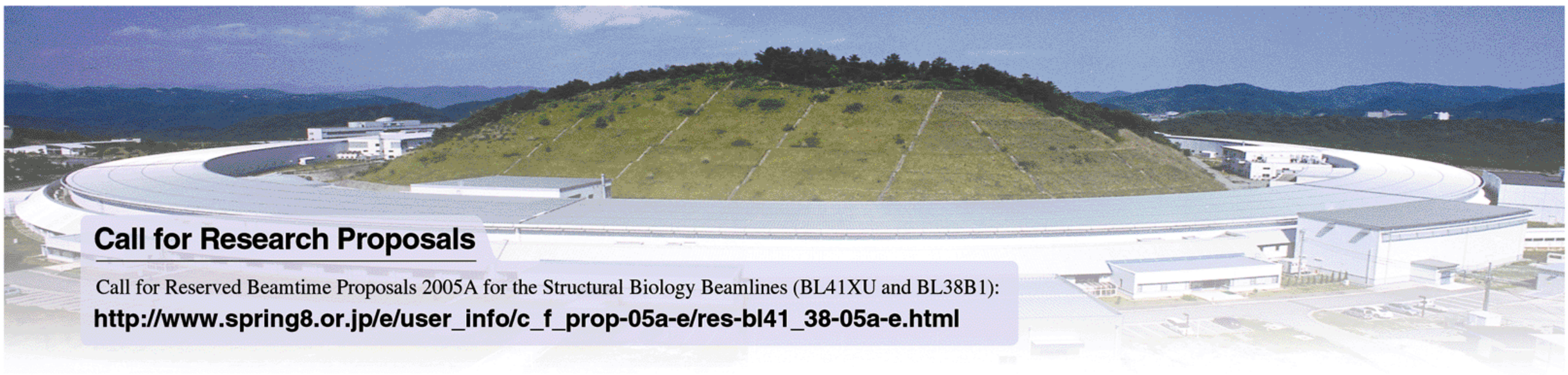


Call for Research Proposals

Call for Reserved Beamtime Proposals 2005A for the Structural Biology Beamlines (BL41XU and BL38B1):
http://www.spring8.or.jp/e/user_info/c_f_prop-05a-e/res-bl41_38-05a-e.html

Phonon behavior in high T_c's correlates with superconductivity

The role of phonons in high temperature superconductivity remains a subject of great importance and debate. Recently, research carried out at SPring-8 has provided two important results. Work by Drs. H. Uchiyama (ISTEC/SRL), A.Q.R. Baron (SPring-8/JASRI), and co-workers [PRL **92**, 197005], showed that anomalous softening of the high energy bond stretching mode, known from neutron scattering measurements in LSCO and YBCO, is also present in the high T_c material Hg1201, and has a very similar behavior to that appearing in YBCO, as seen in Figure 1. This seems to support the universality of this softening in the hole-doped high T_c materials.Then, systematic investigation of the doping dependence of this softening in LSCO by Drs. T. Fukuda and J. Mizuki (SPring-8/JAERI), Prof. K. Yamada (Tohoku Univ.), Dr. A.Q.R. Baron (SPring-8/JASRI) and co-workers [PRB **71**, 060501(R)], showed the softening correlates with T_c, as evident in Figure 2, providing strong evidence it is linked to changes in the electronic system related to superconductivity.

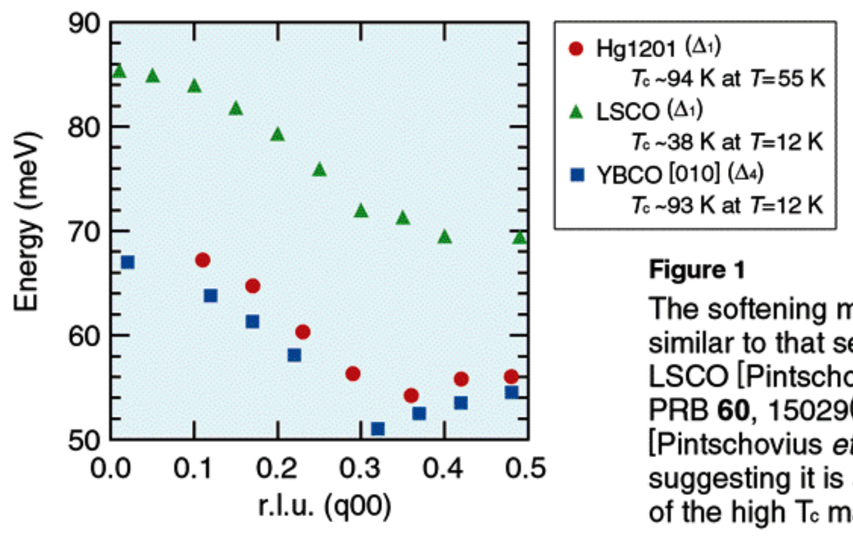


Figure 1
The softening measured in Hg1201 is similar to that seen in optimally doped LSCO [Pintschovius and Braden, PRB **60**, 15029(R)] and YBCO [Pintschovius *et al.*, PRB **69**, 214506] suggesting it is a universal property of the high T_c materials.

