

The key to unlocking long-period transients

Sanne Bloot

LOFAR Annual Meeting 2026
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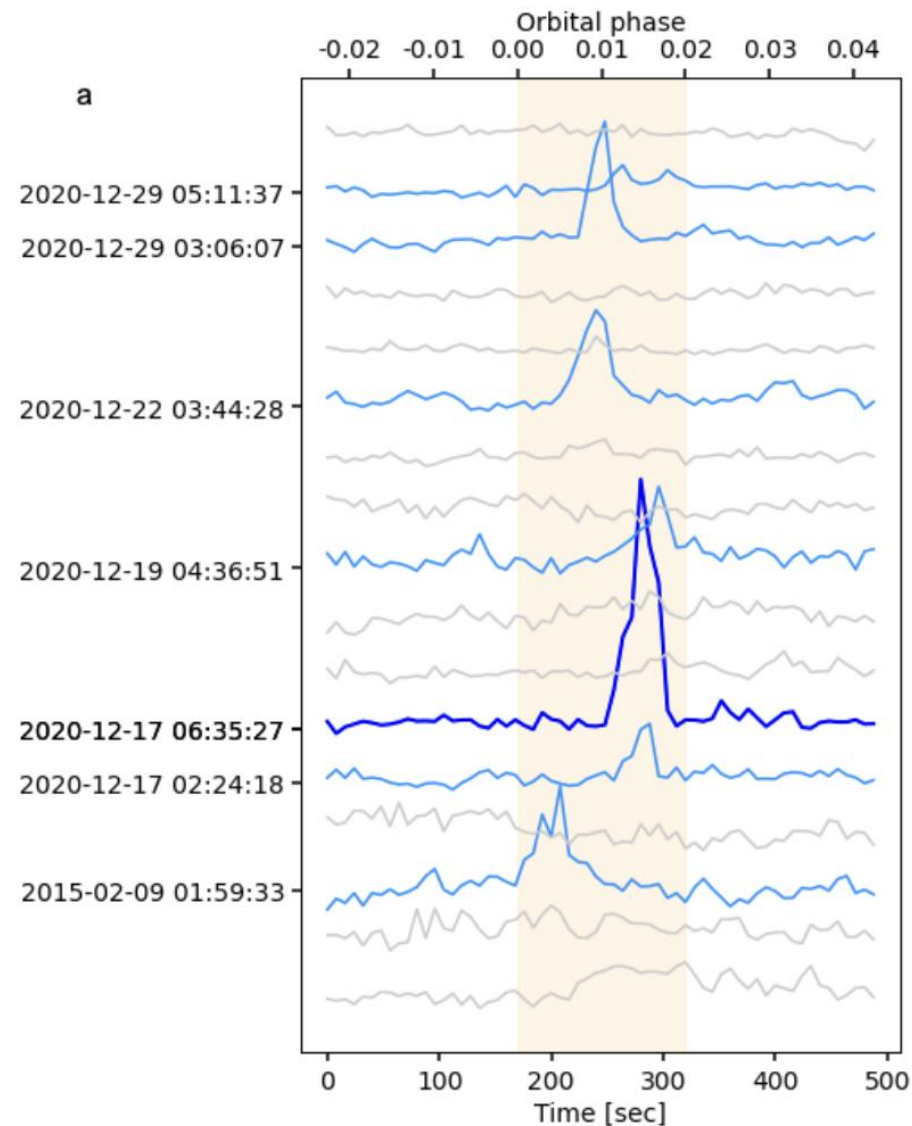


VIDI Grant
PI: Vedantham

Image credit:
NSF/AUI/NSF NRAO/P. Vosteen

Long-period transients

- Short pulses (< few minutes)
- Long periods (minutes to hours)
- Often found in the Galactic Plane



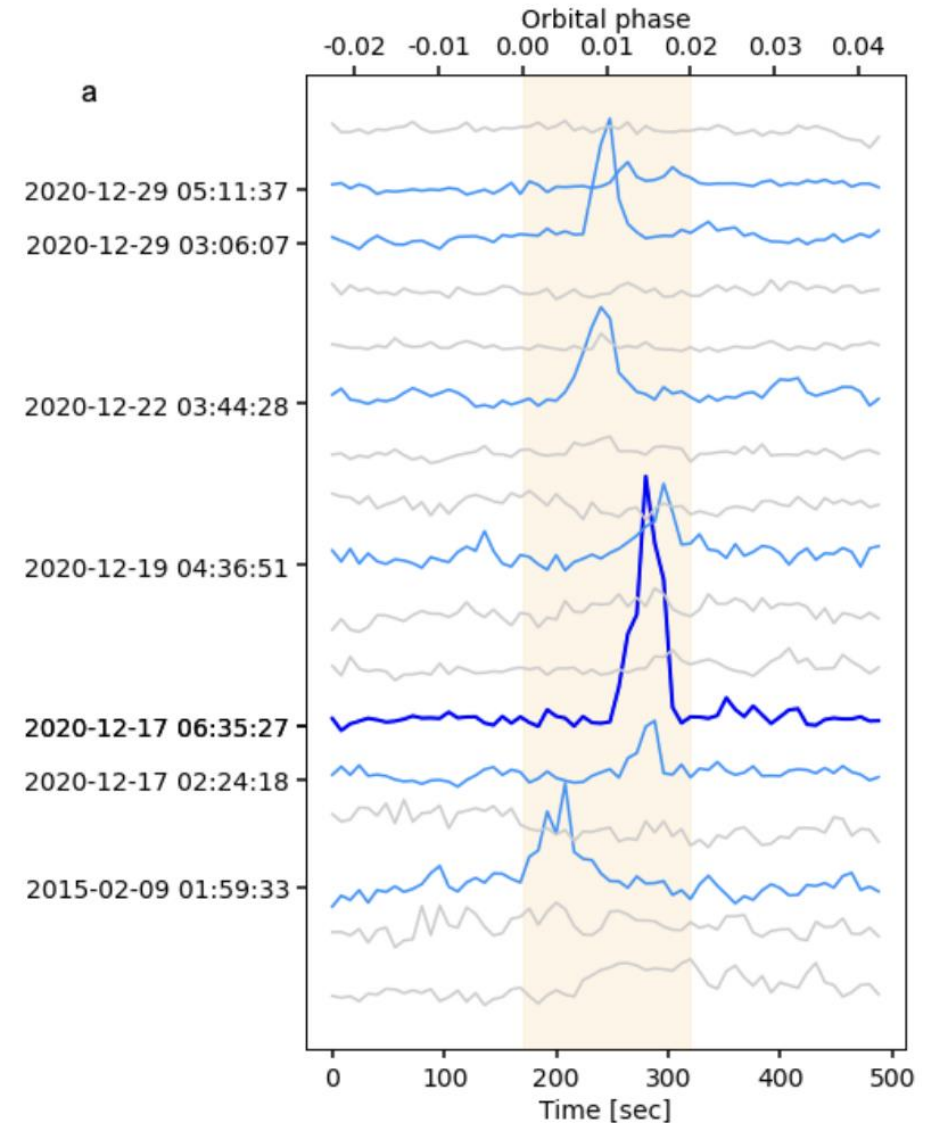
De Ruiter et al. (2024)

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Long-period transients

- Short pulses (< few minutes)
- Long periods (minutes to hours)
- Often found in the Galactic Plane
- We don't know what they are



De Ruiter et al. (2024)

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What are they?

