

Stellar and sub-stellar companions in Chamaeleon

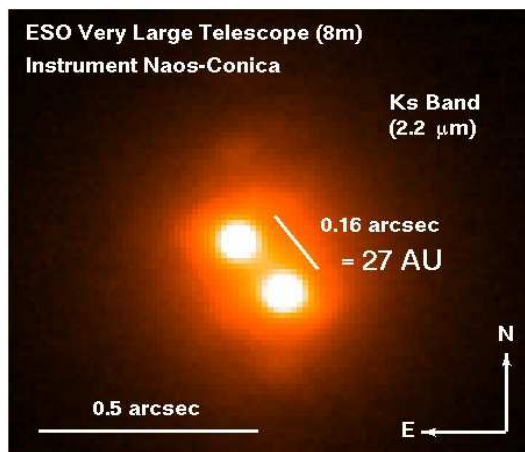
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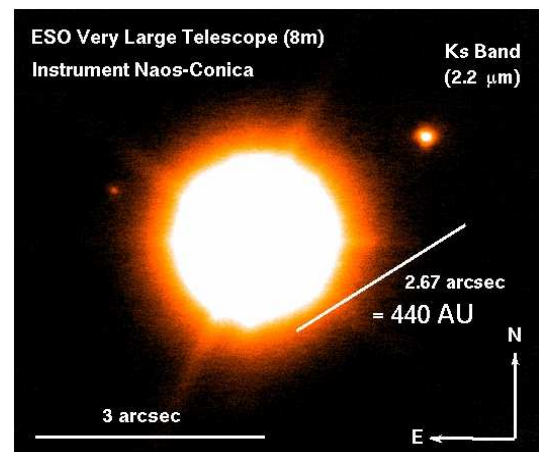
There are several dark clouds with ongoing star formation in Chamaeleon, hence several dozens of young low-mass stars.

We found that the brown dwarf candidate Cha H α 2 is a binary of only ~ 0.16 arcsec separation, corresponding to ~ 27 AU. The binary object itself has an optically flat dust disk (Natta & Testi 2001). From photometry and spectroscopy using Naos-Conica at ESO VLT we could prove common proper motion and found the masses of these ~ 2 Myr young objects to be $\sim 0.110 M_{\odot}$ ($\geq 0.070 M_{\odot}$) and $\sim 0.124 M_{\odot}$ ($\geq 0.077 M_{\odot}$), i.e. probably low-mass stars. Component B could still possibly be a brown dwarf (Schmidt, Neuhäuser et al. 2008, accepted by A&A).

Moreover we found a sub-stellar companion of the ~ 2 Myr young classical T Tauri star CT Cha, also belonging to the Chamaeleon I star forming region at 165 ± 30 pc from imaging, astrometry, and spectroscopy. With direct Ks-band imaging in February 2006 using VLT/NaCo, we detected an object ~ 6 mag fainter than CT Cha located $2.7''$ northwest of it (440 AU at 165 pc). Compared to images obtained 1 year later using the same instrument, this object shares the proper motion of CT Cha by 3.7σ , hence it is a co-moving companion. Its $J - K_s$ color is consistent with a spectral type mid M to mid L. Our Sinfoni J to K-band spectra yield a spectral type M9-L3. From comparison with Unified Cloudy Models from Tsuji et al. (2005) we derive $\log g = 3.25 \pm 0.5$ and $T_{\text{eff}} = 2200 \pm 200$ K with $\sim 2.6 R_{\text{jup}}$ radius at ~ 165 pc, hence ~ 1 to 16 Jupiter masses. The models from e.g. Baraffe et al. (2002) yield a mass of ~ 10 Jupiter masses, but are not valid at the young age of CT Cha. Thus this object is a planetary mass companion candidate and planet candidate imaged directly (Schmidt, Neuhäuser et al. 2008, submitted to A&A).



High S/N, high angular resolution VLT/NaCo image of Cha H α 2 A & B (binary object in the center) after shift+add of 15 observations of 2 min each (March 2007). We could confirm the binary nature of this brown dwarf candidate, already supposed to be a binary from elongation of the object in optical HST observations (Neuhäuser et al. 2002).



Deep, high S/N, high angular resolution VLT/NaCo image of CT Cha A (bright star in the center) and b (2.7 arcsec northwest of it) after shift+add of 30 observations of 28 sec each (March 2007). The object b is a planetary mass companion with a mass of few to 16 Jupiter masses. Northeast of CT Cha A a faint object can be seen, which is not co-moving, hence a background star.