

The Laboratory Universe and Theory invites applications for a post-doctoral position in Computational Astrophysics and Theoretical Cosmology

The evidences for cosmic acceleration come from various observations in cosmology, such as the distance-redshift measurements of type Ia supernovae, the properties of the cosmic microwave background and the abundance of galaxy clusters. There are numerous theoretical models trying to explain the origin of dark energy, from the vacuum energy modelled by a cosmological constant to a modification of general relativity. Discriminating between all those explanations is a hard task since their predictions are often quite similar, and it appears necessary to compare different cosmological consequences to prevent the question of the deep nature of dark energy from becoming almost a question of theoretical elegance.

Structure formation is expected to bring more insight into the dark energy debate as this process covers the whole intermediate redshift range between CMB ($z \sim 1000$) and the farthest supernovae ($z \sim 2$). However, the problem of structure formation is quite complicated due to the variety of the physical processes involved in the mechanism and has to be addressed by means of numerical or semi-analytical computations. The project HORIZON (<http://www.projet-horizon.fr/>) has recently been created to federate all the French theoretical activities in the field of galaxy formation. In these fields, it gathers many renowned scientists from various institutions (SAP, CRAL, IAP, LERMA, LUTH) and will benefit from numerical facilities on the international and national level. In this project, the candidate will perform research at the edge of theoretical cosmology, high-energy physics and the astrophysics of structure formation. He will therefore be involved in the HORIZON project to study the limits of the Λ CDM concordance model with structure formation. He will also study how the observational predictions are modified when different dark energy models are considered (influence of varying equation of state, modification of the gravitational law, clumping of the quintessence field, dark-energy, dark matter models, transient dark energy, etc). This part of this project will help theorists to have more insights on the nature of dark energy (vacuum properties, scalar fields, brane cosmology, violation of the equivalence principle, etc.). Cosmological effects such as the Sunayev-Zeldovich effect, the properties of the intergalactic medium, the weak lensing are expected to be also of first importance to test the dark energy paradigm.

The LUTH team has already developed an experience in these questions by having studied and developed dark energy models as well as having performed numerical simulations of galaxy formation in various dark energy-driven universes. The successful applicant will therefore work in close collaboration with the cosmology LUTH group and the scientists of the HORIZON project while attempting to address these issues. The LUTH (<http://luth2.obspm.fr/>) is located in Observatoire de Meudon, near Paris. It is engaged in research activities which include cosmology, numerical relativity, AGN, interstellar medium, fluid and plasma astrophysics.

The post-doc position's duration will be 24 months. The net salary will approximately be of 1950 euro per month. Post doc will receive support for travel and usual research activities. Interested applicants please send a cv, bibliography, description of research interests and manage to have 3 recommendation letters. Applications received by April, the 30th of 2006 will receive full consideration for positions starting in Fall 2006. Engaging dates are flexible.

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