

SCHOOL OF PHYSICS

UNIVERSITY OF NEW SOUTH WALES



COLLOQUIUM

4-5 p.m., Tuesday, 11 August 2009

School of Physics Common Room

Room 64, Old Main Building

Marco Drewes

Theory Group, Deutsches Elektronen Synchrotron (DESY), Hamburg

“Quantum Mechanics and the Origin of Matter”

The generation of a matter-antimatter asymmetry in the early universe, baryogenesis, happens via out-of-equilibrium processes in the primordial plasma. Those are usually studied in terms of classical or semiclassical approximations, in particular Boltzmann equations. While these are of sufficient accuracy in many cases, it has recently been pointed out that there are situations in which a fully quantum mechanical treatment is necessary. A consistent description of the nonequilibrium dynamics of quantum systems is given by means of Kadanoff-Baym (KB) equations. We use those to study the importance of quantum and non-markovian effects in the context of leptogenesis, which provides one of the most promising baryogenesis scenarios. Here the KB equations can be solved semianalytically. The formalism is also used to study other phenomena in cosmology, such as the reheating after inflation.

The audience is invited to meet the speaker beforehand at 3.45 p.m. over coffee and biscuits in the Common Room.

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