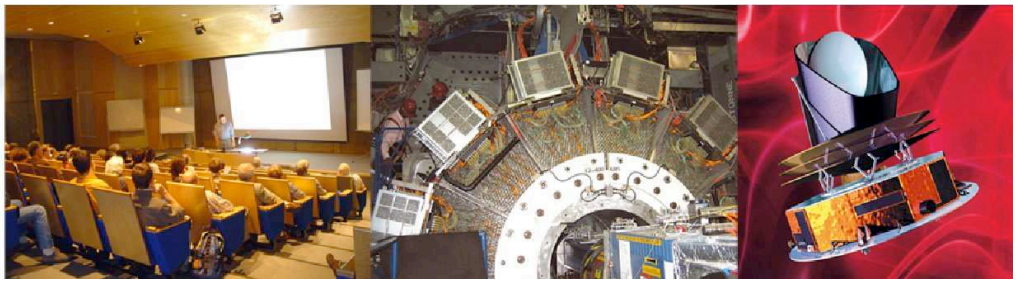
LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE



Séminaire du Laboratoire de l'Accélérateur Linéaire

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Institut d'Astrophysique de Paris

Mardi 1 Fevrier 2011 à 11 :00

From frozen Super Earth to Habitable Earth via microlensing

In the last fifteen years, astronomers have found over 500 exoplanets including some in systems that resemble our very own solar system. These discoveries have already challenged and revolutionized our theories of planet formation and dynamical evolution. Several different methods have been used to discover exoplanets, including radial velocity, stellar transits, direct imaging, pulsar timing, astrometry, and gravitational microlensing which is based on Einstein's theory of general relativity. So far 10 exoplanets have been published with this method. While this number is relatively modest compared with that discovered by the radial velocity method, microlensing probes a part of the parameter space (host separation vs. planet mass) not accessible in the medium term to other methods. The mass distribution of microlensing exoplanets has already revealed that cold super-Earths (at or beyond the snow line and with a mass of around 5 to 15 Earth mass appear to be common (Beaulieu et al., 2006, Gould et al., 2006, Sumi et al. 2010, Cassan et al. 2010) . We detected a scale 1/2 model of our solar system (Gaudi et al., 2008), several hot Neptunes/Super Earth, shown that our detection efficiencies extends to 1 Earth mass planets (Batista et al., 2009). We have made the first measurement of the frequency of ice and gas giants beyond the snow line, and have shown that this is about 7 times higher than closer-in systems probed by the Doppler method. This comparison provides strong evidence that most giant planets do not migrate very far (Gould et al. 2010). Microlensing is currently capable of detecting cool planets of super-Earth mass from the ground (and on favourable circumstances down to 1 Earth), with a network of wide-field telescopes strategically located around the world, could routinely detect planets with mass as low as the Earth. Statistics about Mars to Earth mass planets, extending to the habitable zone will be achieved with space based wide field imagers such as EUCLID or WFIRST. EUCLID is a 1.2m telescope with optical and IR wide field imagers and slitless spectroscopy, proposed to ESA Cosmic Vision to probe for Dark Energy, Baryonic acoustic oscillation, galaxy evolution, and an exoplanet hunt via microlensing. A 3 months microlensing program will already efficiently probe for planets down to the mass of Mars at the snow line, for free floating terrestrial or gaseous planets and habitable super Earth. A 12+ months survey would give a census on habitable Earth planets around solar like stars. This is the perfect complement to the statistics that will be provided by the KEPLER satellite, and these missions combined will provide a full census of extrasolar planets from hot, warm, habitable, frozen to free floating.

Salle 101 du LAL - Bât. 200, Orsay

Thé et café seront servis 1/4 h avant le séminaire

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