Contribution ID : **95** Type : **Oral Presentation**

Molecular layer formation on cooled sapphire mirrors in KAGRA Japanese gravitational wave observatory

Wednesday, 15 August 2018 11:45 (15)

KAGRA is Japanese gravitational wave observatory which is located in the underground site to reduce seismic motion. In order to decrease the mirror thermal fluctuation, four antenna mirrors have to be cooled down. To achieve 20K for mirror temperature, sapphire was chosen as a material of cooled mirrors and their suspension components in the final vibration reduction stage because of its advantages of thermal conductivity and high mechanical Q value at cryogenic temperature.
The requirements of KAGRA vacuum pressure is 1×10^(-7) Pa, or lower, to avoid refractivity fluctuation due to vacuum residual gases. In order to achieve above requirement in huge volume/area of vacuum chambers and ducts, surface processing for reducing outgassing was applied and materials for use as large suspension systems are carefully chosen. Furthermore, by cooling down, cryostat works as cryo-pump so pressure around cryostat becomes quite low.
Recently, it was revealed that the vacuum residual molecules were adsorbed on cooled sapphire mirrors and finally many numbers of molecules form an adlayer. This molecular adlayer works as a kind of optical coating and changes mirror reflectivity depending on its thickness. To investigate the molecular layer formation in KAGRA, a small optical cavity, having high finesse, was installed in KAGRA cryostat and its finesse was monitored for 35
days.

Primary author(s) : Mr HASEGAWA, Kunihiko (ICRR, University of Tokyo)

Co-author(s) : Prof. AKUTSU, Tomotada (NAOJ); Dr INOUE, Yuki (Academia Sinica); Prof. KIMURA, Nobuhiro (KEK); Prof. SUZUKI, Toshikazu (ICRR, University of Tokyo); Prof. TOMARU, Takayuki (KEK); Ms UEDA, Ayako (KEK); Prof. SAITO, Yoshio (ICRR, University of Tokyo); Prof. MIYOKI, Shinji (ICRR, the University of Tokyo)

Presenter(s) : Mr HASEGAWA, Kunihiko (ICRR, University of Tokyo)

Session Classification : Speaker Sessions and Seminars

Track Classification : Vacuum Science and Technology