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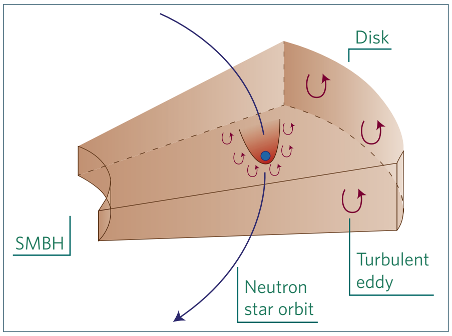
research highlights

MILKY WAY

Pulsar *ex machina*

Mon. Not. R. Astron. Soc. Lett. (in the press); preprint at https://arxiv.org/abs/1701.08804 (2017)



ROYAL ASTRONOMICAL SOCIETY

There is robust observational and theoretical evidence that now confirms the presence of a supermassive black hole at the centre of our own Milky Way. This black hole is believed to be fed by an advection-dominated accretion disk whose thermal emission has been extensively observed and successfully modelled in the past.

However, an additional emission component, observed at radio wavelengths, indicates the existence of a non-thermal population of electrons, whose origin is under debate. Ian Christie and collaborators propose a model that can offer a solution: a pulsar transits through the accretion disk of our Galaxy's supermassive black hole (SMBH; pictured) and relativistic charged particles generated by the resulting shock are injected into the disk. These particles sustain their emission until they are accreted by the black hole.

Analytical calculations show that periodic transitions of a young pulsar with a large spinup luminosity ($\geq 10^{35}$ erg s^{-1}) within 0.1 pc of the black hole can provide an adequate supply of non-thermal charged particles that emit in the radio through synchrotron cooling. Independent observations indicate that up to ten such pulsars should exist within the Galactic Centre. The emission calculated by Christie *et al.* matches observations at radio frequencies below 10 GHz.

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