Physics of Liquids and Complex Matter (PLMC)

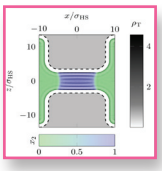
Research unit

Key words
Physics of complex condensed matter • Colloidal systems • Metallic alloys • Macroscopic properties and microscopic models

Objectives and research topics

PLMC research group mainly performs theoretical studies on the physics of complex condensed matter systems and particularly on colloidal ones. They are usually studied when at least one dense fluid phase is present, but this may also involve solid or glassy states.

These studies can be divided into three interdependent sub-themes:

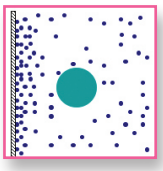


Statistical physics of condensed matter

- Liquid state physics, integral equations, density functional theory, Monte simulation and molecular dynamics (classical and ab-initio)
- From the structure to the phase diagram, glassy states, gels

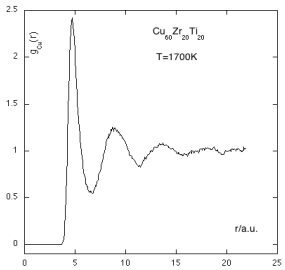
Application to real systems

- Colloidal dispersions in bulk phase and in confinement
- Metal alloys (e.g.: electro-rheology, magnetic colloids, transition metal glasses)



Modelling complex system

- Microscopic models, relevant parameters, generic and specific behaviour
- Effective-interaction approach (colloids), first principles approach (metallic alloys)



Ab-initio simulation of the radial distribution function of copper in the CuTiZr alloy

Methods and means

- Structural calculation software, phase diagram, dynamic properties, Monte Carlo simulation, classical and molecular ab-initio dynamics
- Multicore (2 to 8) workstations

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