- Magnetar origin suggested
 - e.g. Caleb et al. 2024, Lee et al. 2025, Wang et al. 2025, Dong et al. 2025a
- White dwarf – M dwarf binaries
 - de Ruiter et al. 2024, Hurley-Walker et al. 2024, Anumalapudi et al. 2025, Bloot et al. 2025, Dong et al. 2025b, Rose et al. 2026

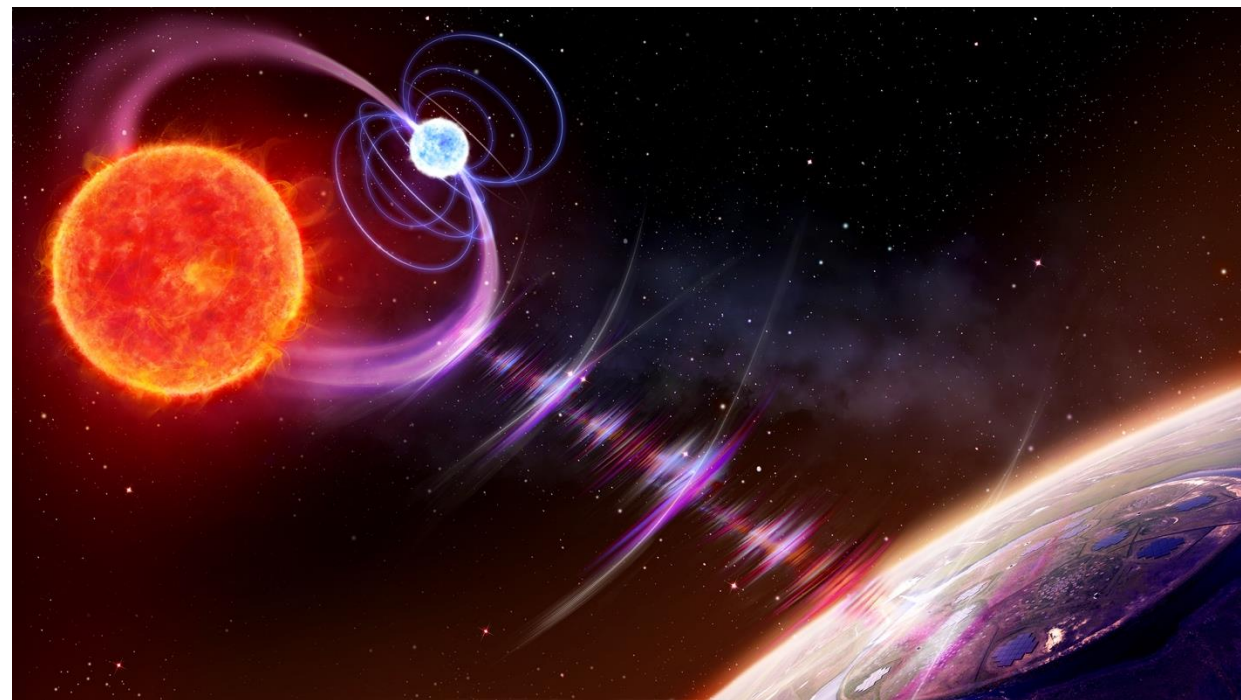
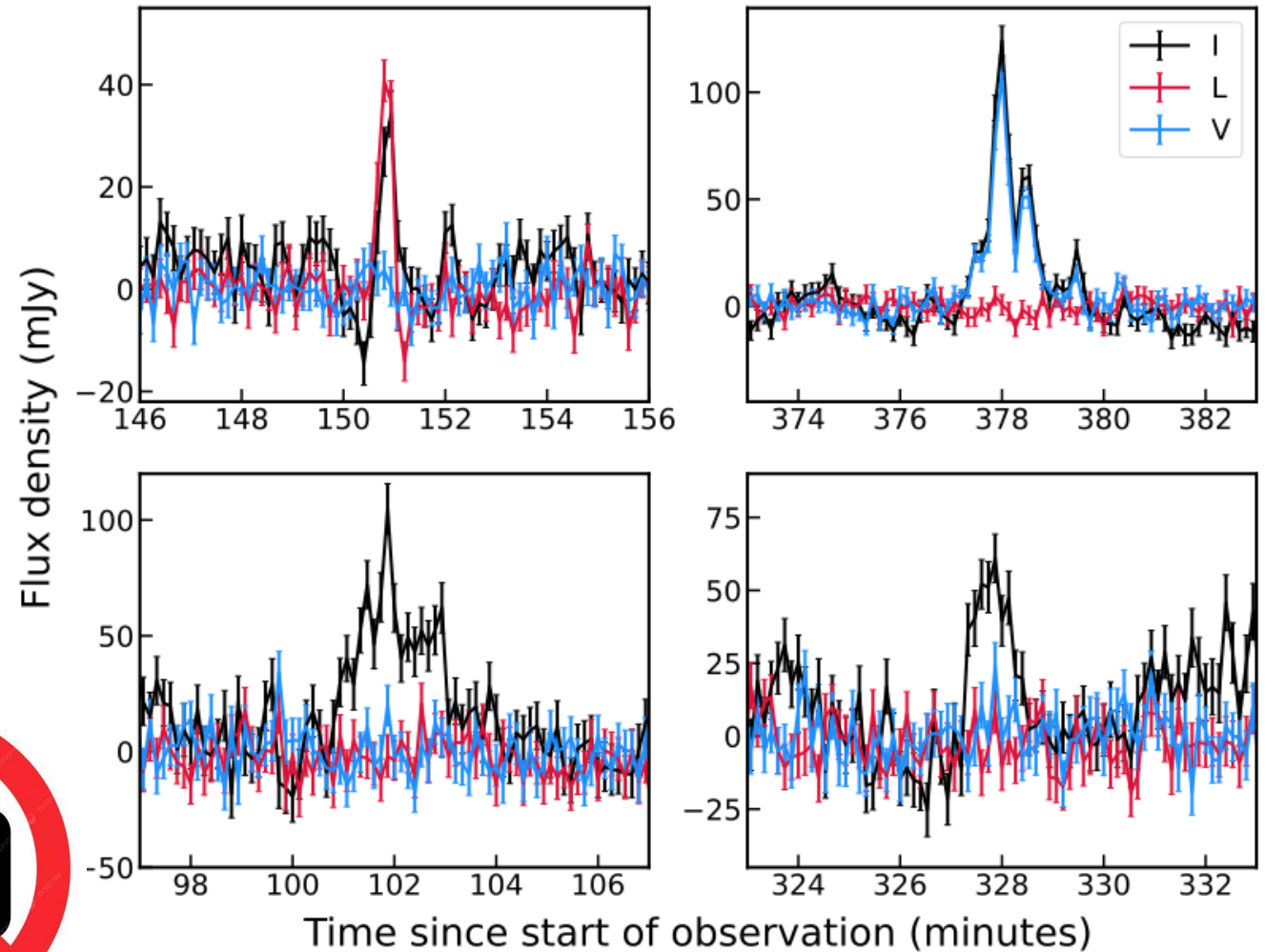


