NITheP cordially invites you to a seminar by:

Dr Rytis Paškauskas  
*NITheP, Stellenbosch Node*

**Date:** Monday 22 October 2012  
*(Please note not the normal seminar slot)*

**Time:** 14:00

**Venue:** NITheP Stellenbosch Node, Seminar Room

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**TITLE:** Quantum dynamics of spin-half particles on a lattice

**ABSTRACT:** Lattice models of quantum spin-half particles are fundamental objects of condensed matter and quantum information research and since recently, are presumably simulated by cold ion, atom or molecule experiments. Novel theoretical methodology is presented for resolving the temporal evolution of a class of closed quantum lattice models. This methodology is motivated by recent experiments, where both the range of interactions can be controlled, and the nearly closed system evolution resolved. The presented theory is similar to the Bogoliubov-Born-Green-Kirkwood-Yvon (BBGKY) theory that is used in plasma physics since almost a century, but is also original in several aspects. It considers spin correlators to "all orders" and from this point of view, it differs from the so-called kinetic theories. In addition, it does not make the "product state" assumption. The methodology may be summarized as follows: Firstly, the Von Neumann equation is mapped to a dynamical system in the space of expectation values of certain operators. Secondly, expressed in terms of certain collective variables, these equations turn into recursion equations that define orthogonal polynomial sequences. Analysis of the resulting recurrence relations then allows to extract some information about the temporal evolution: Thermodynamic limit scaling and possible scenarios of equilibration and, when applies, causes of the slow-down or even absence of equilibration.

Coffee/Tea and snacks will be served after the talk.

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