



**UCD School of
Mathematics and Statistics**

University College Dublin
Belfield, Dublin 4, Ireland

Tel +353 1 716 2580
Fax +353 1 716 1196

**Scoil na
Matamaitice agus na Staitisticí UCD**

An Coláiste Ollscoile, Baile Átha Cliath
Belfield, Baile Átha Cliath 4, Éire

Email seminars@maths.ucd.ie
Web maths.ucd.ie/seminars

Applied and Computational Mathematics Seminar

Dr. Max Rinaldi (University of Bologna)

will speak on

**"The Trans-Planckian Problem in Black Hole Evaporation and
Modified Dispersion Relations"**

Thu 18th October 2007 at 2:15AM

Location: Mathematical Sciences Seminar Room

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.

This talk is part of the **Applied and Computational Mathematics** series. For more, see
<https://maths.ucd.ie/seminars>