Image credit: Danielle Futselaar

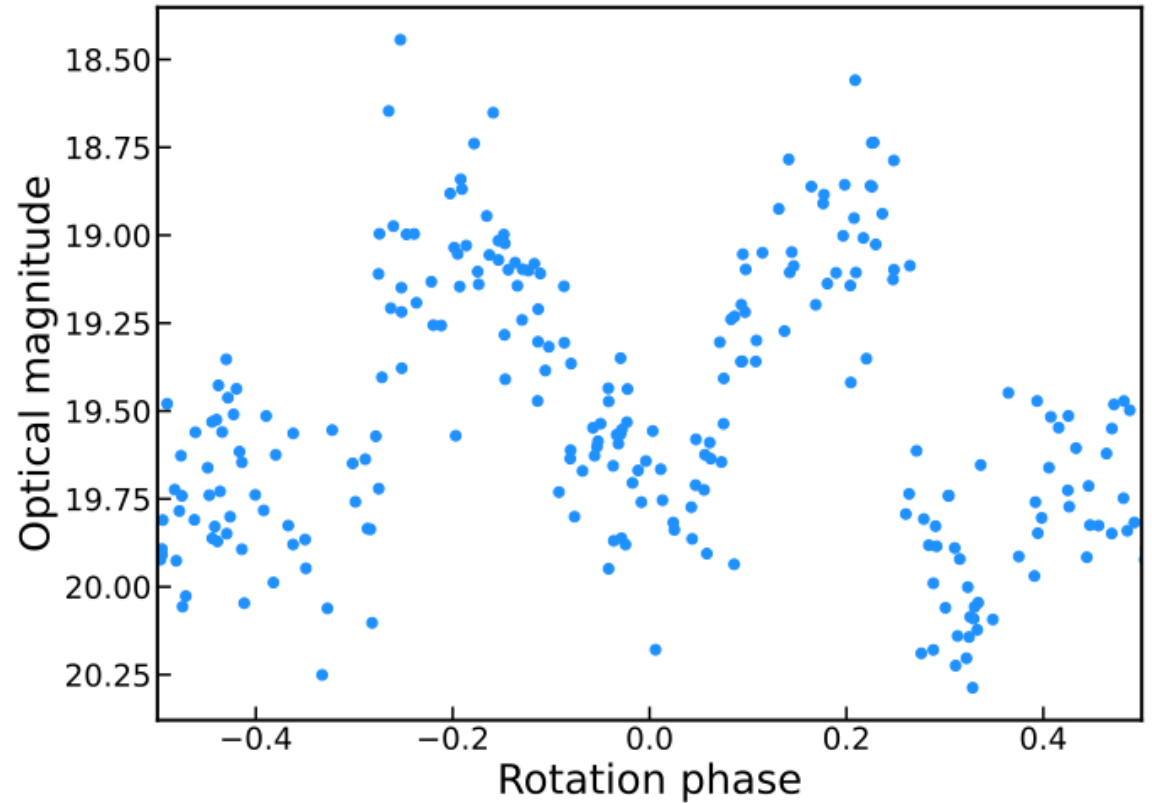
PSV-2

- LoTSS circular polarisation transient search
- Four detections of short pulses
- Varying polarisation states



Optical counterpart

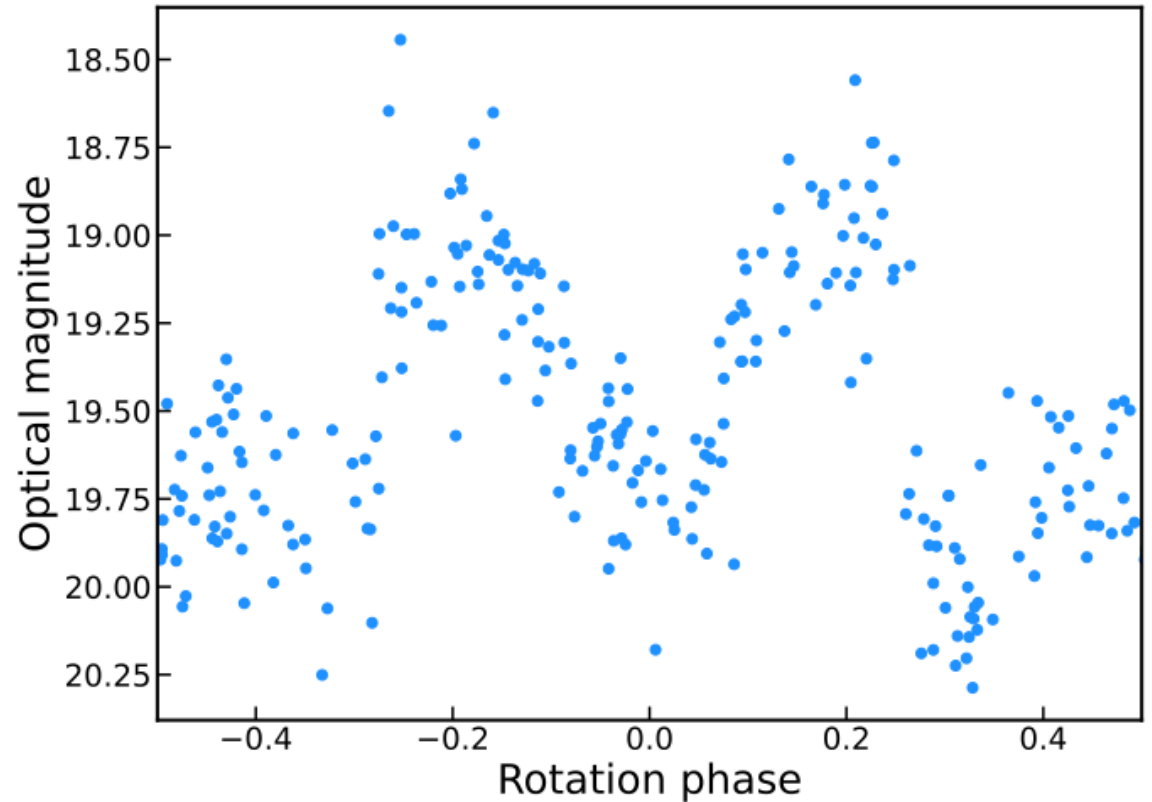
- White dwarf binary
- Asynchronous polar



Adapted from Kolbin et al. (2023)

Optical counterpart

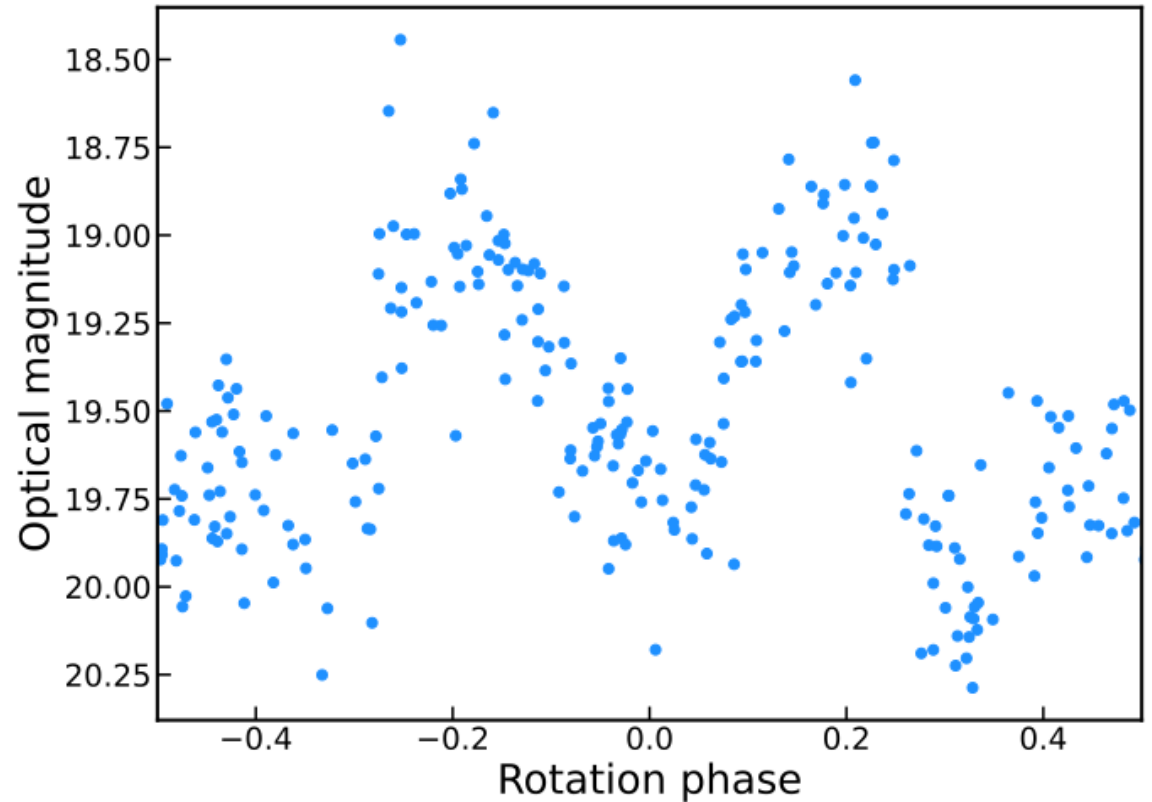
- White dwarf binary
- Asynchronous polar
- Cyclotron spot that switches poles



