# UNIVERSITÀ DI PARMA

## DIPARTIMENTO DI SCIENZE MATEMATICHE, FISICHE E INFORMATICHE

## SEMINARI di FISICA MATEMATICA

Data e ora : **Giovedì 2 dicembre** 2021, a partire **dalle ore 10.30**

Luogo: **Aula F,** Plesso di Matematica/Informatica

Relatori:

1. **Dott. Kevin Guillon,** University of Bordeaux, France

   ***A Fick-relaxation BGK operator for general mixtures of gases***

2. **Dott.ssa Nadia Loy,** Assegnista di Ricerca in Fisica Matematica, Università di Parma

   ***Nonlocal kinetic models for cell migration***

Organizzatrice: prof.ssa Marzia Bisi

1. ABSTRACT: *In this talk, we extend the derivation of the Fick-relaxation BGK model to a setting which includes both monoatomic and polyatomic gases. The construction of the present model is based on the introduction of relaxation coefficients and by solving an entropy minimisation problem. The distribution functions of each species are described by adding a supplementary continuous variable collecting vibrational and translational energies. Finally, by using a Chapman-Enskog equation, we recover the Fick matrix, the volume viscosity and the shear viscosity*

2. ABSTRACT: *In this talk we present nonlocal kinetic models for cell migration. We will deal with a transport equation with a nonlocal turning operator which implements a velocity-jump pro-cess, that is the typical microscopie stochastic dynamics that describes cell motion. Moreover, we have nonlocality because we suppose that cells sense the environment by extending their protrusions up to a maximum sensing radius. Furthermore, the model can be enriched with physical limits of migration, that is when cells cannot move because of overcrowding or other kinds of physical obstacles. In arder to obtain physical results, the sensing radius determining the nonlocality depends on time, position and direction of sensing. A linear stability analysis in the one dimensional case will be performed. We analyse how the actual possible sensing of the environment influences the dynamics by recovering the appropriate macroscopic limits and by integrating numerically the kinetic transport equation.*