Measuring the Frequency of Massive Planets around M Dwarfs with Microlensing

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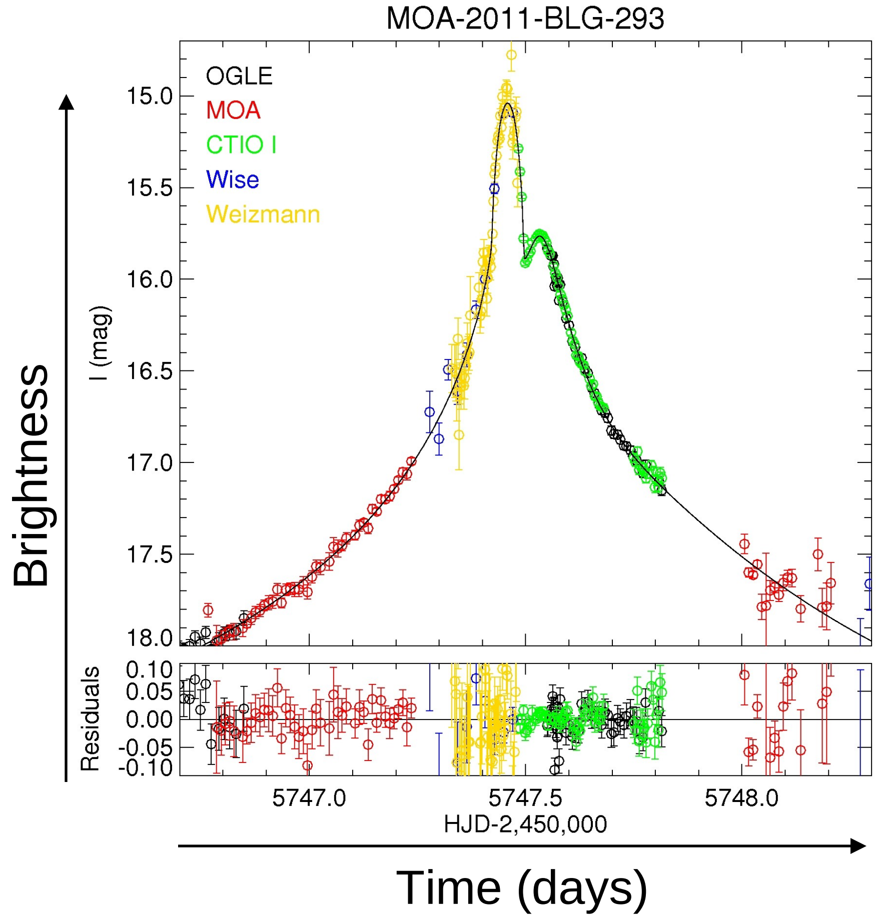
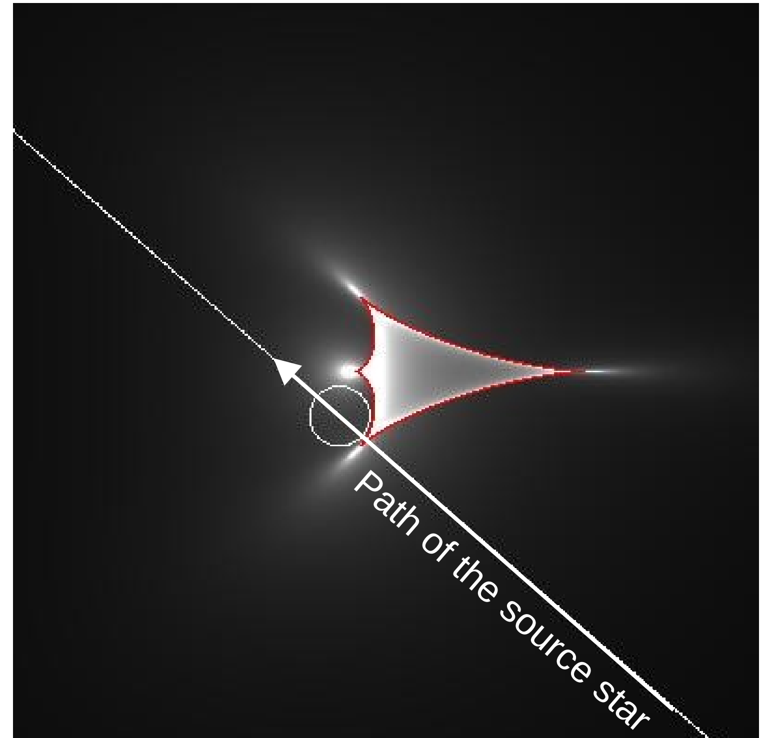


