



# *Seminari di Matematica*

Nell'ambito delle attività seminariali del Dipartimento di Matematica,  
su proposta del gruppo di ricerca  
“Modelli fisici e metodi matematici”  
responsabile locale la Dott.ssa Marilena LIGABO’,

la **Prof.ssa Cécilia LANCIEN**  
del Institut de Mathématiques de Toulouse

terrà presso il Dipartimento di Matematica  
dell'Università degli Studi di Bari Aldo Moro,  
la seguente conferenza:

**“Typical correlations and entanglement in random MPS and PEPS”  
il 29 giugno 2021 alle ore 15.30**

**ABSTRACT:** Tensor network states are used extensively as a mathematically convenient description of physically relevant states of many-body quantum systems. Those built on regular lattices, i.e. matrix product states (MPS) in dimension 1 and projected entangled pair states (PEPS) in dimension 2 or higher, are of particular interest in condensed matter physics. In this talk, I will try to answer the following general question: which features of MPS and PEPS are generic and which are, on the contrary, exceptional? Or to rephrase it: given an MPS or PEPS sampled at random, what are the features that it displays with either high or low probability? One property which we will focus on is that of having either rapidly decaying or long-range correlations. In a nutshell, the main result I will state is that translation-invariant MPS and PEPS typically exhibit exponential decay of correlations at a high rate. I will show two distinct ways of getting to this conclusion, depending on the dimensional regime under consideration. Both yield intermediate results which are of independent interest, namely: the parent Hamiltonian and the transfer operator of such MPS and PEPS typically have a large spectral gap. If time allows, I will also present on-going attempts at quantifying the amount of genuinely multipartite entanglement in such random MPS and PEPS. The talk will be based mainly on a joint work with David Perez-Garcia, available at arXiv:1906.11682, and on some work in progress with Ion Nechita.

**Zoom Link:** <https://zoom.us/j/85626841381?pwd=QlE0M2xSaTA2UFIwTFFVbXc1NUMrZz09>  
**Meeting ID:** 856 2684 1381  
**Passcode:** 098393

La S.V. è cordialmente invitata a partecipare.  
Bari, 28.06.2021

**Il Direttore del Dipartimento di Matematica**  
F.to **Prof.ssa Addolorata SALVATORE**