

Progress Report SP 1998-013

Monitoring gravitational microlenses

Perth Observatory

Project Core Team

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Terminated and closed

Document endorsements and approvals as of June 1, 2016, 4:38 p.m.

Project Team

granted

Program Leader

granted

Directorate

granted

Monitoring gravitational microlenses

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Context

Gravitational microlensing happens when the motion of the Sun and other stars around the Milky Way brings two distant stars into precise alignment. Rather than 'blocking out' the more distant star, the gravity of the nearer star instead bends light that would normally have missed the Earth inwards, amplifying the light from the distant star like a giant, natural telescope. As the two stars move into alignment, and then out again, what looks like one faint star in an image from the telescope gets brighter then dimmer again, over hours, days or weeks. Following the precise change in brightness over time allows many properties of the nearer (lensing) and further (lensed) stars to be determined. More importantly, if one or more planets is orbiting the lensing star, it can be detected relatively easily.

Microlensing observations must be carried out at frequent intervals, 24 hours a day, seven days a week, to cover the entire 'light curve' of the lensing process. This requires international collaboration, and the use of telescopes spaced out around the world, so that there is always at least one telescope observing at any given time. Perth data is combined with observations from collaborators using telescopes in Siding Springs (NSW), Tasmania, South Africa, the Canary Islands, Chile, Brazil and Hawaii (ranging from 0.6 m to 2 m) allowing 24-hour monitoring during the 'galactic bulge season' (May–August).

Aims

- Use precise light curve measurements in order to characterise the statistics and kinematics of Galactic microlensing events.
- Detect extra-solar planets.
- Gather information on the stellar population in and around the Galactic Bulge.

Progress

- Four circulars published in 2012.
- Seven publications as a contributor to the PLANET project.

Management implications

Gravitational microlensing has developed into a powerful tool for studying stars and planets.

Future directions

Perth Observatory involvement in this project is completed.