

**TATA INSTITUTE OF FUNDAMENTAL RESEARCH**  
**DEPARTMENT OF ASTRONOMY & ASTROPHYSICS**

**SPECIAL ASTRONOMY SEMINAR**

April 5, 2010

Speaker : Swastik Bhattacharya  
TIFR-DAA

Title : Dynamical massless scalar fields in collapse  
and cosmology

Day, Date & Time : Monday, 5 April, 2010 at 16.15 hrs

Venue : TAP Seminar Room (A-269)

(J.S. Yadav)

**Abstract**

*In this talk, we shall discuss massless scalar field models, both in the context of cosmology and gravitational collapse. We shall describe here a toy model and a class of solutions in Einstein theory, in which it is possible to achieve the accelerated expansion of the universe without violating any of the energy conditions which demand the positivity of mass and energy density. The possible relevance of this result for cosmology will be discussed. I shall also talk about collapsing scalar field models, in which the collapse stops ultimately and the endstate is non-singular. Finally, we shall briefly discuss another result that if during the dynamical evolution, the timelike gradient of the scalar field changes to a space like vector, it must be accompanied by dispersal of the scalar field. Possible connection of this to numerical studies of the massless scalar field collapse models will be indicated.*