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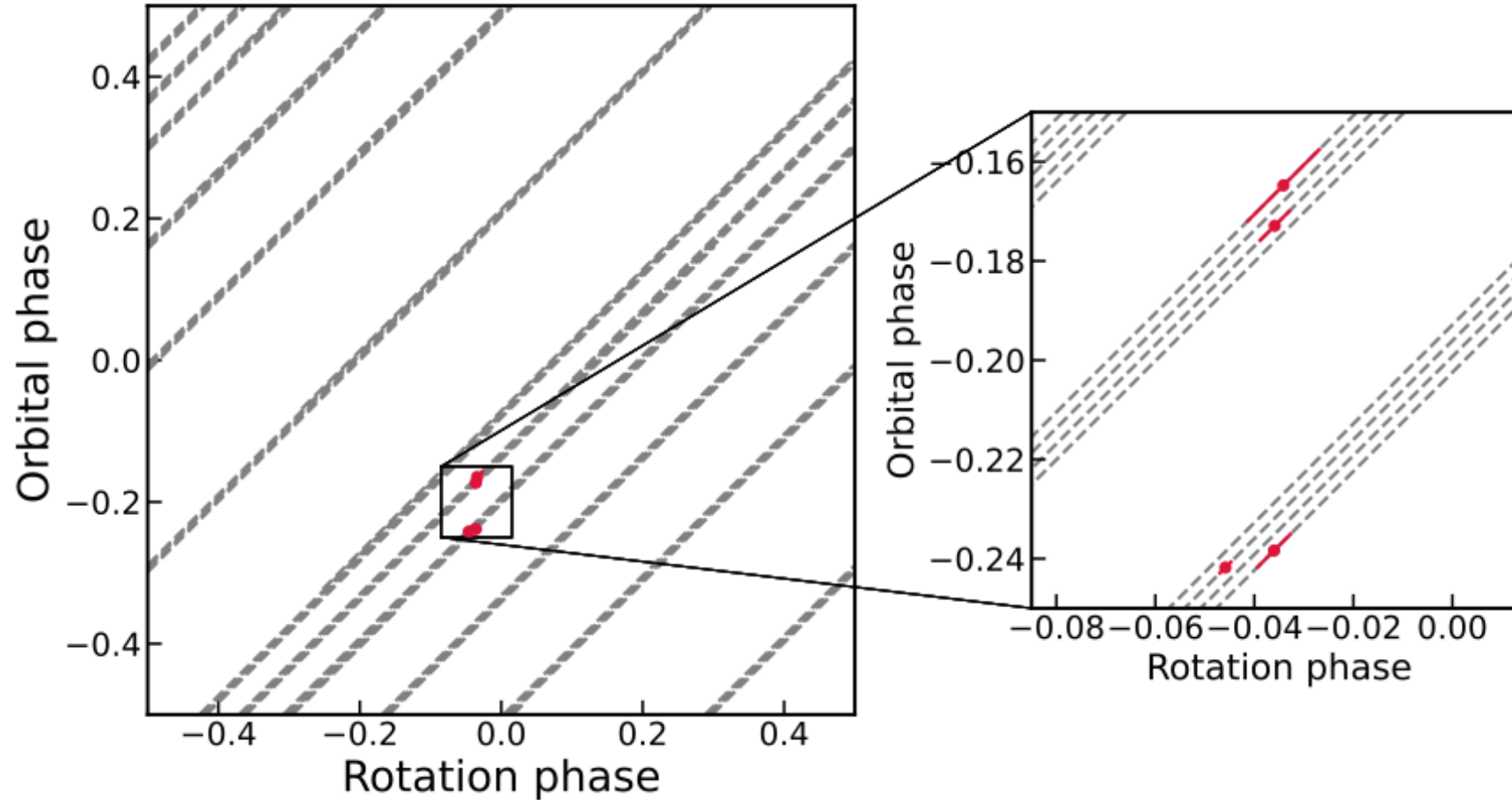
Optical counterpart

- White dwarf binary
- Asynchronous polar
- Cyclotron spot that switches poles
- Both rotation period and orbital period measured



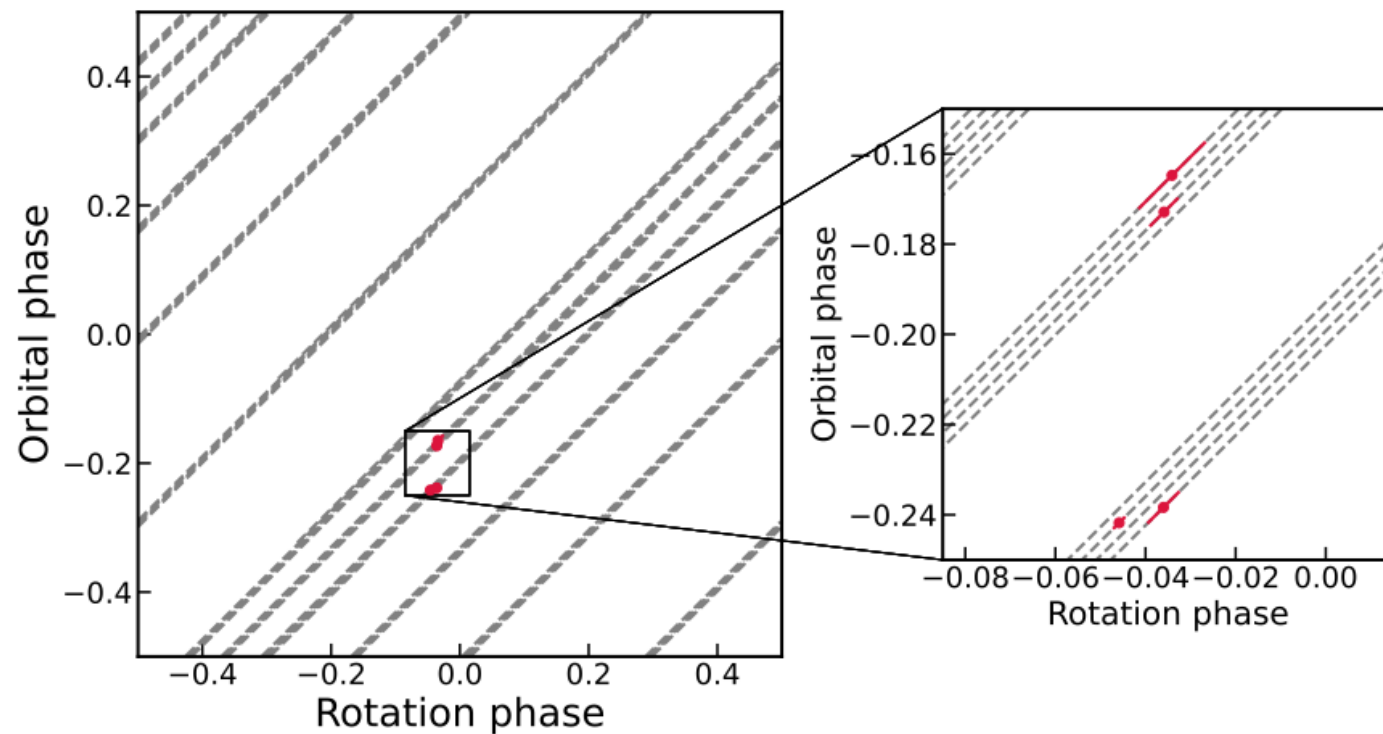
Adapted from Kolbin et al. (2023)

