

Inelastic UV Scattering: a new Tool to Investigate Collective Excitations in Condensed Matter Physics

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The recent construction of an Inelastic UltraViolet Scattering (IUVS) beamline [1] at the ELETTRA Synchrotron Light Laboratory opens new possibilities for studying the density fluctuation spectrum, $S(Q,E)$, in the mesoscopic momentum (Q) and energy (E) transfer region not accessible by other spectroscopic techniques (namely Q from 0.07 to 0.3 nm^{-1} and E from 10 to $10^3 \text{ } \mu\text{eV}$). This region is of great interest for the study of the properties of collective excitations in many research fields at the frontier of condensed matter physics and chemistry [2].

In the direction of characterizing the possibilities of the IUVS beamline we have been running a series of test experiments on prototype samples such as liquid water and fused silica. The measured $S(Q,E)$ allowed the determination of the structural relaxation parameters in the kinematic region where the probe frequency becomes comparable to the inverse of the relaxation time [2].

We will also discuss how the tunability of the source may be exploited to perform resonant experiments and, therefore, studying specific phenomena where the scattering signal is usually very low.

References

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- [2] F. Sette, G. Ruocco, M. Krisch, C. Masciovecchio, G. Monaco, Science **280**, 1550 (1998).
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