ESRF	**Experiment title:** Coupled structural distortions in kagome francisites $Cu_3Bi(SeO_3)_2O_2X$ (X = Cl, Br, I)	**Experiment number**: HC-2332
Beamline: ID22	**Date of experiment**: from: 30.09.2016 to: 3.10.2016	**Date of report**:
Shifts: 9	**Local contact(s)**: Andy Fitch	*Received at ESRF:*

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Report:

We performed powder XRD measurements for two kagome francisites, $Cu_3Bi(SeO_3)_2O_2Cl$ and $Cu_3Bi(SeO_3)_2O_2Br$. The iodine compound was excluded, because we got indications that it does not show any signatures of structural distortions. For the Cl compound, we determined a non-polar two-fold superstructure below 110 K. In the Br compound, similar atomic displacements are observed, but no long-range antiferroelectric order occurs.

The synchrotron patterns of the Cl and Br compounds and thermal expansion for both compounds are shown below. Further information can be found in the published article, **[Phys. Rev. B 95, 064102 (2017)]**.

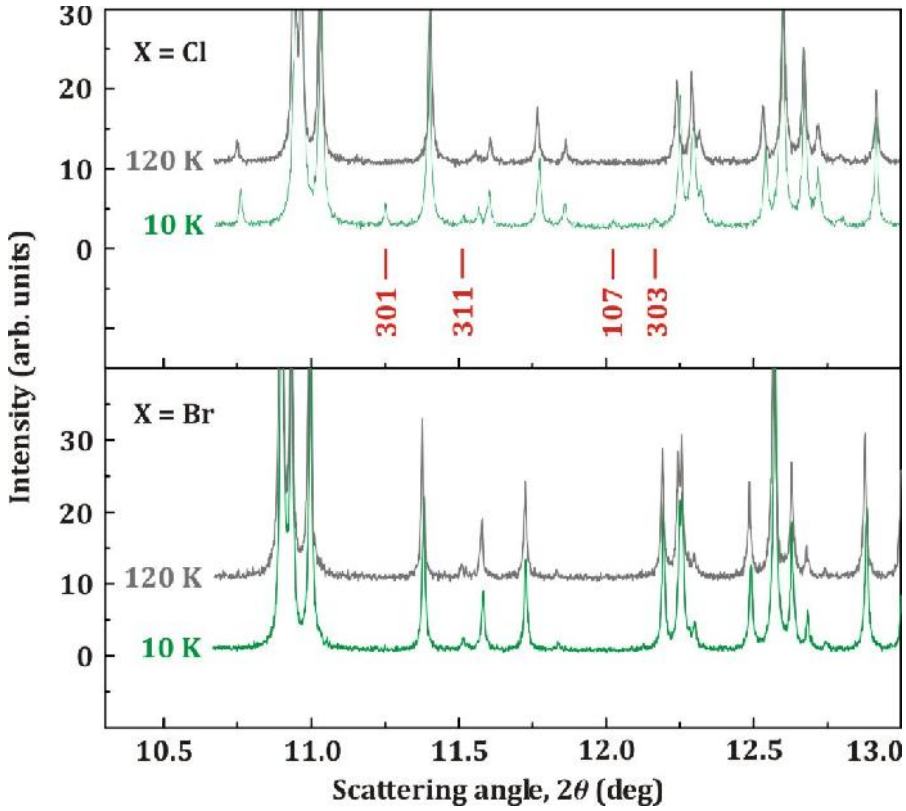

Figure 1. Synchrotron patterns of $Cu_3Bi(SeO_3)_2O_2X$ (X = Cl, Br) measured at 10 K and 120 K. The X=Cl compound shows superstructure reflections, which are indexed with the doubled *c* lattice parameter.

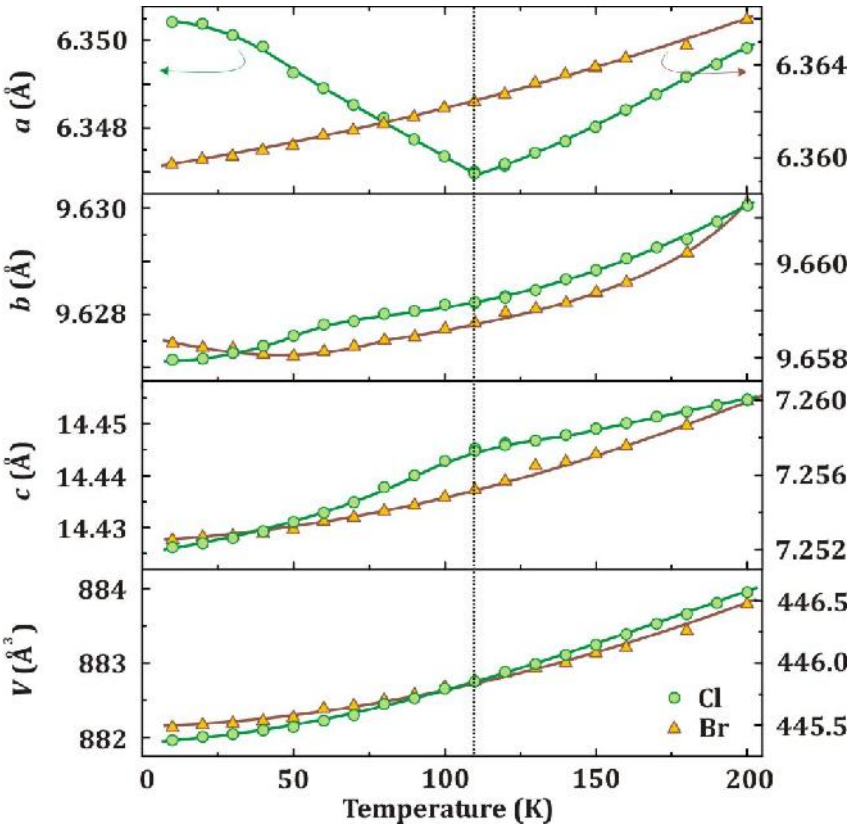

Figure 2. Thermal expansion for $Cu_3Bi(SeO_3)_2O_2X$ (X = Cl, Br). The antiferroelectric transition at 110 K in the Cl compound is seen clearly.