

Advanced Magneto-Optical Imaging in High Magnetic Fields

Magneto-optical imaging (MOI), a technique for visualizing the spatial distribution of magnetic flux density, has been widely used to investigate magnetic domains in magnetic materials and the critical states of superconductors. Dr. Yuto Kinoshita has developed a novel sensor film and an optical measurement system, enabling the application of MOI under magnetic fields exceeding 10 Tesla. The results of this study have been published in the following article:

<https://iopscience.iop.org/article/10.1088/1361-6668/ae90f2>

In this study, we observed the critical state of the iron-based superconductor $\text{Ba(Fe,Co)}_2\text{As}_2$ in magnetic fields up to 13 T. The critical current density derived from the magnetic flux density distribution in the critical state shows excellent agreement with values obtained via independent methods. Furthermore, we have extended this technique to successfully visualize the spatial distribution of the critical current in magnetic fields as high as 25 Tesla. These advancements represent a significant contribution toward the practical, real-world application of superconducting materials.