European XFEL Science Seminar

Wednesday, 26th June 2019, 11:00
Campus Schenefeld, XHQ, room E1.173 (coffee & biscuits will be served at 10:30)

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X-ray views of disordered matter

Disordered materials lack, by definition, translational order but yet display universal properties that, to be characterized and understood, require investigations spanning many orders of magnitude in space and time. X-ray-based studies play already an important role in this programme and, with the continuous development of sources, optics and techniques, can contribute even more to that in the coming up years. Some potentialities of these studies will be here highlighted using selected examples in liquids, glasses and soft matter. In particular, time-domain interferometry studies will be presented which provide a microscopic picture of the so called Johari-Goldstein secondary relaxation in undercooled liquids, a class of universal processes that control the dynamics on a timescale faster than the diffusion related one. X-ray photon correlation studies on both soft matter and metallic glasses will then be presented which shed light on the microscopic mechanisms of slow rearrangement processes taking place beyond the structural arrest, and point out to the role of stress relaxation in disordered materials. Stress fluctuations in glasses also leave distinct signatures in their high-frequency dynamics probed in inelastic X-ray scattering experiments, and appear to be at the origin of the low-temperature universal thermal anomalies of glasses. Finally, stress-relaxation processes induced in oxide glasses by X-ray irradiation will be discussed, and their information content to probe local stress in materials will be highlighted.

Host: Karen Appel