APPLICATION FOR REGISTRATION - deadline : sept. 3rd, 2012 **:**
www.cpt.univ-mrs.fr/~cosmo/EC2012/EcoleLuminy12_a.html

XITH SCHOOL OF COSMOLOGY

17-22 SEPTEMBER 2012 IESC CARGESE (CORSICA), FRANCE

GRAVITATIONAL LENSES : THEIR IMPACT IN THE STUDY OF GALAXIES AND COSMOLOGY

WEAK GRAVITATIONAL LENSING : A TOOL TO FIND THE EQUATION OF STATE OF DARK ENERGY • LENSING GALAXY CLUSTERS, THE DISTRIBUTION OF DARK MATTER • STRONG GRAVITATIONAL LENSING BY GALAXY CLUSTERS, AND STUDY THE FIRSTGALAXIES AT HIGH RESOLUTION • EXTRAGALACTIC GRAVITATIONAL MICRO LENSING : QUASARS AND DARK MATTER • GALAXY-GALAXY GRAVITATIONAL LENSING

The current standard model of galaxy formation is crossing a crisis : the dark matter is predicted to collapse in the center of galaxies, baryons lose their angular momentum through dynamical friction against dark matter, and each halo of Milky Way type should be surrounded by thousands of unseen dark satellites. Are the baryonic physical processes (star formation, feedback, active galactic *nuclei*...) able to modify sufficiently the distribution of dark matter, and solve the various problems ? Massive galaxies are forming most of their stars early in the universe, while the present starbursts are occurring mainly in dwarfs, is this incompatible with the hierarchical scenario ? Direct observations at high redshift, and numerical simulations have made large progress in recent years, and it should be fruitful to confront both in order that possible solutions to the problems emerge.

Previously regarded simply as a prediction of general relativity, the gravitational lenses became a valuable tool in astronomy. When strong, they act like a telescope, by amplifying enough the image of distant galaxies to make them detectable. When weak, they can be efficient in statistical studies to trace mass in the universe, and mainly the one of dark matter. They can be used to enlighten fundamental problems such that the equation of state of dark energy, which is now a main clue to allow the determination of cosmological parameters, or the nature of the first galaxies, which requires a high-resolution study. Catalogs from deep fields at high resolution (COSMOS...) as well as those corresponding to larger fields but lower resolution (CFHTLS, Terapix...), have shown that we can detect the distribution of dark matter at different scales around the clusters and voids. In the case of individual clusters, strong lensing has allowed a clearer determination, which can be compared to the dark-matter distribution derived from X-rays. Towards individual galaxies, the only method is to stack of a large number of them, of the same type, or derive statistical properties.

This school will cover the study and use of gravitational lenses at all scales (cosmological, that of galaxy clusters, and galaxies), **so to highlight the shape and extent of dark matter halos around structures** (clusters, galaxies of all types).It provides an opportunity for theorists and observers to discuss by confronting data with theories. We can also compare the properties of dark matter relative to those of baryons.

Invited lecturers : David Bacon, Henk Hoekstra, Tom Kitching, Jean-Paul Kneib, Leon Koopmans, Simona Mei, Céline Péroux, Cristiano Porciani, Johan Richard, Graham Smith, Joachim Wambsganss

Scientific organizing committee : Françoise Combes (LERMA), Yannick Mellier (IAP), Roland Triay (CPT)

Scientific advisory committee : Monique Arnaud, David Bacon, Stéphane Charlot, Françoise Combes, François Couchot, Henk Hoekstra, Jean-Paul Kneib, Yannick Mellier, Peter Schneider, Roland Triay

Contact : Roland Triay / triay@cpt.univ-mrs.fr
Centre de Physique Théorique, CNRS Luminy
Case 907, F-13288 Marseille CEDEX 9, France

Aix*Marseille université · cnrs · PNCG · Institut d'Études Scientifiques de Cargèse · Collectivité Territoriale de Corse