Pulse arrival times



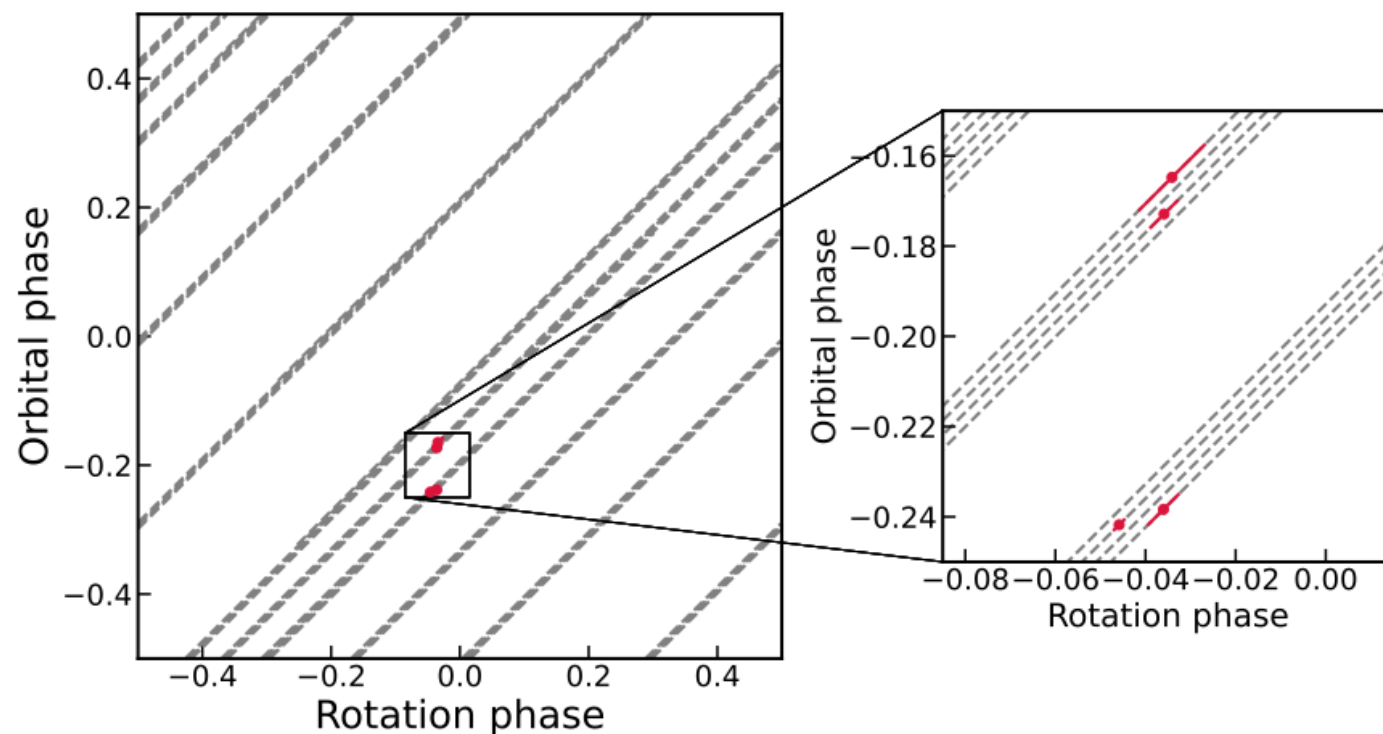
Pulse arrival times

- The pulses are periodic with the rotation



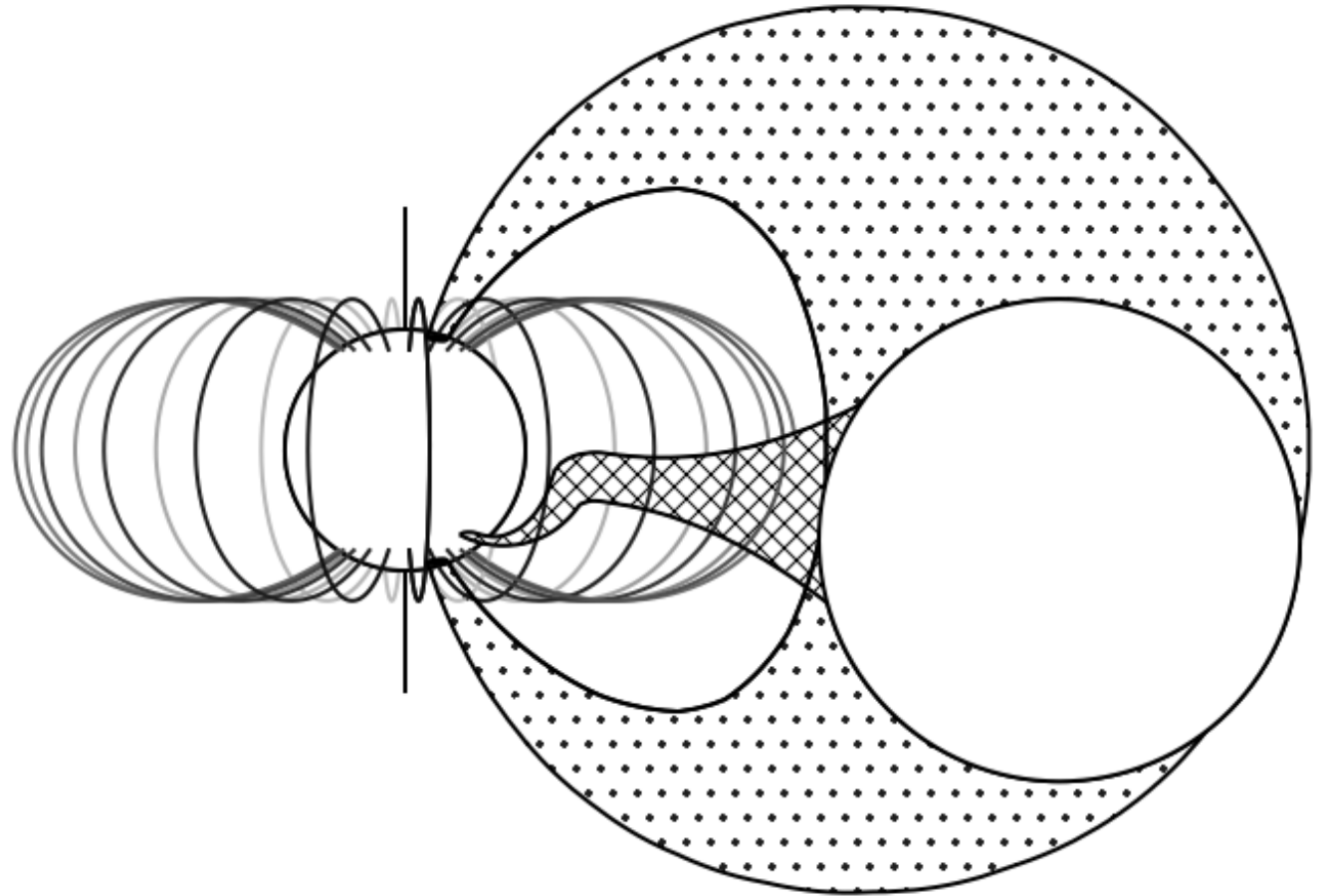
Pulse arrival times

- The pulses are periodic with the rotation
- Pulses are only detected at certain orbital phases



