Ultraviolet Brillouin Spectroscopy: a new opportunity

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In the past few years the INFM research unit of L'Aquila (Italy) has been involved in the construction of a high resolution high contrast monochromator (HIRESUV) suitable for Brillouin spectroscopy with ultraviolet excitation. The main motivation for building such an instrument was to make narrower the gap existing in exchanged wavevector space between conventional Brillouin spectroscopy, performed with visible light, on one hand and the newborn inelastic X-ray scattering technique as well as neutron Brillouin spectroscopy on the other.

The instrument, which is now fully operative, will be briefly described and its performances will be presented with particular attention to the resolution and contrast properties which have both met the theoretical expectations both in the visible (532 nm) and in the near ultraviolet (266 nm).

The first spectra collected and their preliminary analysis will be presented. In particular the spectra of undercooled water which show, even at a moderate undercooling regimes (-8°C), the clear presence of positive sound dispersion thanks to the larger wavevector range explored. Similarly the dispersion of the hypersonic parameters in glycerol have been followed in a large temperature range where a clear high frequency saturation plateau is observed.

Comments will be also made on the possibility of using UV radiation to study collective excitations in fluid metals where, until now, the reduced penetration depth of visible light has prevented any clear observation of the low wavevector density fluctuation spectra. In connection with inelastic X-Ray experiments recently performed on several liquid alkali metals this will help in clarifying several aspects connected with isothermal propagation of the density fluctuations as well as the nature of the observed relaxation phenomena.