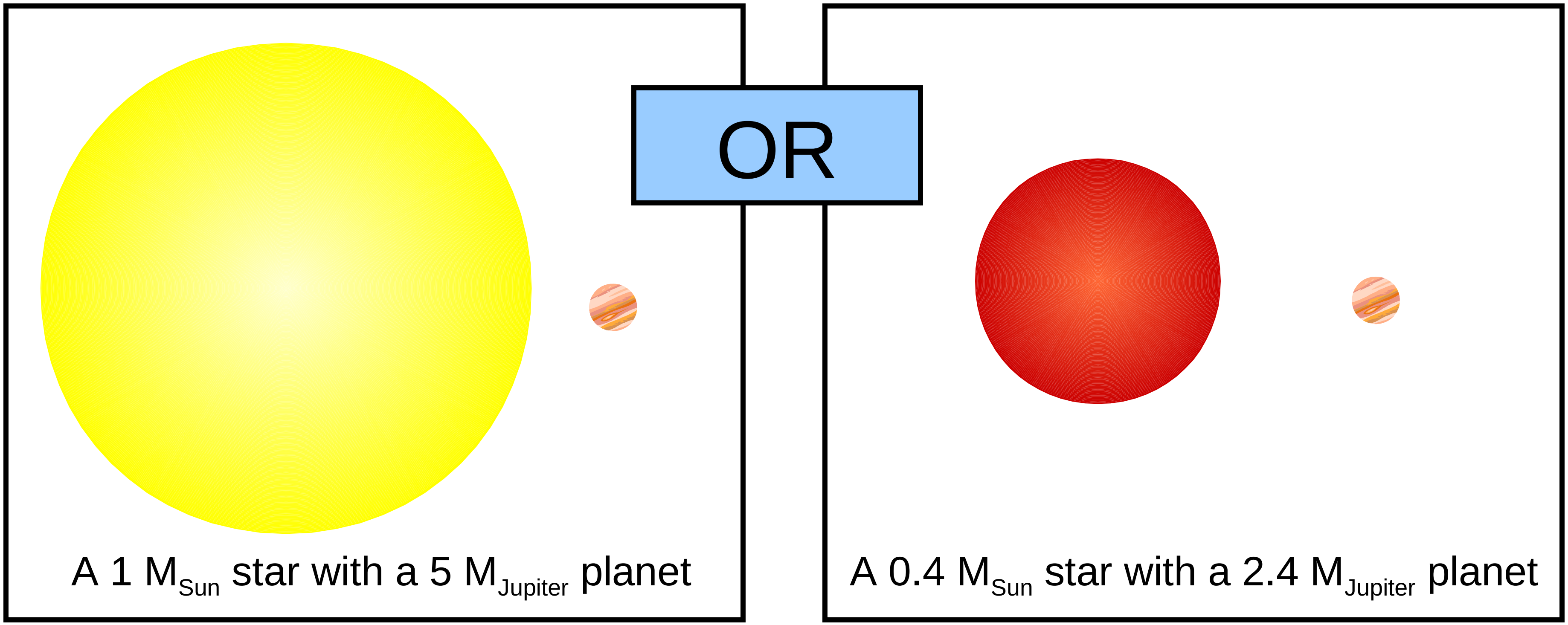


Yee et al. 2012, ApJ, 755, 102

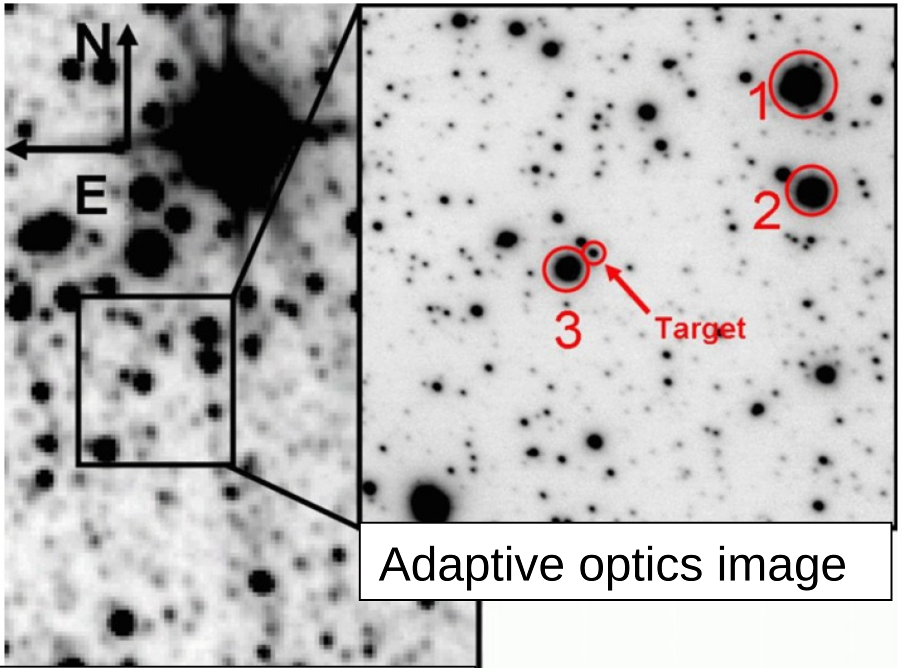
Magnification map showing how light from the source is distorted by the gravitational field of the lens star and planet.

This event is a candidate for an M-dwarf hosting a super-Jupiter. The mass ratio measured from the microlensing event is $m_{planet}/M_{star} = 5 \times 10^{-3}$. If the host star is an M-dwarf ($0.4\ M_{Sun}$), the planet is 2.4 times the mass of Jupiter.

Microlensing is sensitive to mass ratio = m_{planet}/M_{star}, so a mass ratio of 5×10^{-3} could correspond to either of the following scenarios:



MOA-2008-BLG-310



Adaptive optics image

Normal, seeing-limited image

Janczak et al. 2010 ApJ, 711, 731

Because microlensing fields are crowded, the event is often blended with other stars (*left*). Adaptive optics observations resolve the blended stars and allow a measurement of the lens light (*right*).

I will use adaptive optics observations to measure the lens light (and infer the mass) for a large number of microlensing events both with and without planets. From these events, I will measure the frequency of giant planets around M-dwarfs, which can be directly compared to the predictions of planet formation theories.