



High-Resolution Inelastic X-Ray Scattering at SPring-8

SPring-8 has two powerful beamlines optimized for \sim meV resolution measurement of atomic dynamics: JASRI public beamline BL35XU [1] and RIKEN BL43LXU [2] (now commissioning). These are excellent facilities for investigating excitations in disordered materials and phonons in crystals.

The beamlines operate with resolution as good as 0.75 meV [3] and have two-dimensional arrays of analyzers (12 analyzers at BL35, 24 analyzers at BL43) allowing highly parallel data collection. They have been optimized for world-leading high-flux operation at 1.3~1.5 meV resolution at 21.7 keV, with >10 GHz onto the sample at BL35 and >15 GHz at BL43 (>40 GHz is expected after the upgrade to the full 15m ID is completed at BL43). The beam size in most operating configurations is <80 microns in diameter and can be reduced to <20 microns if required.

Scientific programs include geologically relevant materials in extreme conditions (pressures > 150 GPa and temperatures ~ 3000 K), ferroelectric / multiferroic materials, superconductors, cage compounds, as well as disordered materials (liquids and glasses)

[1] A.Q.R. Baron, *et al.*, J. Phys. Chem. Sol. **61** (2000) 461.

[2] A.Q.R. Baron, SPring-8 Information Newsletter, **15**, (2010) 14.

[3] D. Ishikawa, *et al.*, J. Synch. Rad., **22** (2015) 3.

Some recent topics/publications include

"Elastic anisotropy of experimental analogues of perovskite and post-perovskite help to interpret D" diversity" A. Yoneda, *et al.* in Nat. Comm. **5** (2014)

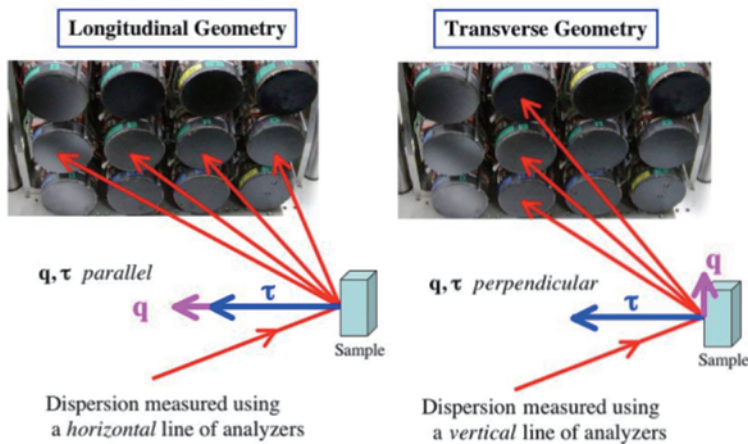
"Sound velocity of hexagonal close-packed iron up to core pressures" E.Ohtani, *et al.*, Geophys. Res. Lett., **40** (2013)

"The origin of antiferroelectricity in PbZrO_3 " A.K. Tagantsev, *et al.* in Nat. Comm. **4** (2013)

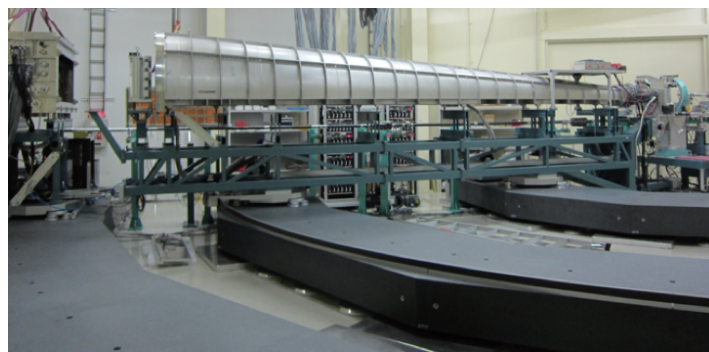
"Soft phonon mode coupled with antiferromagnetic order in incipient ferroelectric Mott insulators $\text{Sr}_{1-x}\text{Ba}_x\text{MnO}_3$ " Sakai, *et al.*, Phys. Rev. B (2012)

"Universality of Anharmonic Motion of Heavy Rare-Earth Atoms in Hexaborides," K. Iwasa, *et al.* in The J. Phys. Soc. Japan **83** (2104)

"Collective dynamics of room-temperature ionic liquids and their Li ion solutions studied by high-resolution inelastic X-ray scattering" K. Fujii *et al.*, J. Chem. Phys. **138** (2013)



Using the analyzer arrays for efficient phonon measurements



View of the new 10m (42 analyzer) arm at RIKEN BL43LXU