ON THE POSSIBILITIES OF DETECTING DARK MATTER BY THE GRAVITATIONAL LENS EFFECT

R. Kayser
Hamburger Sternwarte
Gojenbergsweg 112
D-2050 Hamburg 80
F.R. Germany

A class of compact objects with cosmological density ϱ leads to a probability for multiple imaging by gravitational lensing of roughly $P \approx \varrho/\varrho_c$, where ϱ_c is the critical density.

Thus every kind of compact objects which contribute significantly to Ω should be detectable by lens effects. This is of special interest for the lower end of the mass spectrum, i.e. for the detection of brown dwarves and jupiters ("micro-lenses"). Gravitational micro-lensing does not lead to observable separations of quasar images, but may induce variability to the quasar brightness. However, the question is : How to distinguish between variability induced by micro-lensing and intrinsic variability ?

If the time delay between two macro-images is known the problem is trivial, since only intrinsic variations appear (time-shifted) in both images. If the time delay is not known or no multiple imaging occurs, the problem may be solved by

1. typical lightcurves [1]
   If the compact continuum source crosses an anti-caustic, a typical asymmetric maximum appears in the light curve.
2. spectral effects [1]
   The influence of micro-lensing depends on the source size.
3. parallax effects [2) 3)]
   Micro-lensing leads to a brightness gradient at the observer, which should be observable by interplanetary probes even with relative small telescopes.

Ref.: 1) Kayser,Refsdal,Stabell: 1986,Astron.Astroph.166,36
2) Grieger,Kayser,Refsdal: 1986,Nature 324, 126
3) Grieger,Kayser,Refsdal: 1987,subm. Astron.Astroph.

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