

CONDENSED MATTER THEORY SEMINAR

Subject: **Localized vibrations in solids: domain walls, cluster compounds**
Speaker: **Dr. Sergey Artyukhin (IIT Istituto Italiano di Tecnologia, Genova, Italy)**
Date & time: **Wednesday, December 18th, 2019 at 3 p.m.**
Venue: **Seminar room 02.116 a/b**

Topological defects in ferroic materials are low-dimensional systems that may enable promising applications. We study domain wall and vortex-localized vibrations in proper and improper ferroelectrics and their role in dielectric loss, conductivity, acoustic phonon scattering and elastic anomalies. The lowest energy vibrations correspond to sliding modes of these topological defects, are polar and are found at microwave frequencies.

An opposite situation of hard localized vibrations is found in cluster compounds, where transition-metal ions form clusters. In these cases vibrations are hard. Particularly, in IrTe₂ they give rise to a complex phase diagram with a large number of phases. A simplified model is proposed, parametrized from first principles, and solved for the phase diagram. The influence of spin-orbit coupling, pressure and doping is studied.