



Contribution ID: 518

Type: **Plenary** (only invited by ECNS team!)

Harnessing the power of neutron to quantify softness

Tuesday, 21 March 2023 09:00 (45 minutes)

Although softness is a concept used in everyday life, its precise quantification is still far to be achieved. This is a fundamental step to build bridges between model systems which are largely studied and bio-relevant materials. The softness of a building block in solution plays a key role in determining the macroscopic properties of the material, such as viscosity or apparent yield stress. Controlling these properties is fundamental for application in the pharmaceutical field, for paint and health-care product, and for the stabilization of Pickering emulsions or foams. All these properties depend on the nature, interaction, and microstructures formed by the nanoparticle suspended in the material under flow. Small-angle neutron scattering, and neutron reflectivity are fundamental tools to probe softness for soft compressible colloids. In this talk, I will show examples of the use of these techniques to quantify and investigate the softness of micro- and nanogels, compressible crosslinked polymeric network swollen in a good solvent that are widely used as model system for soft spheres but also useful in application as emulsion stabilizer, nano-reactors, nanocarrier for targeted drug delivery, and disposable scaffold for 3D printing.

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Session Classification: Plenary

Track Classification: Soft Condensed Matter