



## Applied and Computational Mathematics Seminar

**Title:** Trans-Planckian problem and Modified Dispersion Relations

**Speaker:** Dr. Massimiliano Rinaldi (Bologna)

**Date:** Thu 18th October 2007 at 2:15PM

**Location:** Mathematical Sciences Seminar Room

**Abstract:** The possibility of violations of the Lorentz invariance at high energy has attracted a flurry research activity in recent years, in the context of trans-Planckian physics. In particular, Lorentz violations can be encoded in modified dispersion relations (MDR) at high frequency. At a more fundamental level, such violations might modify dramatically the renormalization of quantities such as the energy-momentum tensor. However, very little is known about renormalization techniques in the presence of MDR, especially in the case of black hole backgrounds. An unexpected twist in the theory of Bose-Einstein condensates, also leads to analogue models of scalar fields propagating, with MDR, on curved backgrounds. In my talk, I will present the general framework of a classical theory allowing for MDR, which, in principle, can be applied also to Bose-Einstein condensates. Then, I will show how to work out the scalar Green's functions in the presence of MDR, and how these results will be useful to build renormalized expectation values.

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