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SEMINAR 3:

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Wed. June 11, 14:30-15:30:

SPEAKER: **Pietro Smacchia (SISSA)**

TITLE: **"Statistics of observables and dynamical phase transitions in many-body quantum systems out of equilibrium"**

ABSTRACT:

Recent experimental advances, especially in the context of cold atomic gases, have made possible the realization of highly tunable systems in which decoherence effect are highly suppressed, triggering a renewed interest in the out of equilibrium dynamics of thermally isolated quantum systems, which is now one of the most active and intriguing areas of condensed matter and statistical physics.

Among the fascinating issues studied in this context, an important question is the characterization of the steady state attained by the system after an abrupt change of one of its parameters (a quantum quench). Early studies have shown that integrable systems, where infinite conserved quantities are present do not thermalize, but even when there is thermalization, there can be an highly non trivial dynamics, requiring a two-step process passing trough the so-called pre-thermal state, which can as well show interesting non-thermal features. In particular, non-thermal states can display dynamical transition, characterized by the singular behavior of long time averages of observables, and separating different dynamical behaviors. This phenomenon has been theoretically studied in a variety of models (mostly at mean field level), however the nature and the critical properties of this transitions are still unclear.
In this seminar, after an overview of the previous studies, I will study in detail the dynamical phase transition of the O(N) vector model, discussing its critical properties and showing that strong signatures of such a transition can be found in the statistics of the number of excitations created in a double quench.