INTERNSHIP PROPOSAL

(One page maximum)

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CNRS identification code: UMR 783
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Internship location: Gulliver ESPCI

Thesis possibility after internship: YES
Funding: NO If YES, which type of funding:

Title: Continuous Field Theory for Microscopic Properties in Polar Fluid.

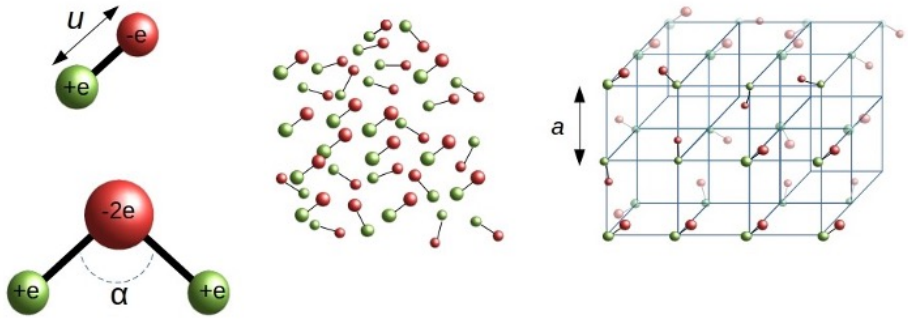


Figure. a) Sketch of basic units constituing the fluid. b) Gaz model. c) Latice model.

Summary :
The project aims in developing **continuous field-theoretic models** that incorporate microscopic molecular details to predict the **dielectric response** of polar liquids. We focus on deriving **q-dependent permittivity functions** for systems ranging from simple dipolar fluids to explicit water models (e.g., SPC/E or TIP3P). The intern will explore how **structural constraints** (e.g., lattice incompressibility vs. gas-like density fluctuations) and **molecular architecture** (charge distributions, bond angles) influence dielectric screening at nanoscales. The work will bridge analytical theory with molecular dynamics observations. Strong Backgrounds statistical mechanics, electrodynamics, or mathematical modeling is a plus. The internship provides an opportunity to engage in research at the intersection of theory, simulation, and nanoscale physics.

References
[1] A. Levy, et al. Phys. Rev. Lett. 108:227801, (2012).
[2] G. Monet, et al. Phys. Rev. Lett., 126 (2021)

Condensed Matter Physics: NO Soft Matter and Biological Physics: YES
Quantum Physics: NO Theoretical Physics: YES