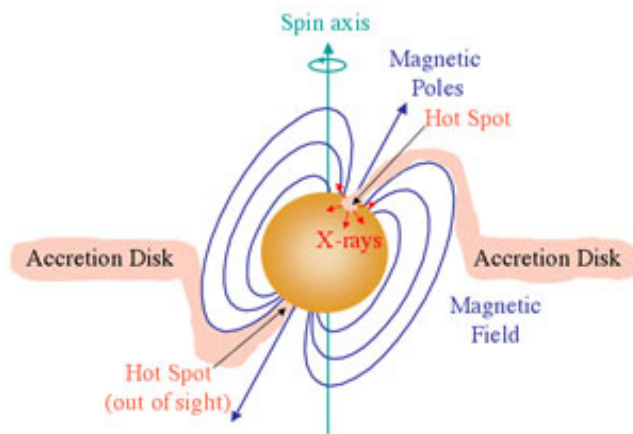


# Propeller Effect in Action: Unveiling Quenched Accretion in 4U 0115+63



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## Background

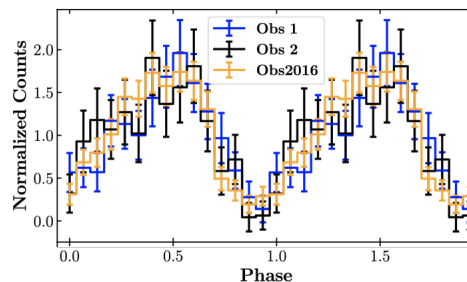
Be/X-ray pulsars host highly magnetized neutron stars (NS,  $B \sim 10^{12}$  G). As the accreted material approaches the NS magnetosphere, it couples to the magnetic field lines and is funneled onto magnetic poles produces **pulsed X-ray emission**.

Theoretical prediction: when  $L < L_{\text{prep}}$ , the **propeller effect** inhibits accretion via the centrifugal barrier.

Observations indicate that pulsations can still be detected even when  $L < L_{\text{prep}}$ .

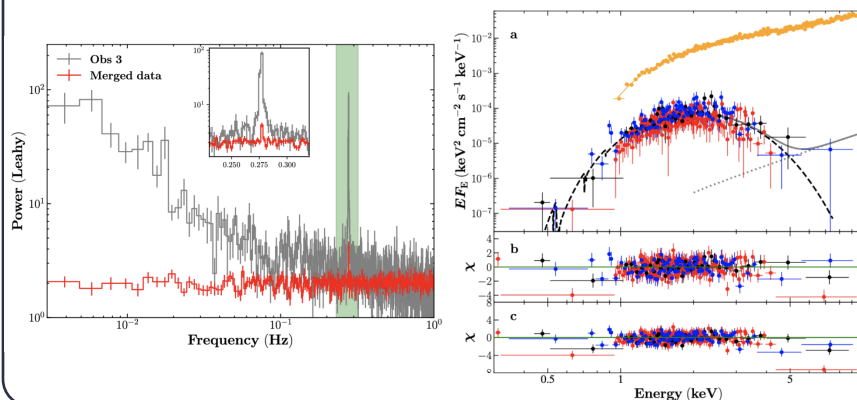
## Observational Results of 4U 0115+63

★ Clear pulsations correspond to the NS spin frequency



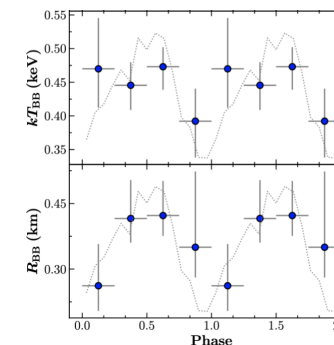
★ No signs of accretion

- **Absence of red noise** in the power density spectrum.
- Spectra are better described by a **single blackbody model** than by non-thermal models.



## ★ Temperature-Flux Correlation

- Phase-resolved spectroscopy revealed a **positive correlation** between blackbody temperature and flux.



## Discussion & Summary

1. X-ray pulsations at the spin frequency persist in the propeller regime.
2. Single blackbody spectrum with small emitting area suggests a cooling NS crust.

→ X-ray pulsations in the propeller regime originate the anisotropic cooling of NS crust.