ESRF	**Experiment title: Connection between the nematic fluctuations and local structure in iron pnictide superconductors**	**Experiment number:** HC-1021
Beamline: BM-26A	**Date of experiment:** from: 29-01-2014 to: 04-02-2014	**Date of report:**
Shifts: 18	Local contact(s): Dipanjan Banerjee (email: banerjee@esrf.fr)	*Received at ESRF:*

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Report:

During this beamtime, we have studied the local structure of a $Ba(Fe_{1-x}Co_x)_2As_2$ superconductor using temperature dependent extended x-ray absorption fine structure (EXAFS) measurements. Polarized EXAFS at the Fe K-edge on an optimally doped (x = 0.06) single crystal has permitted us to determine atomic displacements across the superconducting transition temperature (T_c). The Fe–As bondlength is found to have hardly any change with temperature; however, the Fe–Fe bonds revealed a significant drop in mean square relative displacements across T_c. We have also found a large atomic disorder around the substituted Co, revealed by polarized Co K-edge EXAFS measurements. The Co–Fe/Co bonds are more flexible than the Fe–Fe bonds with the As-height in Co-containing tetrahedra being larger than the one in $FeAs_4$. The results suggest that the local Fe–Fe bondlength fluctuations and the atomic disorder in this sub-lattice should have some important role in the superconductivity of $Ba(Fe_{1-x}Co_x)_2As_2$ pnictides.

Publication: A Study of temperature dependent local atomic displacements in a $Ba(Fe_{1-x}Co_x)_2As_2$ superconductor: M. Y. Hacisalihoglu, E. Paris, B. Joseph, L. Simonelli, T. J. Sato, T. Mizokawa, N. L. Saini, in *Phys. Chem. Chem. Phys.* 18 (2016) 9029 doi: 10.1039/C5CP07985C

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