# Department of Theoretical Physics

## Free Meson Seminar

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| *Speaker* | : | Paramita Deb (University of Calcutta) |
| *Topic* | : | QCD phase diagram and fluctuations using PNJL model with multiquark interactions |
| *Day, Date & Time* | : | Thursday, July 7, 2011 at 2:30 p.m. |
| *Place* | : | AG 69 |

## Abstract

With a plethora of data from RHIC and recently from LHC, and more experiments coming up, the study of the properties of strongly interacting matter at large temperatures and densities is a very active field of research at present. Because of the complexity of QCD, one often has to take recourse to efective models for such studies. One of the most popular models is Polyakov loop extended Nambu–Jona-Lasinio (PNJL) model. We have investigated thermodynamic properties of strongly interacting medium, like pressure, energy density, specific heat, speed of sound, etc., with this model. We have also studied the phase diagram using PNJL model with six-quark and eight-quark interactions. The introduction of eight-quark interaction shifts the critical point in the (T, $\mu_B$) plane to lower values of baryon chemical potential $\mu_B$, close to the lattice QCD results. We have calculated the fluctuations of baryon, charge and strangeness quantum numbers with respect to temperature. The second derivative of pressure show a steep rise near the transition region, which indicates the increase of fluctuations. However at higher temperature it saturates and converges to the ideal gas value. The results are consistent with lattice data. All the fourth order fluctuations show peaks near the transition temperature for six-quark and eight-quark interactions. We have also calculated the correlations between baryon, charge and strangeness quantum number. They show different interesting behaviors at different temperature regimes.

*(Saumen Datta)*