Title

XPCS: X-ray Photon Correlation Spectroscopy

Short title

XPCS

Scope

Coherent X-rays are a unique tool to explore dynamics in condensed matter, providing a microscopic description over a wide range of length scales according to the scattering vector Q, from the meso-scale at small angles to the atomic scale at wide angles. X-ray Photon Correlation Spectroscopy (XPCS) is an experimental technique to measure the intermediate scattering function f(Q,t) characterizing the dynamics of the sample. XPCS retrieves the f(Q,t) by quantifying the temporal correlation of the intensity fluctuations in coherent scattering patterns (speckles) that encode the electronic density fluctuations. Spontaneous and driven dynamics can be retrieved in the temporal domain down to 10^{-6} s in a large variety of soft and hard condensed matter systems, e.g. colloids, gels and phase-ordering alloys at the meso-scale, deeply super-cooled melts and structural glasses at the atomic scale.

The tutorial covers the fundamental principles of XPCS based on coherent X-ray scattering and details of the data collection. Special emphasis is put on the data analysis practice and interpretation of the results. Finally, we show the large impact for XPCS of 4th generation synchrotron radiation sources like the recent Extremely Brilliant Source at the ESRF, with the greatly increased brilliance and coherence enabling new exciting scientific opportunities in the field.

Maximum participants

25

Program

Three lectures: 50 min (FZ) + 50 min (YC) + 30 min (MC)

- "Correlating temporal intensity fluctuations in speckle patterns to probe dynamics in condensed matter", Federico Zontone
- "How dynamics is retrieved in practice", Yuriy Chushkin
- "Unique opportunities offered by EBS", Marco Cammarata

Start/finish

Spanned time: 14h00 – 16h30

14h00 - 14h50 – Tutorial intro and 1st lecture (FZ)

14h50 - 15h00 - Break

15h00 - 15h50 - 2nd lecture (YC)

15h50 - 16h00 - Break

16h00 - 16h30 - Outlook lecture (MC)

Meeting room/equipment

Yes/Video projector

Organisation

On site