

**Research Report**  
**ICRR Inter-University Research Program 2019**

Research Subject:

Noise Evaluation and Reduction of Cryogenic Mirror Suspension System in KAGRA

Principal Investigator:

Zonghong Zhu

Participating Researchers:

Yikang Chen

Summary of Research Result :

Mirror thermal noise is one of the fundamental noises for room-temperature gravitational-wave detectors in KAGRA. One effective approach for reducing thermal noise is to cool the mirrors. There are many technical challenges that must be overcome to cool the mirrors, such as cryocooler induced vibrations and thermal drift in suspensions. The member of our group have joined the cryogenic group to learn and do some experiments in KAGRA site. For example, we measured some parameters of cryogenic cavity, such as the material-monocrystalline silicon. We also learn to adjust the parameters in sensing matrix of the Type-A tower of cryogenic payload. Up to now, the digital control system of cryogenic payloads has been applied in kamioka site and KAGRA has already finished the O3 international observation with aLIGO and aVIRGO. we will continue work on the reduction of real noise of KAGRA cryogenic payload at Kamioka site with KAGRA cryogenics subgroup members. We aim to observe more gravitational wave in later observation.

No.F07