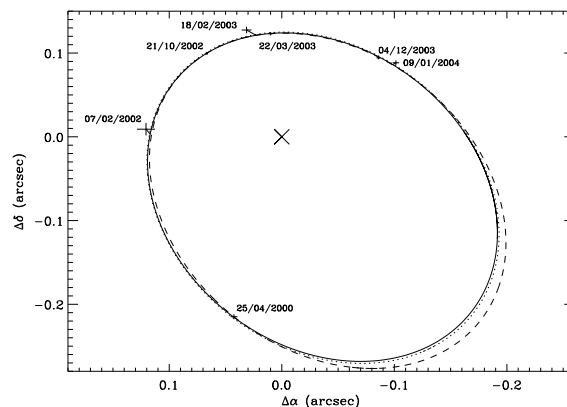
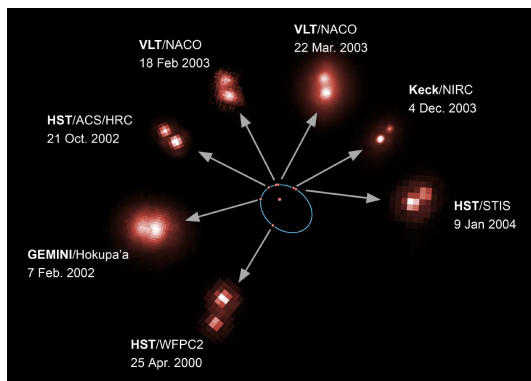


Using the Hubble Space telescope, the Very Large telescope, the Keck Observatory, and the Gemini Observatory, we have been able to perform astrometric measurements of the relative motion of a binary L-dwarf. Our seven measurements cover 60% of the 10.5 years period. It was the first time that a dynamical mass of an object belonging to the recently discovered L spectral class was measured.

We present the results of astrometric and photometric observations leading to the determination of the dynamical masses of the binary L dwarf 2MASSW J0746425+2000321. High angular resolution observations spread over 4 years and obtained with the Hubble Space Telescope, the ESO Very Large Telescope, the W. M. Keck Observatory and the Gemini Observatory cover 60% of the orbit. We find an orbital period of 3850.9 days. The total mass is $0.146 M_{Sun}$ with uncertainties depending on the distance. Spatially resolved low resolution optical (550-1025 nm) spectra have been obtained with HST/STIS, allowing us to measure the spectral types of the two components ($L0 \pm 0.5$ for the primary and $L1.5 \pm 0.5$ for the secondary). We also present precise photometry of the individual components measured on the high angular resolution images obtained with HST/ACS and WFPC2 (visible), VLT/NACO (J, H and K bands) and Keck I (K band). These spectral and photometric measurements enable us to estimate their effective temperatures and mass ratio, and to place the object accurately in a H-R diagram. The binary system is most likely formed by a primary with a mass of $0.085 \pm 0.010 M_{Sun}$ and a secondary with a mass of $0.066 \pm 0.006 M_{Sun}$, thus clearly substellar, for an age of approximately 0.5 1 Gyr. $H\alpha$ variability indicates chromospheric and/or magnetic activity.



With spectral properties between those of giant planets and late-type stars, brown dwarfs have opened a new chapter in the study of atmospheric physics. One of the ultimate goals of a theory of sub-stellar objects is an accurate determination of the mass based on spectroscopic characteristics and luminosity. The degeneracy in the mass-luminosity relation makes it difficult to pin down their physical properties. Luminosities and effective temperatures of ultra-cool dwarfs are function of both age and mass so that an older, slightly more massive ultra-cool dwarf can exhibit the same effective temperature as a younger, less massive one. Dynamical masses, which are model-independent, are highly required in order to calibrate the mass-luminosity relation. Only very few observational constraints on the masses of this class of objects are available nowadays, and we present here the first measurement for field L-dwarfs, at the stellar/sub-stellar transition. Although the age of 2MASSW J0746425+2000321 is not known independently from any models yet, these observations give promising results as a first step toward the calibration of the models.