Contribution ID: **24** Type: **Oral presentation**

Near-unstable cavities for future gravitational wave detectors

Friday, 15 February 2019 18:00 (20 minutes)

Near-unstable cavities have been proposed as an enabling technology for future gravitational wave detectors, as their compact structure and large beam spot can reduce the thermal noise floor of the interferometer. These cavities operate close to the edge of geometrical stability, and may be driven into instability via small cavity length perturbations or mirror surface distortions. They are at risk of suffering from problems such as high optical scattering loss and Gaussian mode degeneracy. The well-defined Gaussian beams can also be distorted through their interaction with the small imperfections of the mirror surfaces. These issues have an adverse impact on the detector sensitivity and controllability. We will report an experiment designed and built to investigate the technical hurdles associated with near-unstable cavities. A marginally stable table-top cavity is built and accurate control achieved through length and alignment control systems. The experiment provides a detailed account of the behaviour of the near-unstable cavity and of the difficulties that need to be overcome in order to achieve optimal operation. Additionally, we will report the latest simulation study of influences of mirror defects to modes in a near-unstable cavity.

Primary author: HAOYU WANG (BEIJING NORMAL UNIVERSITY)

Presenter: HAOYU WANG (BEIJING NORMAL UNIVERSITY)

Session Classification: Multi-messenger