

# Investigation of Crackling Noise in the Vibration Isolation System of KAGRA(2)

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Crackling noise includes a broad class of noise when a system responds to a changing external condition in a nonlinear way. We have conducted an experiment to investigate crackling noise in the GAS (Geometric Anti-Spring) filter of the vibration isolation system of KAGRA. It is possible that crackling noise in the GAS filter will couple into KAGRA's readout. The sensitivity of ground-based interferometric gravitational wave detectors are limited by the seismic vibration. The main optics of KAGRA, the 3 km Japanese second generation interferometric gravitational wave detector, are isolated from the seismic vibration by the vibration isolation system, of which the vertical vibration isolation is mainly provided by the GAS filter. It has been studied that the strain-stress curves exhibit crackling noise near the yielding point. As the GAS filter works in the condition that is highly stressed, it is possible that crackling noise will be generated when the GAS filter is vibrating. This experiment is designed to investigate crackling noise in the GAS filter, further more to help KAGRA to achieve the designed sensitivity and to increase the sensitivity, which will contribute on the establishment of gravitational wave astronomy in Japan.