Structure and Dynamics of Complex Fluids and their Interfaces

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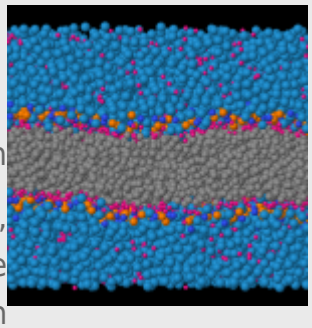
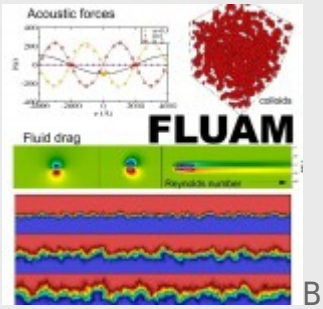
Principal Investigator: Enrique Velasco
Description:



The project focuses on a variety of fundamental problems in the structure and dynamics of complex fluids and their interfaces, problems that are central to the field of Soft Matter. We use theoretical tools based on statistical mechanics, together with numerical simulations. It is a coordinated project that includes various research groups that share common interests. One of the main objectives of the project is the formulation of connections between mesoscopic physics (hydrodynamics, effective models, etc) and the underlying (molecular) microscopic physics in a soft-matter context. The aims are within the boundaries of statistical physics and some of its interdisciplinary applications:



Biophysically inspired problems, such as formation of protein filaments or description and dynamics of membranes and vesicles.
Molecular scale dynamics of capillary waves in complex fluid surfaces and their hydrodynamics at the mesoscopic scale.
The connection between molecular hydrodynamics and dynamic density functionals.
Formulation of consistent coarse-graining theories for complex fluids.
The structure and dynamics of polymers and colloids in a solvent and at interfaces.
The formulation of models that bridge the gap between the microscopic and the mesoscopic description of liquid crystals containing topological defects.