

**Title: Theory and phenomenology of quarkyonic matter**

**Speaker: *Giorgio Torrieri* - *Columbia University***

Abstract:

I will discuss the phase structure of matter at moderate temperature and chemical potential, relevant for the lower energy runs at RHIC as well as the upcoming experiments of NICA and FAIR. Motivated by large  $N_c$  physics, I will argue that the non-perturbative structure of QCD can give rise to hitherto little explored phenomena, such as the coexistence of confinement with perturbative quark degrees of freedom. I will however show that this "quarkyonic phase" is defined by a percolation-type phase transition line which curves in "number of colors", as well as density and temperature.

Given theoretical uncertainties in dealing with matter at this regime, therefore, a phenomenological and experimental investigation of matter at high chemical potential might be decisive to determine if the quarkyonic phase does in fact exist. I will conclude discussing possible experimental signatures of this new state of matter, concentrating on electromagnetic signals