



Centro de Ciências Exatas e da Natureza  
Departamento de Matemática  
Secretaria de Pós-Graduação

# SEMINÁRIO do DMat

## Physical ageing and its dynamic symmetries

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### Abstract:

Physical ageing is a basic feature which describes the slow evolution of the mechanical, optical, electrical...properties of many materials, even if left for themselves and not subjected to any apparent external forces. Ageing has been known and used for the systematic processing of materials since prehistoric times and has been studied especially in glassy materials (e.g. polymeric, monomeric, organic, metals, ...) but it occurs and is relevant much beyond the physics of glasses. In contrast to biological ageing, which can be conceived as a slow accumulation of defects, in physical ageing defects have the tendency to slowly disappear.

Physical ageing naturally arises in many physical systems far from thermal equilibrium.

A typical example is the evolution of the physical state of a magnet, quenched from a totally disordered initial state deeply into the two-phase regime. Such systems relax simultaneously towards several equivalent equilibrium states. The competition between these distinct ground states leads to (i) a very slow relaxation, (ii) the breaking of time-translation-invariance and (iii) dynamical scaling. These three defining properties of physical ageing are realised without having to fine-tune one or several thermodynamic parameters. Here, we shall illustrate how the naturally realised dynamical scaling property

can be generalised towards a larger dynamical symmetry group and thereby furnishes a simple example of a dynamical local scale-invariance (LSI). The kinetics of the growth of interfaces will serve as the physical scaffold to explain this new kind of extended dynamical symmetry.

We present a number of elementary and not too well-known proofs of some mathematical results (mostly in analysis) that often figure in the university programs.

**26 de fevereiro de 2019 (terça-feira) às 15:30h horas**  
**Sala 210 - Departamento de Matemática - CCEN**

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