



## Study of the crystal quality in detwinned BaFe<sub>2</sub>As<sub>2</sub> by X-ray diffraction.

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### Abstract

In the present work we measured the crystal quality of BaFe<sub>2</sub>As<sub>2</sub> samples in room and low temperatures using single crystal X-ray diffraction. We then proceeded to try and detwine [1] them as a way of correcting the distortions in the crystalline structure caused by the phase transition that happens in low temperatures.

### Key words:

X-ray, Superconductors, BaFe<sub>2</sub>As

### Introduction

In this work we studied BaFe<sub>2</sub>As<sub>2</sub> single crystal samples that were grown at the GPOMS laboratory. First we characterized the sample at room temperature, measuring its Bragg peaks, then we brought the samples to very low temperature and again characterized it. In doing so, we can see that below the phase transition temperature some of the peaks split near its regular angular position. We tried to find a way to remove the twinned domains that causes the splitting and loss of crystal quality.

### Results and Discussion

We have measured the samples in a range of temperatures and have assured that the splitting occurred. After long alignments and measurements of the orientation matrix we tried heating the sample with a laser to see if the transferred energy was enough to cause the phase transition to the tetragonal phase, in which we hadn't got much success. We then proceeded to try to obtain diffractograms for the samples where the twinned peaks would not appear in the low temperature range. For this we had some special sample holders designed for this purpose.

### Conclusions

The data gathered were hard to analyze due to various factors that impaired our work this year, but despite that fact we were able to see evidences of some phenomena that happens in the crystalline structure of the compound that seems really promising for studies yet to come.

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1. M. A. Tanatar, E. C. Blomberg, A. Kreyssig, M. G. Kim, N. Ni, A. Thaler, S. L. Bud'ko, P. C. Canfield, A. I. Goldman, I. I. Mazin, and R. Prozorov, Uniaxial strain mechanical detwinning of CaFe<sub>2</sub>As<sub>2</sub> and BaFe<sub>2</sub>As<sub>2</sub> crystals: Optical and transport study. Phys. Rev. B 81, 184508, May 2010, doi: 10.1103/PhysRevB.81.184508.