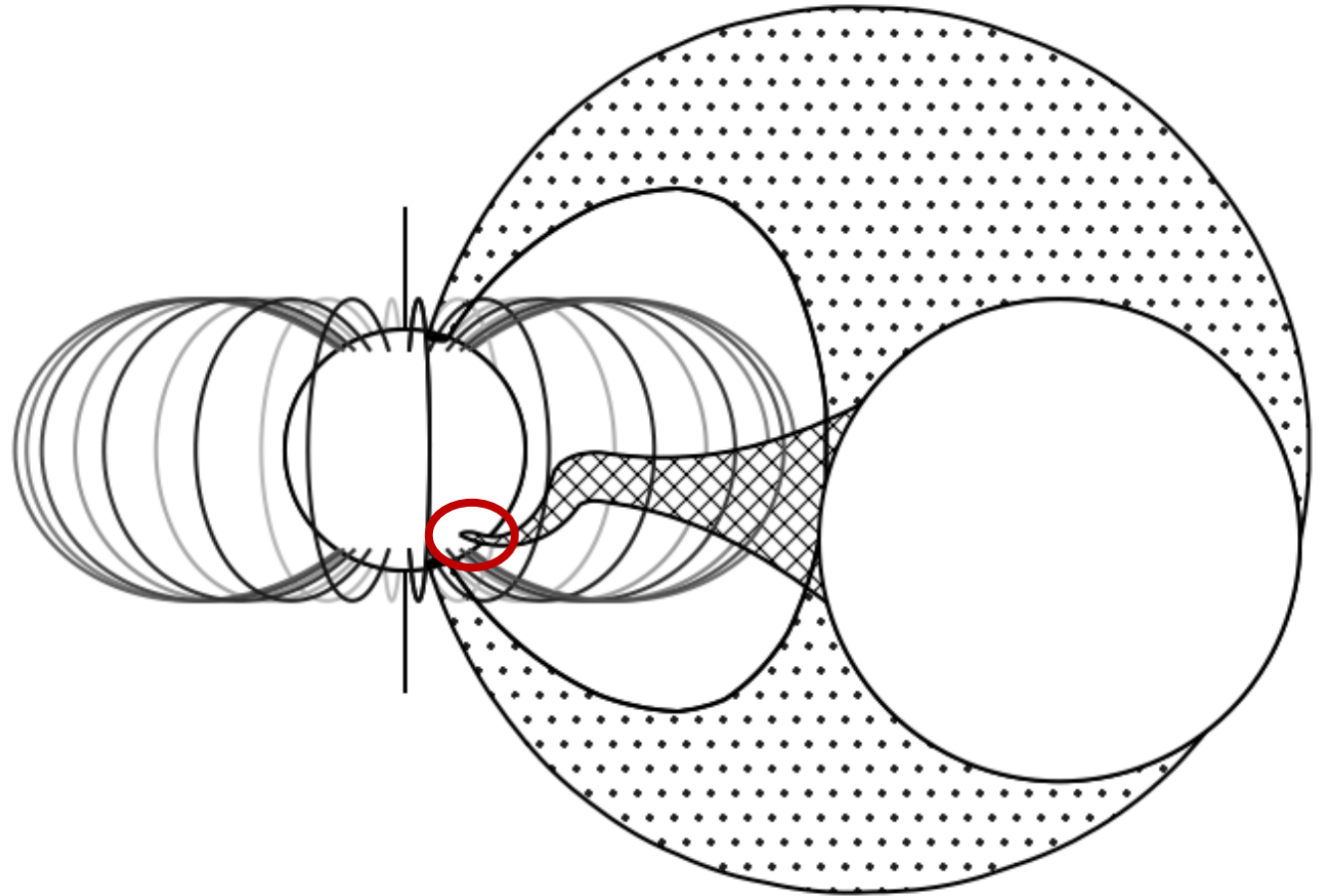
Origin of the radio emission

- LPTs are often binaries
- Question: is the emission powered by accretion or a magnetic interaction?



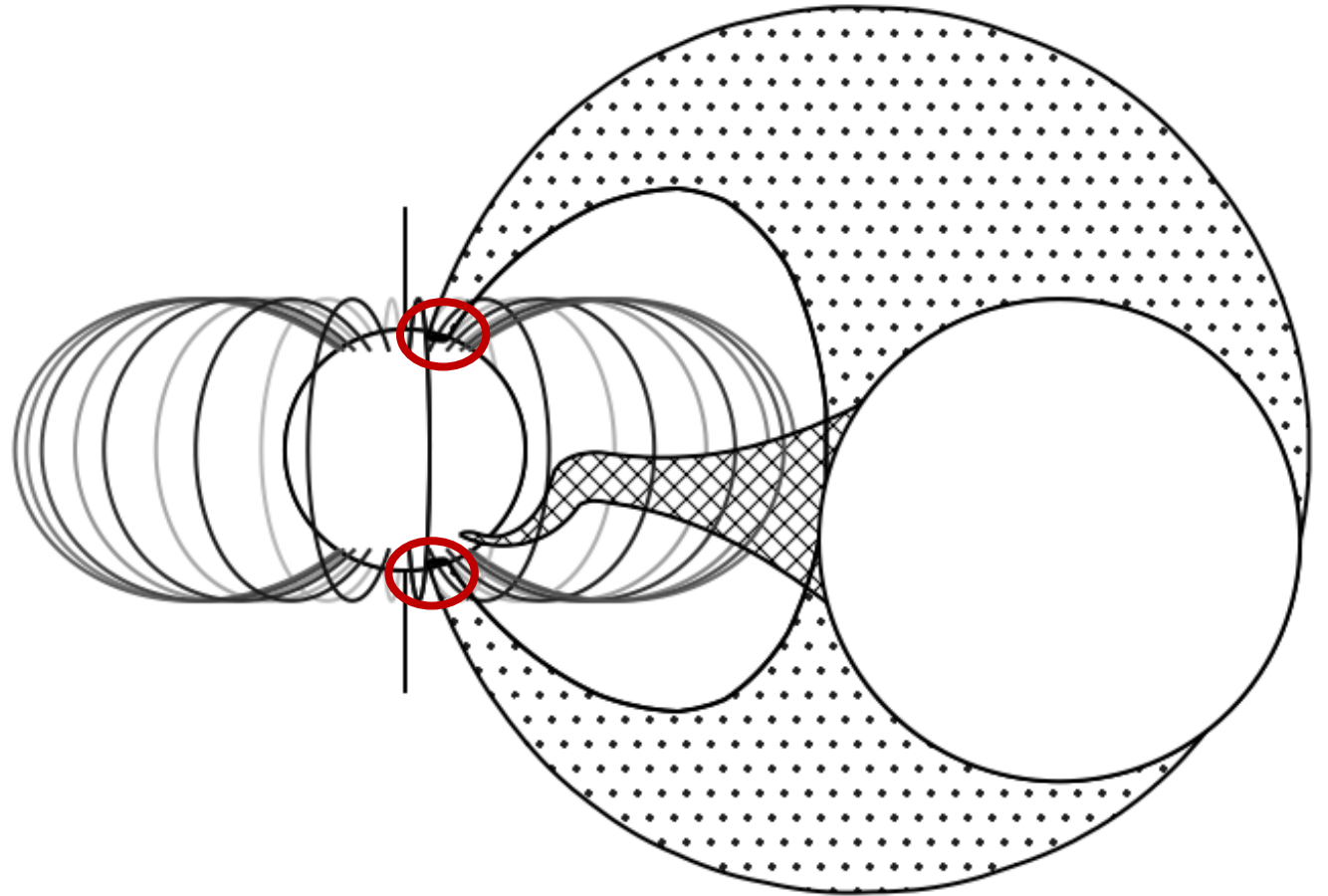
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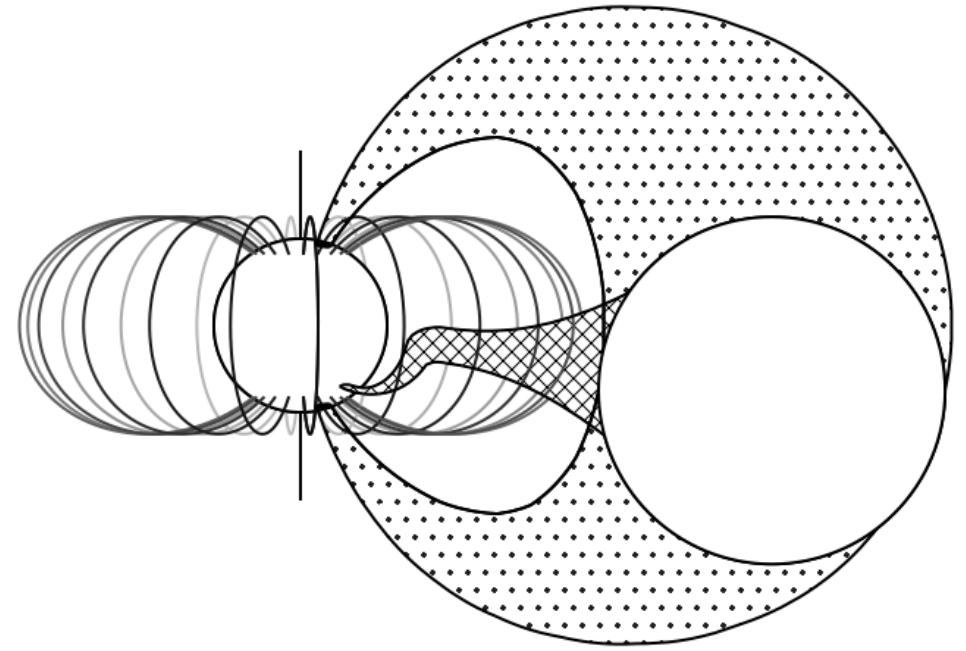
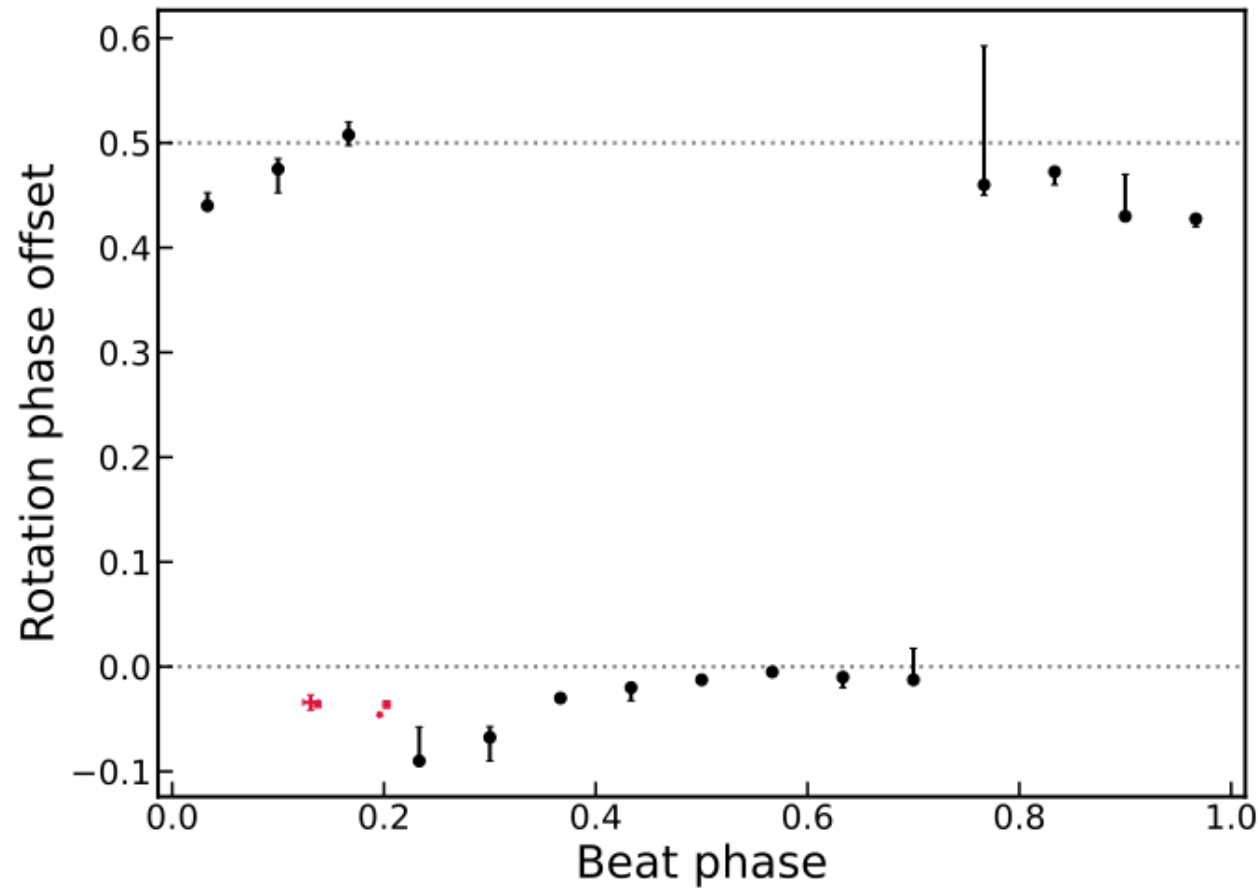


