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research highlights

ACCRETION PHYSICS

Black hole impostors

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Ultra-luminous X-ray sources (ULXs) — those with X-ray luminosities above 10^{39} erg s^{-1} — have long posed an interesting question to astronomers; they are too luminous to be powered by normal stellar processes, but too faint to be active galaxies. Black holes with masses in the range 10^{2}–10^{5} $M_{\odot}$ have been suspected to reside in these systems.

However, the recent discovery of a small sample of three pulsing ULXs is pointing towards an alternative scenario. Andrew King and collaborators analytically described accretion onto magnetic neutron stars to reproduce the observed luminosities and spinup rates of these systems. The calculations by King *et al.* show that for all three ULXs the radius within which accretion occurs along magnetic field lines (the Alfvén radius) is nearly equal to the radius at which radiation pressure dominates. This is a surprising result, considering that all three ULXs show otherwise rather different properties.

The authors argue that the derived near-equality is a necessary condition for a ULX to appear pulsed. These systems must host a magnetized neutron star that is accreting mass at a super-Eddington rate and with much faster spinup than other pulsing neutron stars in binaries. The existence of pulsed ULXs indicates that many unpulsed ULXs should contain neutron stars rather than black holes. ❐

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