

# Theoretical Physics Seminars

## **Z\_N symmetry and Confinement-Deconfinement transition in SU(N)+Higgs theory**

**Speaker:** Dr. Minati Biswal

**From:** Institute of Mathematical Sciences, Chennai

**When:** June 22 , 2017 Thursday 4:00 pm

**Place:** Room No. 469

At very high temperatures, around  $\sim 150$  MeV, hadrons melt to form the Quark-Gluon Plasma(QGP). Such extreme thermal conditions existed in the early Universe and currently are being created in heavy-ion collision experiments. Theoretical studies using Quantum ChromoDynamics (QCD) show that the melting of hadrons to QGP proceeds via the confinement-deconfinement (CD) transition. Interestingly this transition occurs in all  $SU(N)$  gauge theories like QCD. The nature of this transition depends greatly on the presence of matter fields. This has to do with the  $Z_N$  symmetry which describes well the CD transition when the matter fields are not considered. It is spontaneously broken in the deconfinement phase and gets restored in the confinement phase. The presence of matter fields is supposed to break this symmetry explicitly making the CD transition weaker. We study this explicit symmetry breaking in  $SU(N)$  gauge theories by considering only the bosonic matter fields. Contrary to conventional expectations we find vanishing explicit symmetry breaking in parts of the relevant phase diagrams.

**All are welcome**