A multiplicitous affair
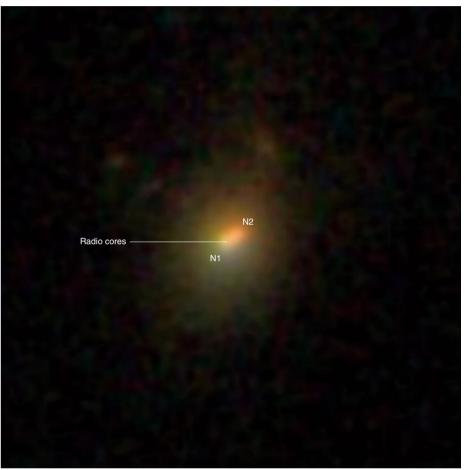*Astrophys. J.* (in the press); preprint available at https://arxiv.org/abs/2001.02837

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It is known that supermassive black holes can come in pairs or even in some rare cases in triples. These systems are typically the result of galaxy mergers but identifying them is not easy as, more often than not, one or more of the supermassive black holes are inactive and therefore effectively undetectable. Preeti Kharb and collaborators report radio interferometric observations that point to a triple black hole system at the centre of an elliptical galaxy.

The elliptical galaxy KISSR 102 (pictured) has two optical nuclei with a separation of ~1.5 kpc (labelled N1 and N2 in the image). The galaxy shows optical emission-line ratios consistent with a LINER (low-ionization nuclear emission-line region). Radio interferometric observations performed by the authors with the Very Long Baseline Interferometry Array reveal, however, the presence of two radio sources, A and B separated by just ~5 pc, within nucleus N1. Their radio spectral properties indicate that they are both powered by an active galactic nucleus rather than star formation.

Kharb et al. discuss potential scenarios that could produce this complex configuration. While the two radio sources could be part of a core–jet system, the large spectral index difference between them would require that the jet is interacting with an extremely dense medium. On the other hand, it could be that this is a triple black hole system, with N1 harbouring two jet-producing black holes and N2 harbouring the third, non-jetted one. Such a multiple system could have been created through a three-body interaction, where the black hole in nucleus N2 was ejected from the triplet, while the orbit of the remaining two black holes (radio components A and B within nucleus N1) was tightened.

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