

## ICTS Condensed Matter Seminar (HYBRID)

**Title** : Deconfined pseudocriticality in a model spin-1 quantum antiferromagnet

**Speaker** : Nisheeta Desai (TIFR, Mumbai)

**Date** : Wednesday, 13<sup>th</sup> September, 2023

**Time** : 03:00 PM (IST)

**Abstract** : Berry phase interference arguments that underlie the theory of deconfined quantum criticality (DQC) for spin-1/2 antiferromagnets have also been invoked to allow for continuous transitions in spin-1 magnets including a Néel to (columnar) valence bond solid (cVBS) transition. We provide a microscopic model realization of this transition on the square lattice consisting of Heisenberg exchange ( $J_H$ ) and biquadratic exchange ( $J_B$ ) that favor a Néel phase, and a designed Q-term ( $Q_B$ ) interaction which favors a cVBS through large-scale quantum Monte Carlo (QMC) simulations. For  $J_H=0$ , this model is equivalent to the SU(3) JQ model with a Néel-cVBS transition that has been argued to be DQC through QMC. Upon turning on  $J_H$  which brings down the symmetry to SU(2), we find multiple signatures -- a single critical point, high quality collapse of correlation ratios and order parameters, "U(1)-symmetric" cVBS histograms and lack of double-peak in order parameter histograms for largest sizes studied near the critical point -- that are highly suggestive of a continuous transition scenario. However, Binder analysis finds negative dips that grow sub-extensively that we interpret as these transitions rather being pseudocritical. This along with recent results on spin-1/2 models suggests that deconfined pseudocriticality is the more generic scenario.

**Venue** : **Offline:** Madhava Lecture Hall (ICTS)

**Online:** Please click the below link to join the seminar

<https://icts-res-in.zoom.us/j/84429969113?pwd=SWFjcVRXVXQzdHc1WTBnRGEyNnhqOT09>