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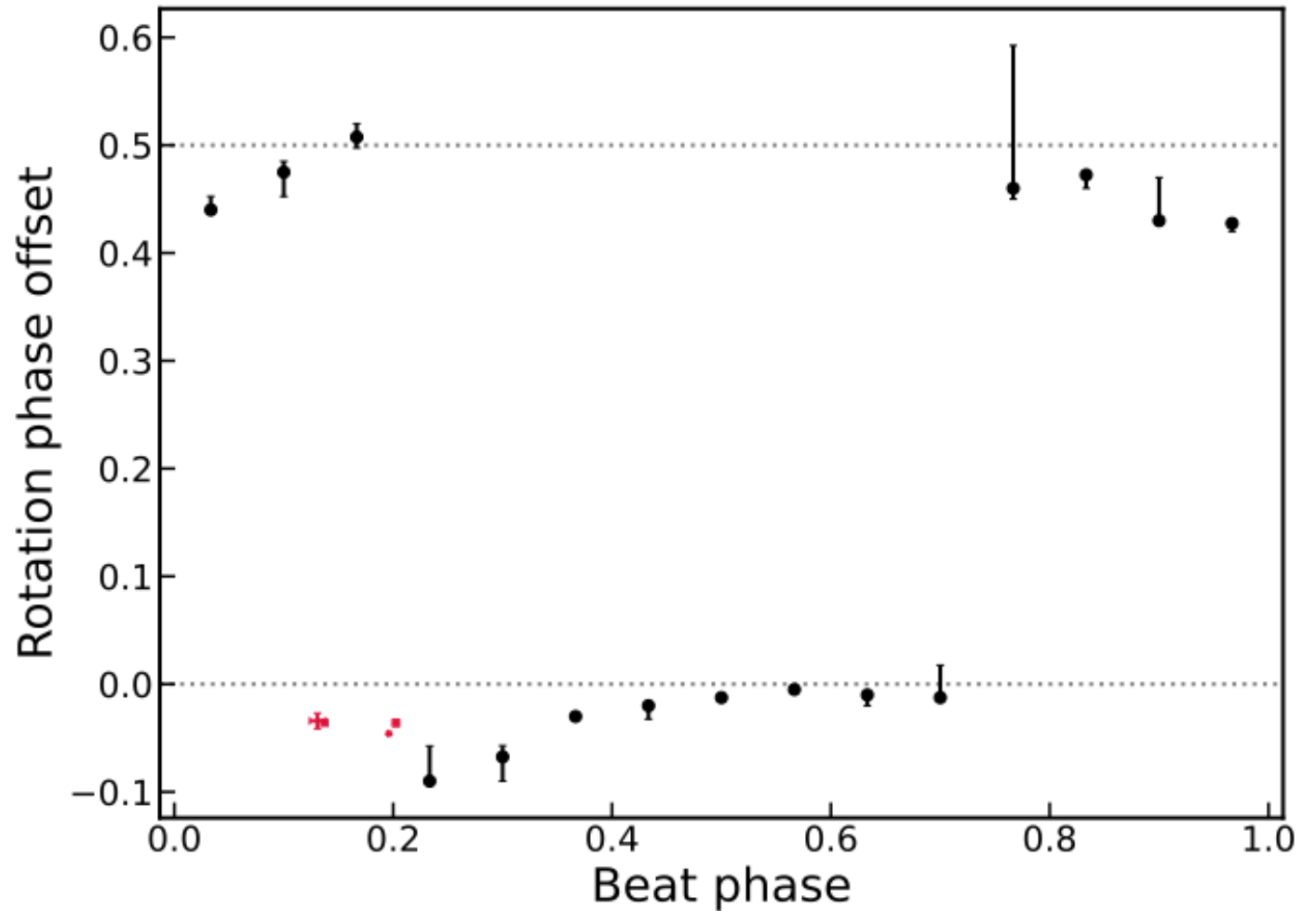


