

INTERSTELLAR MEDIUM

A space oddity*Astrophys. J. Lett.* **849**, L3 (2017)

From the twinkling of 'stars' to the passing of comets, variability on the sky can be due to causes either intrinsic or extrinsic to the varying object. A cloud of interstellar matter (ISM) occulting a bright source is one external cause of variability. For the first time, Harish K. Vedantham and collaborators directly imaged such an ISM cloud and thus identified the culprit responsible for the extreme variability shown by J1819+3845, a bright radio galaxy lying behind it.

The authors performed radio observations with the Westerbork Synthesis Radio Telescope and the Low-Frequency Array and used the Faraday rotation measure effect — the polarization angle of light rotates when passing through an ionized and magnetized medium — to produce an image of this intervening ISM structure. Its extent is found to be between a 1,000 and 10,000 au. J1819+3845 appears to be lying behind the northern edge of the structure, leading the authors to postulate that the observed variability of the radio source was caused by the turbulent boundary of the plasma globule.

However, the origin of such an ISM cloud, and how it can survive, remains unclear, especially since its density is much higher than the ambient medium ($10\text{--}1,000\text{ cm}^{-3}$ compared to 0.03 cm^{-3}). Possible explanations include the globule being the ionized sheath of a 'failed star', the product of the chance alignment of plasma sheets, or the photoionized sheath of a molecular clump around a hot star. While available data cannot conclusively pinpoint the correct answer, the failed-star scenario seems to be currently disfavoured.

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