



Contribution ID: 169

Type: **Poster**

## Proposal for the Quantum Simulation of the $CP(2)$ Model on Optical Lattices

*Wednesday, 15 July 2015 18:30 (2h 30m)*

The 2d  $CP(N-1)$  models share a number of features with QCD, like asymptotic freedom, a dynamically generated mass gap, and topological sectors. They have been formulated and analysed successfully in the formalism of the so-called D-theory.

In that framework, we propose an experimental set-up for the quantum simulation of the  $CP(2)$  model. It is based on ultracold alkaline-earth-atoms located on the sites of an optical lattice, where the nuclear spins represent the relevant fields. We present results for the correlation length and for tunnelling transitions, to be compared with such a future experiment. The latter would also enable the exploration of theta vacua and the phase diagram at finite chemical potential, since it does not suffer from the sign problem.

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**Session Classification:** Poster Session

**Track Classification:** Theoretical Developments