Origin of the radio emission



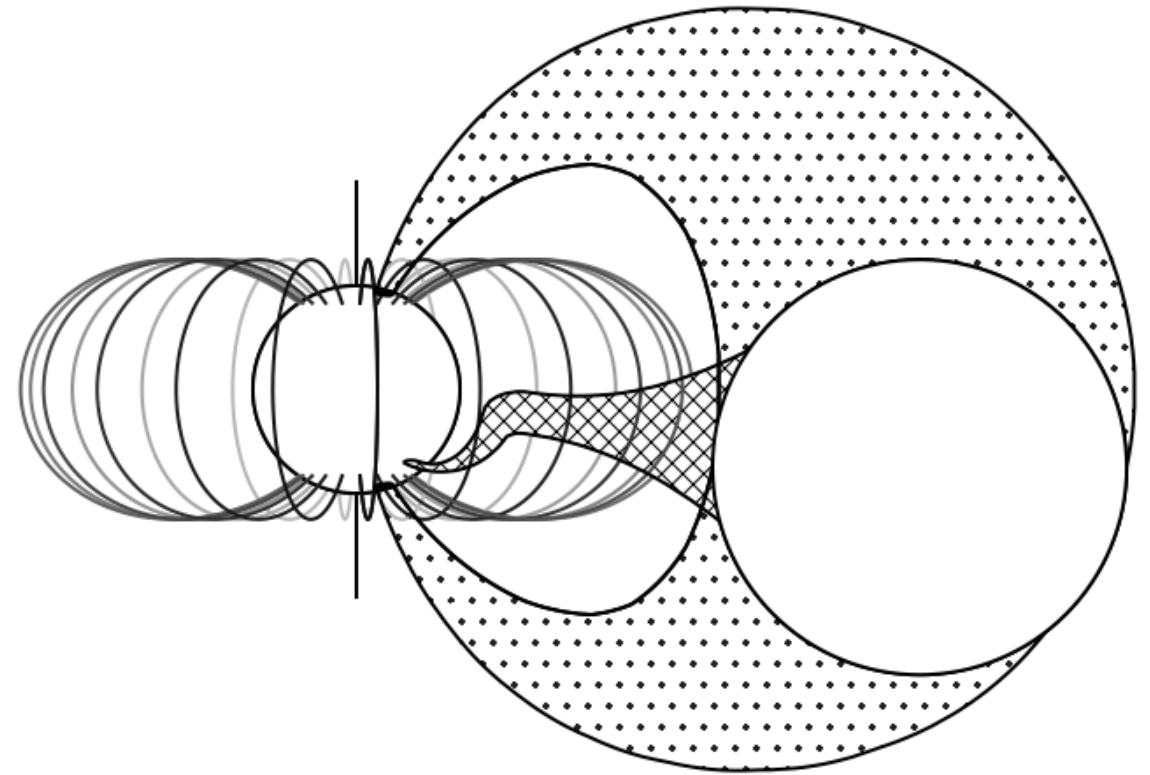
Emission location

- LPTs are often binaries
- Question: is the emission powered by accretion or a magnetic interaction?
- Answer: It is not powered by accretion (directly)



Results

- The radio emission of PSV-2 is periodic with the rotation of the white dwarf
- Radio pulses are only detected at certain orbital phases
- The radio emission is not correlated with the accretion region



Conclusions

- PSV-2 is the first LPT with a well-characterised optical counterpart
- Its radio emission is *not* powered by accretion
- It is likely powered by a magnetic interaction instead

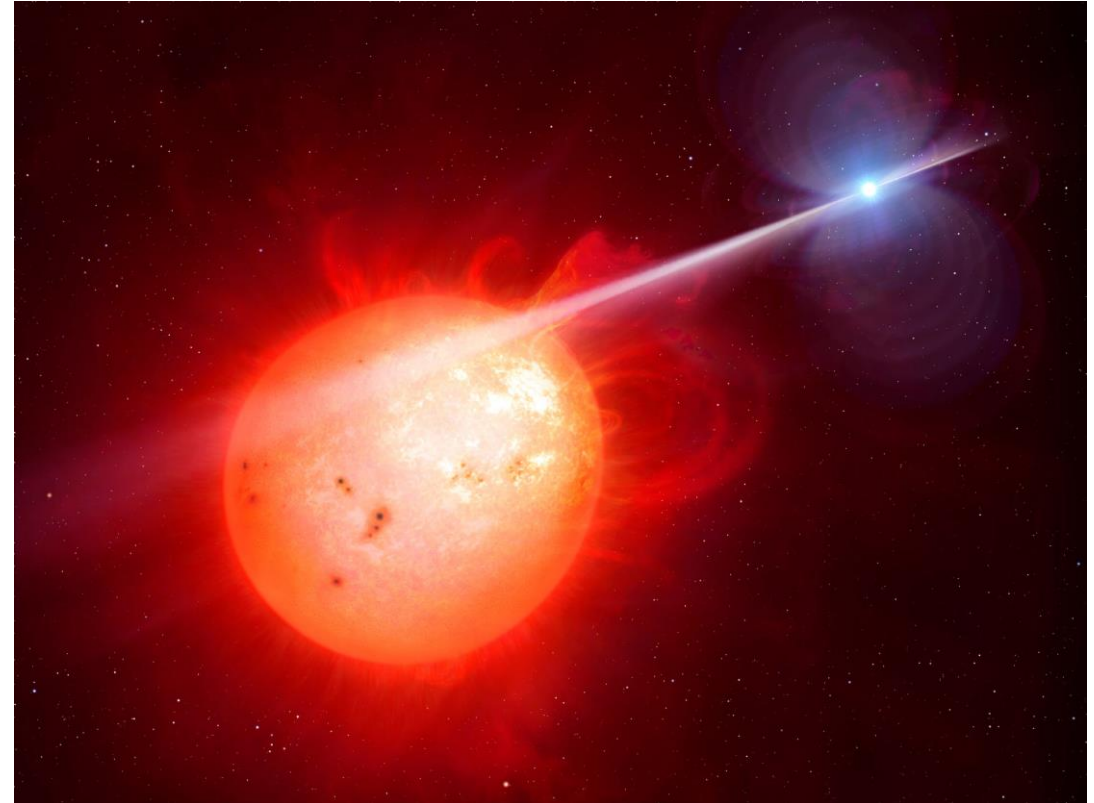
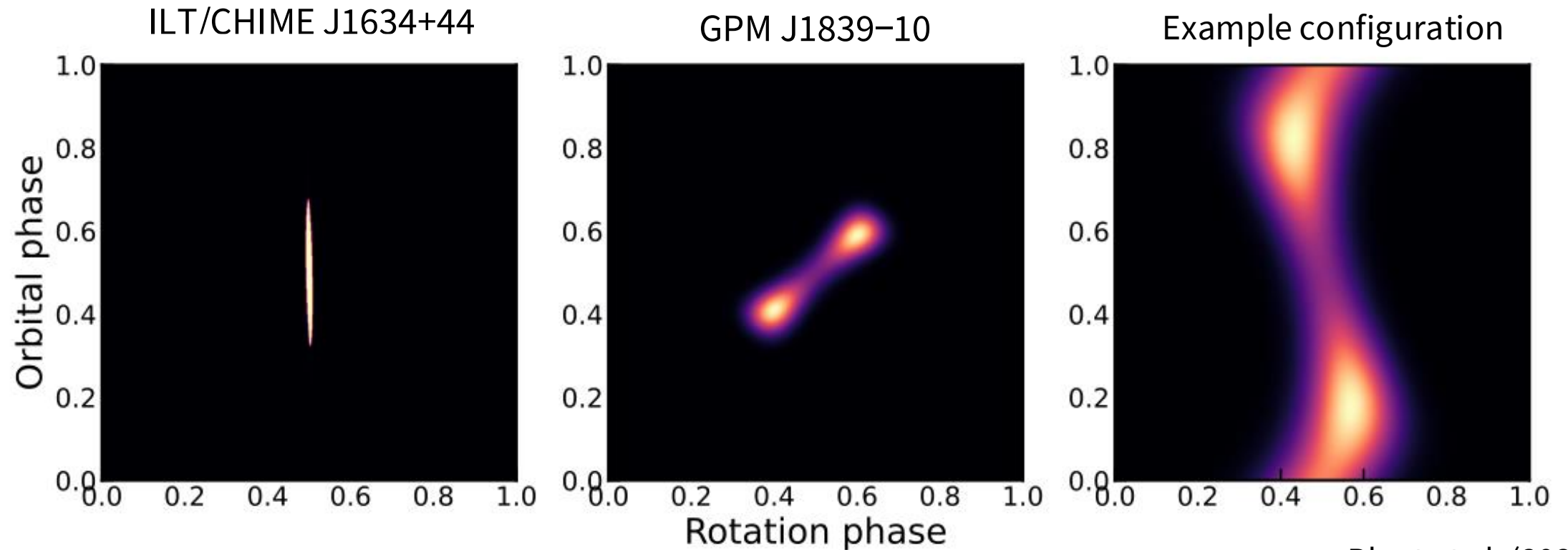


Image credit: M. Garlick / University of Warwick / ESO

White dwarf-companion interaction



Bloot et al. (2025),
Horvath et al. (2026)

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