VLT/ERIS observations of the V960 Mon system: a dust-embedded substellar object formed by gravitational instability?

Anuroop Dasgupta, Alice Zurl, Philipp Weber, Francesco Mai, Lucas A. Cieza, Davide Fedele, Antonio Garufi, James Miley, Prashant Pathak, Sebastián Pérez, Veronica Roccatagliata

European Southern Observatory

V960 Mon is an FU Orionis object that shows strong evidence of a gravitationally unstable spiral arm that is fragmenting into several dust clumps. We report the discovery of a new substellar companion candidate around this young star, identified in high-contrast L′-band imaging with VLT/ERIS. The object is detected at a projected separation of 0.898″ with a contrast of $(8.39 \pm 0.07) \times 10^{-3}$. The candidate lies close to the clumps previously detected in the sub-mm (at 1.3 mm) and is co-located with extended polarized IR signal from scattered stellar irradiation, suggesting it is deeply embedded. The object is undetected in the SPHERE H-band total intensity, placing an upper mass limit of approximately 38 M_Jup from the contrast curve. Using evolutionary models at an assumed age of 1 Myr, we estimate a mass of roughly 660 M_Jup from the L′ brightness; however, this value likely includes a significant contribution from a disk around the companion. The discrepancy between near- and mid-infrared results again suggests the source is deeply embedded in dust. This candidate may represent an actively accreting, disk-bearing substellar object in a young, gravitationally unstable environment.