



**TOR VERGATA**  
UNIVERSITÀ DEGLI STUDI DI ROMA

Dipartimento di Fisica



**European Research Council**  
*Established by the European Commission*

## ***Seminar***

Tuesday, 18 April 2023 - h. 15:00

*Fisica della Materia room (Department of Physics)*

**Dr. Giuseppina Nigro**

*University of Rome Tor Vergata*

# “Solving Plasma Fluid Dynamics: Tools in Solar and Stellar Astrophysics”

### *Abstract*

Studying the nonlinear dynamics of magnetized fluids proved valuable for understanding different astrophysical phenomena. For instance, numerical experiments that solve nonlinear magneto hydrodynamic equations for a solar coronal loop model revealed the fundamental mechanisms that produce impulsive energy releases in the coronal plasma, thus addressing the solar coronal heating problem. Moreover, magnetic dynamo, i.e., the mechanism of amplification and self-sustaining astrophysical magnetic fields, is usually treated by highlighting the properties of non-locality and non-linearity of the energy transport. Direct numerical simulations and low-dimensional models will be discussed to describe the nonlinear dynamics of astrophysical plasma fluids, such as the solar atmosphere and solar and stellar convection one. We will show how different approaches can result helpful in capturing various aspects of phenomena such as solar flares, dynamo waves, and magnetic polarity reversals.

**ERC-2019-ADG Grant N. 882340 “Smart-TURB”**

**(P.I. Prof. Luca Biferale)**

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