

## Complex Systems and Coherent X-rays: A perfect match

Beatrice Ruta

Univ Lyon 1 and CNRS, Institut Lumière Matière, Villeurbanne, France

beatrice.ruta@univ-lyon1.fr

X-ray Photon Correlation Spectroscopy (XPCS) is a spatio-temporal coherent X-ray scattering technique that probes slow collective dynamics at the nanometric and atomic scale based on the observation of fluctuating far-field speckle patterns [1].

This technique has been successfully applied to the investigation of the slow relaxation processes occurring in disordered materials undergoing dynamical arrest, aging and poliamorphic transitions such as glasses, concentrated colloidal suspensions and viscous liquids [2,3].

The advent of 4th generation synchrotrons will allow to extend dramatically the dynamical range of XPCS, opening the field to new ground breaking experiments. For the first time, it will be possible to explore microsecond fluctuations in hard materials undergoing heterogeneous dynamics, and to unveil the particle motion of complex materials under extreme conditions.

In this talk, I will present some examples on the relaxation dynamics in metastable complex systems and I will also illustrate some of the future scientific possibilities offered by 4th generation synchrotrons as ESRF-EBS and the future APS-U.

### References:

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- [2] B. Ruta *et al.* Topical Review, *J. Phys.: Cond. Matter* **29**, 503002, 2017
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