Contribution ID: **3** Type: **Poster**

Non commutative simulations on GRID

Description of content and intended audience</br>- the outcome you expect to achieve.

The fuzzy disk is a discretization of the algebra of functions on the
two-dimensional
disk using finite matrices which preserves the action of the rotation
group. We define a
phi^4 scalar field theory on it and analyze numerically three different
limits for the rank of the matrix going to infinity. The numerical simulations reveal three different phases:
uniform and disordered phases already present in the commutative scalar
field theory and a non-uniform ordered phase as non commutative effects. Since this
simulations have an high grade of parallelism the use of the GRID allow us to process all considered different configurations of the
model (approx 10000 cases) potentially completely in parallel. All the submissions can be achieved using a parametric job together a suitable
wrapper script which allows to use multiple parameters.

Printable summary: this is the only </br> section of the abstract that will
be published in the Book of Abstracts.

Here we present a first implementation in the GRID framework of a set of simulations in the field of the non commutative geometry.Such calculus (typically Monte Carlo like simulations) are usually done on local resources such as local clusters, our goal here is to open the way to the GRID paradigm to such models or even to the “fuzzy” community.
We will study then a quantized phi^4 scalar field theory approximating field with
NxN matrices. We are interested in particular to the phase transitions of the theory as we change the parameters of the action. The
quantity of interest are susceptibility and specific heat, as well as other order parameters,
which we will describe below.
Is worthwhile compare the present method with the simulations of such theories on the lattice. In general the simulations of scalar theories on fuzzy spaces are slower than in their lattice counterparts since the fuzzy models due to the self-interaction term phi^4 are intrinsically non local and for higher power of the self-interacting the number of operations to calculate each Monte Carlo step deltaS grows even faster. However, we can expect some advantages with the simulations of other symmetric field theories.
The implementation of the GRID paradigm in this field of theoretical research could push the complexity of the simulations (aka the
matrix rank) in such a way to obtain a much better result of even new results in the same amount of time spent in the current local simulations.

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