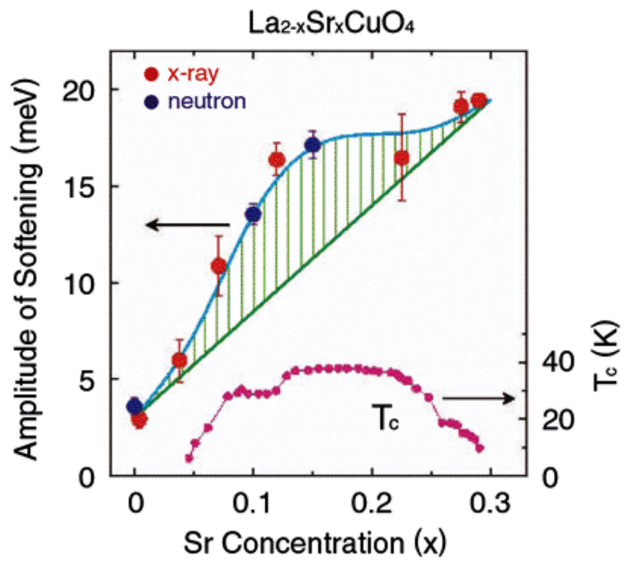
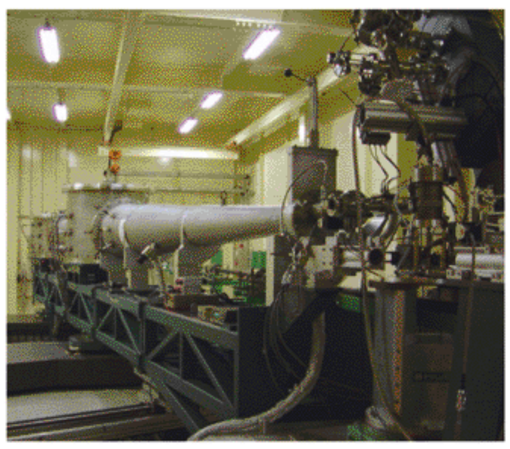


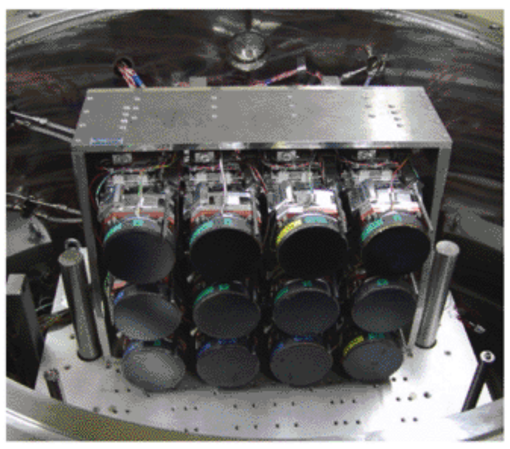
Figure 2
Doping dependence of the amplitude of softening in the bond stretching phonon mode and T_c in LSCO. The neutron data reported by Pintschovius *et al.* are also shown.

High Resolution Inelastic Scattering Beamline, BL35XU

BL35XU is dedicated to the study of the dynamics of materials using inelastic X-ray scattering (IXS) and nuclear resonant scattering (NRS) [Baron, *et al*, J. of Phys. Chem. Solids 61, (2000) 461]. IXS measures the dynamic structure factor, S (**Q**,ω), with ~ meV energy resolution and > 1 nm^{-1} momentum transfers. This is particularly interesting for disordered materials and small samples, where neutron scattering has severe limitations. In particular, IXS allows access to large (1-100 meV) energy transfers at small, ~nm^{-1}, momentum transfers, a region inaccessible for most neutron spectrometers and of great interest for liquids and glasses (disordered materials). Meanwhile the x-ray beam size, ~100 μm diameter, makes small samples (<0.01 mm^3) readily accessible, a vast improvement over the >100 mm^3 typically needed for neutron scattering. NRS allows access to element specific densities phonon of states on the meV level, and several other techniques for probing dynamics (NFS, NBS, TDI) at the neV level.



View of the 10 m spectrometer arm from just upstream of the sample.



The array of 12 analyzers at the end of the 10 m arm greatly facilitates data collection in these count-rate limited experiments. Each analyzer crystal is 10 cm diameter.

XRM 2005

The 8th International Conference on X-ray Microscopy, XRM2005, will be held at the Egret Himeji, Hyogo, Japan, from July 26 to 30, 2005.

http://xrm2005.spring8.or.jp/

SRI 2006

The 9th International Conference on Synchrotron Radiation Instrumentation, SRI 2006, will be held at the EXCO Center, Daegu, Korea, from May 28 to June 3, 2006.

http://sri2006.postech.ac.kr/

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