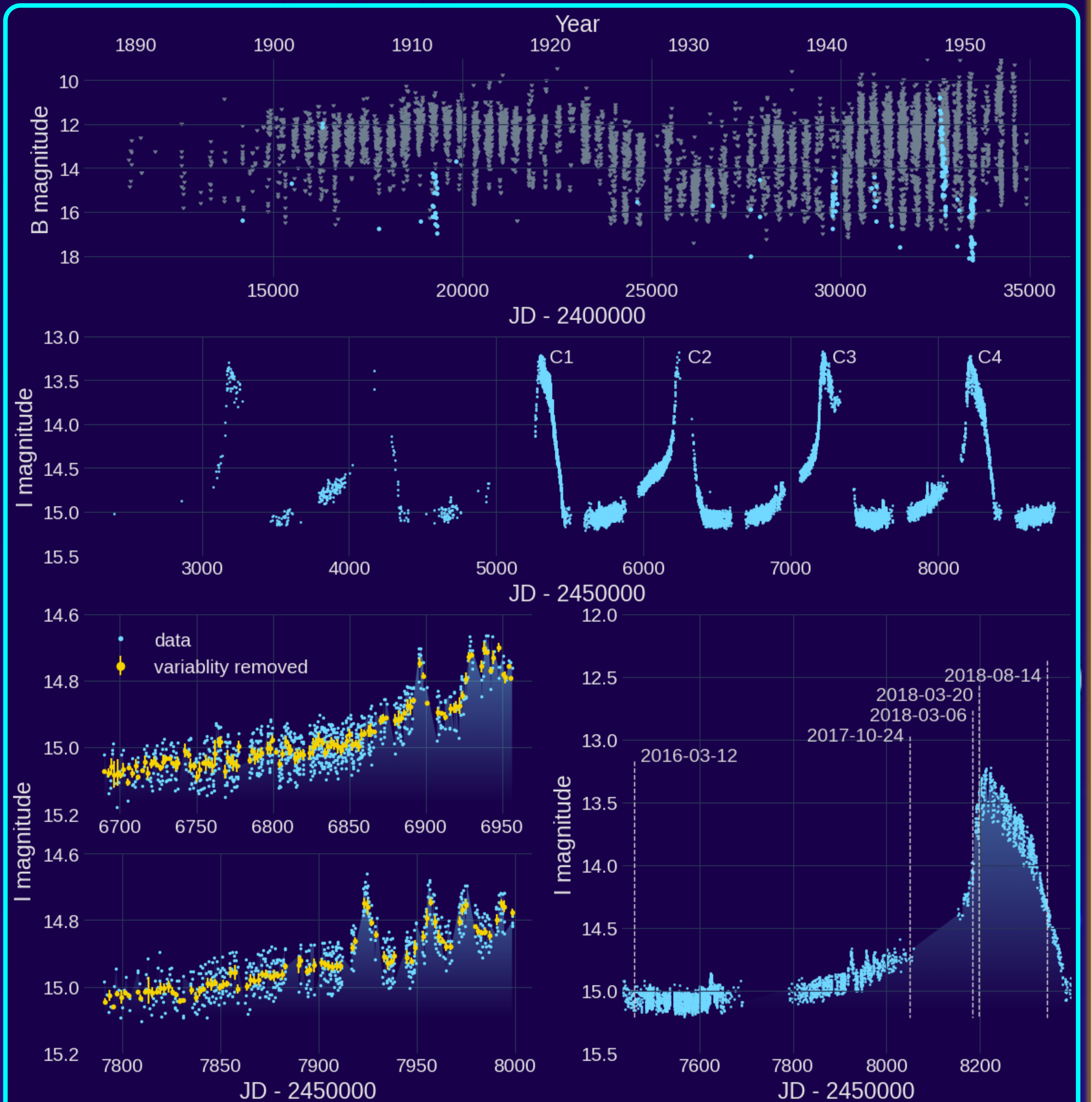


Figure 1: Photometry of O-201843. Upper panel: Archival data from DASCH (Laycock 2010). Middle panel: Data from OGLE. Left panel: Small recurring flares. Right Panel: close-up of an outburst with dates at which spectra were obtained.

05 WHY IS THIS SYSTEM INTERESTING?

Likely a DN with extreme properties: **long outburst cycles, relatively young companion.**

More importantly:

- **Small flares** in quiescence have not been observed in other DNe.
- **Unusually cold disc in quiescence.**
- Brightness increase in quiescence is a **prediction of the DIM, but is never observed in DNe.**

O-201843 is a **great system to learn more about thermally unstable accretion discs** and requires further studies!

ACKNOWLEDGEMENTS

We acknowledge the support by INTER-EXCELLENCE grant LTAUSA18093 from the Ministry of Education, Youth, and Sports. The research of OP has also been supported by Horizon 2020 ERC Starting Grant 'Cat-In-hAT' (grant agreement no. 803158).

REFERENCES

Idan et al., 2010, A&A, 519, A117
Laycock et al., 2010, AJ, 140, 1062
Mróz et al., 2015, Acta. Astron., 63, 313
Smak J., 1982, Acta. Astron., 32, 199
Udalski et al., Acta Astron., 65,1



ABOUT ME