ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 29 November 2012

17:00 -18:00

3rd Floor Seminar Room

"Photonic quantum simulators: Mimicking condensed matter and high-energy physics with light"

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Abstract

I will start by reviewing the founding works in the novel field of photonic quantum simulations and present the ideas for observing photon blockade induced Mott transitions coupled cavity-QED systems [1]. After briefly touching on the idea of simulating the Fractional Hall effect [2] with photons, I will talk about the more recent developments in realizing continuous 1D models in nonlinear optical fibers. Here the "photonic Luttinger liquid" will be introduced along with a proposal to observe spin-charge separation with polarized photons in a nonlinear slow light setup [3]. I will conclude by presenting recent efforts in using electromagnetically induced transparency set ups for simulating 1D lattice models in the non-relativistic regimes, such as the sine-Gordon and Bose-Hubbard [4]. I will then conclude with ongoing work on interacting relativistic models (Thirring) using polarized photons in optical fibers interfaced with cold atoms [5]. The ongoing experimental efforts in implementating will also be briefly discussed.

1) DGA, Santos, Bose, PRA 2007; New Scientist 2007
2) Cho, DGA, Bose, PRL 2008
3) DGA, et al., PRL 2011; Physics 4, 30 (2011) ;
4) Huo, DGA, PRA 2012
5) DGA, Huo, Chang, arXiv:1207.7272