## Title

Mass bends light – the first detection of a black hole through gravitational lensing


## Abstract

Astronomical observations have shown that black holes exist at two different mass scales – stellar-mass black holes formed from the collapse of dying stars, and so-called supermassive black holes fed by the accretion of gas into the central regions of galaxies. While theoretical mechanisms for the formation of black holes at intermediate mass scales have been proposed, the empirical evidence for such objects has remained scant. However, the potential of exploiting effects due to gravitational lensing – the bending of light by strong gravitational fields – to hunt these objects down has so far been largely unexplored. Gravitational lensing has already allowed astronomers to find planets outside our solar systems, to estimate the masses of galaxies and probe the dark matter of the Universe. By searching for such effects in archives of high-resolution data from radio telescopes, we have recently uncovered what may be the smallest gravitational lens ever detected. Our numerical models suggest that if the peculiar appearance of this radio source is indeed due to gravitational lensing by a foreground object, then that object must have properties very similar to an intermediate-mass black hole. If confirmed, this would not only be the smallest gravitational lens ever discovered, but also the first case of a black hole discovered through gravitational lensing, at any mass scale.