ESRF	**Experiment title:** Collective dynamics in a prototype binary liquid mixture	**Experiment number**: HD 243
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Shifts:	**Local contact(s)**: Roberto Verbeni	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Maria Grazia Izzo [1,2]

Filippo Bencivenga [2]

Francesco D'Amico [2]

Alessandro Cunsolo [3]

(1) Università degli Studi di Trieste

(2) Elettra Sincrtotrone Trieste

(3) Advanced Photon Source (APS) Chicago

Report:

Inelastic X-ray Scattering (IXS) data from H_2(80%)/Ne(20%) and He(80%)/Ne(20%) mixtures were collected in the momentum transfer (Q) range [1-35] nm^{-1}, with 1.5 nm^{-1} Q-steps. The experiment was performed at an incident photon energy of 21.747 KeV, using the silicon (11,11,11) set-up, providing an overall energy resolution of 1.5 meV (FWHM). We used the standard large volume (~0.7 cm^3) high-pressure hydrostatic cell available at ID16/ID28 beamlines. Data were collected at T = 40 K, P = 700 bar for the H_2/Ne mixture and T = 33 K, P = 540 bar for the He/Ne mixture. Moreover IXS data from pure He at T = 33 K and P = 280 bar (i.e. at the same T and the same density of the He into the He/Ne mixture) were collected as well. In order to have sufficient statistics we accumulated 2 or 3 spectra with an integration time of 3h each. The contribution of the empty cell was measured and yielded a negligible contribution to the signal.

Fig. 1 shows a selection of IXS spectra from He/Ne mixture at different Q togheter with the cooresponding pure He spectra. For these latter a preliminary analysis was accomplished using a fitting model based both on a Damped Harmonic Oscillator (DHO) function and, additionally, also using a viscoelastic model [2] for determining the values of the adiabatic and infinite frequency sound dispersion, as well as the one of the structural relaxation time. Good agreement with available results [2] was obtained. In the case of the mixtures inelastic features are not clearly observable. This probably invalidates the DHO analysis, whereas a generalization of the viscolasic model to mixtures require less standard procedures. We are spending efforts in this direction. The difficulty in observing inelastic features could also be related to the insurgence of critical fluctuacions. In the investigated thermodinamic conditions, in fact, the mixture shows a tendency to demixing as emphasized to the low-Q incresing of the scattering in the diffraction pattern, S(Q). A set of IXS spectra from the He(80%)/Ne(20%) mixture in the Q range [2-24] nm-1 at a termodinamic point far from the demixing transition (T=87 K; P=320 bar) were collected during the expriment HD 306 with the task to completely characterize the collective dynamics in such a mixture.

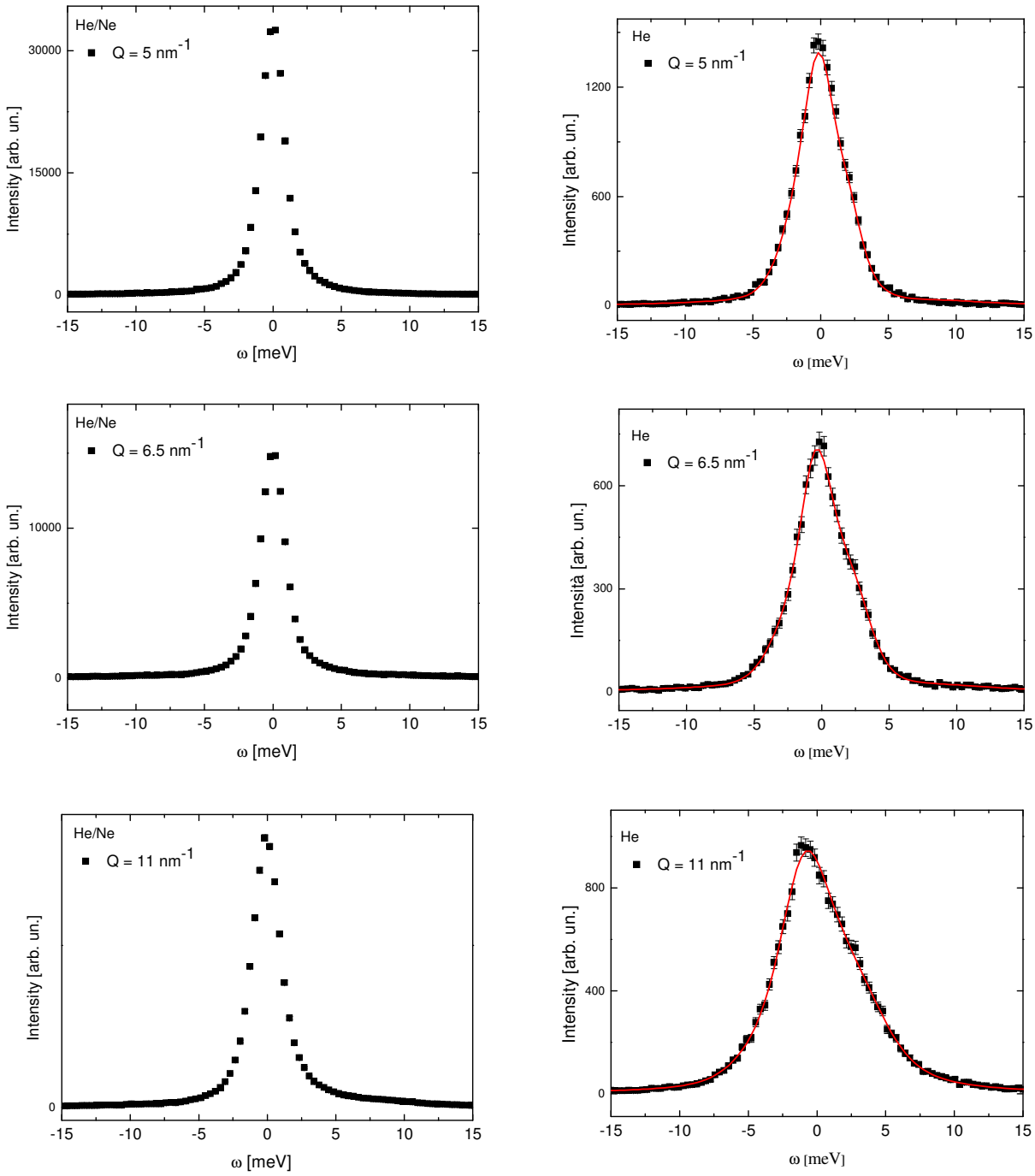

Fig. 1

Left panel. IXS spectra of He(80%)/Ne(20%) mixture at T= 33 K and P=540 bar for the reported Q values.

Rigth panel. IXS spectra of He at T=33 K and P=280 bar (i.e. at the same T and the same density of the He into the He/Ne mixture) for the reported Q values. Best fit curves (full red lines) obtained from the viscoelastic analysis are shown as well.

[1] J. P. Boon, S. Yip, Molecular Hydrodynamics, McGraw-Hill, New York, 1980

[2] A. Cunsolo et al., Journal of Physics ans Chemistry of Solids **61**, 477 (2000)