



	<b>Experiment title:</b> High frequency dynamics in vitreous silica	<b>Experiment number:</b> HD-300
<b>Beamline:</b>	<b>Date of experiment:</b> from: 3/9/2008 to: 9/9/2008	<b>Date of report:</b> 2/9/2010
<b>Shifts:</b> 18	<b>Local contact(s):</b> R. Verbeni	<i>Received at ESRF:</i>
<b>Names and affiliations of applicants</b> (* indicates experimentalists): Mle RUTA Beatrice Address: E.S.R.F., 6 rue Jules Horowitz, B.P 220, F-38043  Dr Giacomo Baldi INFN-CNR OGG c/o E.S.R.F., 6 rue Jules Horowitz, B.P 220, F-38043		

## Report:

The experiment results have been published in:

G. Baldi, V. M. Giordano, G. Monaco, and B. Ruta, “**Sound Attenuation at Terahertz Frequencies and the Boson Peak of Vitreous Silica**”, Phys. Rev. Lett. **104**, 195501 (2010).

and

G. Baldi, V. M. Giordano, G. Monaco, and B. Ruta, “**High frequency acoustic attenuation of vitreous silica: new insight from inelastic x-ray scattering.**”, in publication in the Journal of Non-Cryst. Solids.

## Abstract:

The propagation and damping of the acoustic excitations in vitreous silica is measured at terahertz frequencies using inelastic x-ray scattering. The apparent sound velocity shows a marked dispersion with frequency while the sound attenuation undergoes a crossover from a fourth to a second power law frequency dependence. This finding solves a recent controversy concerning the location of this crossover in vitreous silica, clarifying that it occurs at the position of the glass-characteristic excess of vibrational modes known as boson peak, and thus establishing a direct connection between boson peak and acoustic dispersion curves.