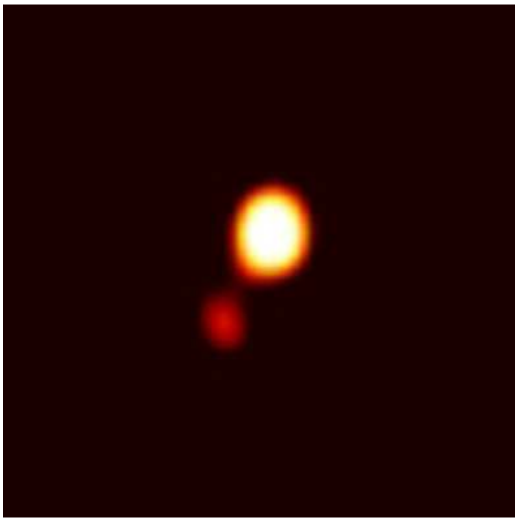

A brown dwarf orbiting its stellar companion, a faint main-sequence star. The image was obtained by adaptive-optics imaging on the Gemini North Telescope. The separation between the two components is of the order of 3 AU, which is a typical distance for this kind of system. Image courtesy Gemini Observatory/Melanie Freed, Laird Close, Nick Siegler University of Arizona/ Hokupa'a-QUIRC image, University of Hawaii, IfA.

Although brown dwarfs are at least as numerous as stars, our knowledge of their intrinsic physical properties, of their formation processes, and of the characteristics of the brown-dwarf population as a whole is comparatively poor. This situation is mainly due to the fact that brown-dwarf astronomy is a relatively new branch of science: the first brown dwarf ever was observed as recently as 1995 and the first dynamical brown-dwarf mass was only measured in the year 2000.

The main reason that so little is known about these objects is their low luminosity, which renders even nearby specimens faint. Another reason is the degeneracy between the effects of age and mass on observed brown-dwarf colours and magnitudes. In this respect, brown dwarfs in binaries provide critical information, because of the possibility of measuring dynamical masses. However, brown dwarfs in binaries can also help to answer more general questions such as *What is the origin of free-floating brown dwarfs? Is the formation process of brown dwarfs in binaries related to the formation of binary brown dwarfs? How do the binary-distribution characteristics (mass ratio, separation, etc.) of brown dwarfs differ from their stellar counterparts?*

A puzzling discovery is that, while planets are now routinely observed orbiting F-, G-, and K-dwarfs, few of these types of stars have brown-dwarf companions. Most of the brown dwarfs in binaries are found orbiting late-M-type stars, but while the distribution of separations peaks around 30 AU in FGK-type binaries, few brown dwarfs are detected at separations larger than 15 AU in low-mass systems. The origin of these differences is not known.

From present-day knowledge, it is estimated that about ~15% of low-mass stars in the solar neighbourhood have brown-dwarf companions. There also seem to be numerous systems in which both components are brown dwarfs. With estimates of the M-star population representing about 50 million stars in the Gaia Catalogue, the present-day knowledge suggests that Gaia will observe several million systems in which one component is a *bona fide* brown dwarf. Among these, Gaia will detect a sizeable fraction of separated components. At distances less than 50 pc, and assuming the presently known distribution of separations, ~6000 systems could be detected as separated components.

Although the long periods and faint magnitudes of brown dwarfs will not permit Gaia to measure viable orbits for many systems, the Gaia data will represent an unprecedented pool of measurements for follow-up observations and accurate mass determinations. Together with accurate parallaxes (better than 1% relative accuracy at distances <50 pc), Gaia will allow the above-mentioned questions to be addressed in detail.