Form 8

Research Result Report
ICRR Inter-University Research Program 2024

Research Subject:
Investigating the relationship between sapphire's impurities, absorption and birefringence for KAGRA upgrade

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Summary of Research Result :

The goal of this project is to investigate the possible correlations between impurities and absorption of sapphire (that forms the test-masses of KAGRA) at 1064 nm.
For this purpose, we performed spectroscopy and absorption measurement at 1064nm of several sapphire samples. We developed a model able to fit the absorption spectrum measured by spectroscopy and reproduced most of the absorption at 1064nm.
However, some issue appeared from the fact that the spectrophotometer light is unpolarized while the absorption measurement light is s-polarized.
Thanks to this funding, we acquired a broadband polarizer and a stable mount for installation inside the spectrophotometer. We developed and validated the measurement procedure to acquire high-resolution s- and p-polarized absorption spectrum of sapphire.
Due to construction work around the mesurement apparatus, the measurement was delayed and is now still on-going.
Nevertheless, the preliminary measurement are highly promising and will be crucial to develop low-absorption sapphire for future KAGRA upgrades

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