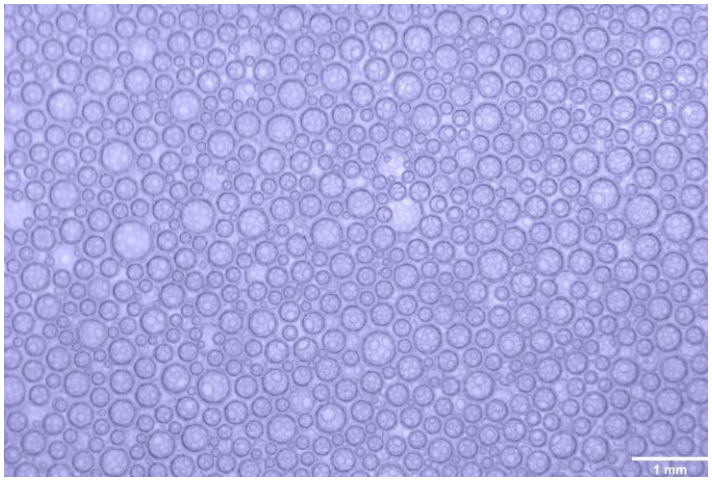
A postdoc position is open at the Institut des Nanosciences de Paris, Sorbonne Universités, in Paris, in the framework of a project of the European Space Agency. The aim of the research is to model and to analyze the structure, dynamics and aging of liquid foams near the jamming transition observed in recent experiments on the International Space Station.



Under microgravity the liquid in a wet foam is not drained and, at liquid fractions near the jamming transition, bubbles behave as close packed nearly perfect spheres, without static friction, as illustrated above. These samples are similar to frictionless solid sphere packings studied in many simulations of jamming in granular materials, but there are important differences: Diffusive gas exchange between the bubbles induces a slow collective aging process where the average bubble size grows following a scaling law, and which is accompanied by intermittent rearrangements in the packing. These aging dynamics are governed by scaling laws that are not well understood. Furthermore, ab initio analytical studies and experiments have revealed significant differences between the interactions of bubbles and the hertzian or harmonic ones used in previous simulation studies. The impact of this on the jamming and aging behavior is to be investigated.

The work of the postdoc will consist in setting up and running molecular dynamics simulations using the code LAMMPS, where bubbles are modelled as interacting particles, and where the evolution of the size distribution and packing structure upon aging are predicted. He or she will also simulate light propagation in foams simulated by LAMMPS using an existing optical ray tracing software. The results will be compared to a large set of experimental data (surface observations and multiple light scattering) that have been obtained in 2020 on the International Space Station.

Previous experience with molecular dynamics simulations would be highly appreciated. The duration of the postdoc is 1 year, with a possible prolongation.

Candidates should address a CV and a one page summary of his or her previous research experience to Reinhard Höhler, email: hohler@insp.upmc.fr