Contribution ID: **27** Type: **Poster**

Torsion-Bar Antenna and its Angular Sensor

Tuesday, 23 May 2023 18:06 (1 minute)

Torsion-Bar Antenna (TOBA) is a ground-based gravitational-wave detector using a torsion pendulum. The resonant frequency of torsional motion is $\sim 1\,\mathrm{mHz}$, therefore TOBA has good design sensitivity in low frequency, specifically $10^{-19}/\sqrt{\mathrm{Hz}}$ at 0.1 Hz. TOBA can detect intermediate-mass black hole binary mergers, Newtonian noise, and so on. A prototype detector Phase-III TOBA with a 35 cm-scale test mass is under development to demonstrate noise reduction. The target sensitivity is set to $10^{-15}/\sqrt{\mathrm{Hz}}$ at 0.1 Hz. To achieve our target sensitivity, we need to measure the pendulum rotation precisely. We propose a wavefront sensor with a coupled cavity (Coupled WFS) as an angular sensor for Phase-III TOBA. In our method, an auxiliary cavity is used to compensate Gouy phase of a main cavity and enhance the first-order TEM modes in the main cavity. The experimental demonstration was successfully performed. Here we show the principle of TOBA and demonstration results of a Coupled WFS.

Primary author: Ms OSHIMA, Yuka (University of Tokyo)

Co-authors: Mr OOI, Ching Pin (University of Tokyo); Dr KOMORI, Kentaro (University of Tokyo); Prof. ANDO, Masaki (University of Tokyo); Ms CAO, Mengdi (Beijing Normal University); Mr TAKANO, Satoru (University of Tokyo); Dr MICHIMURA, Yuta (California Institute of Technology)

Presenter: Ms OSHIMA, Yuka (University of Tokyo)

Session Classification: Tuesday Poster session

Track Classification: Low Frequency Noise: Low Frequency Sensing and Control