

# Department of Theoretical Physics

## Special Free Meson Seminar

- Speaker* : Akin Wingerter  
(Indian Institute of Science, Bangalore)
- Topic* : A Fourth Chiral Generation in the  
MSSM and its Consequences for  
SUSY Breaking
- Day, Date & Time* : Wednesday, January 20, 2010  
at 2:30 p.m.
- Place* : Theoretical Physics  
Seminar Room (A304)

### *Abstract*

We consider the MSSM with a fourth chiral generation of matter. We show that if the masses of the fourth generation fermions lie above their present experimental limits, perturbativity in the Yukawa couplings can be maintained only up to 1000 TeV. As a consequence, a fourth generation of chiral matter and perturbative unification are mutually exclusive. On the other hand, such low scales are ideally suited for gauge mediated SUSY breaking, where the mediation scales can be as low as 10-20 TeV. The simplest models of gauge mediation, however, are strongly constrained, and large parts of the parameter space are ruled out by the absence of electroweak symmetry breaking, and the rest suffers from the presence of tachyonic staus. We conclude that general gauge mediation with its broader set of boundary conditions is better suited to accommodate the fourth generation. The results in this work are mainly based on INDISOFT, a SOFTSUSY spin-off that we developed to handle the case of four generations. Talk based on arXiv:0911.1882 to appear in JHEP.

*(Nilmani Mathur)*