Experimental report

25/04/2024

Proposal: **EASY-1086** **Council:** 10/2022

Title: Cs2CoBr4 sample alignment

Research area: Physics

This proposal is a new proposal

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Experimental team: Leonardo FACHERIS

Local contacts: Andrew WILDES

Samples: Cs2CoBr4

Instrument	Requested days	Allocated days	From	To
ORIENTEXPRESS	48	48	05/06/2023	07/06/2023

Abstract:

We aim at checking the orientation of 2 single-crystal samples of Cs2CoBr4 in preparation for an approved experiment on D23 (CRG-2941, from 22nd to 27th of March 2023) using the OrientExpress Laue diffractometer. The sample is mounted on a Copper sample holder in a presumed geometry which we would like to double-check before the actual D23 experiment. To this end, we apply for two days of beamtime (20th and 21st of March 2023) on the OrienTExpress instrument. The experiment plan is the following: a series of Laue patterns will be collected (around 20 mins each, total time expected 2 hrs), stacked, and indexed through software to obtain the direction of the main crystallographic axes. The instrument scientist Dr. Andrew Wildes has already been informed. No special sample environment is required. Sample orientation and quality check with OrientExpress is absolutely crucial for the positive outcome of the D23 experiment.

Experimental report EASY-1086

The goal of the submitted proposal EASY-1086 is to check the quality and orientation of two single crystals of Cs_2CoBr_4 in preparation for a subsequent 6-day-long diffraction experiment on D23. To this end, 2 days of beamtime were allocated on the Laue reflectometer OrientExpress. No specific sample environment was requested.

The samples (m = 45 mg and m = 60) belong to the Pnma 62 space group with orthorhombic unit cell and room-temperature lattice parameters $|\boldsymbol{a}| = 10.18$, $|\boldsymbol{b}| = 7.72$, $|\boldsymbol{c}| = 13.49$ Å. They are mounted onto copper holders with flat surfaces lying on a vertical blade. The holders were sequentially screwed on the sample table of OrientExpress and adjusted vertically to match the beam's height.

Two 20-minute-long Laue pattern was collected to determine the quality and the initial orientation of the sample. Due to the relatively low flux and the absorption from the sample, a satisfactory pattern required 2 hours per sample. The samples were confirmed to be single crystals with good mosaicity $\sim 0.5°$. In addition, the samples were found only a few degrees off from their desired orientation. Threfore, an iterative adjustment of the azimuthal and polar blade angle allowed to align the sample within $\sim 1°$ from the desired scattering geometry.

We would like to acknowledge ILL for the allocation of the beamtime. We sincerely thank Dr. Eric Ressouche and Dr. Andrew Wildes for their help and support.