



## **Passive laser gyroscopes for inertial rotation sensing of the Earth**

Kui Liu (1), Fenglei Zhang (1), Zongyang Li (1), Xiaohua Feng (1), Ke Li (1), Zehuang Lu (1), Ulrich Schreiber (2), and Jie Zhang (1)

(1) PGMF and School of Physics, Huazhong University of Science and Technology, Wuhan, P. R. China (liukui2007@hust.edu.cn), (2) FESG, Technical University Munich, Munich, Germany

Large laser gyroscopes have important applications in geophysics, geodesy, seismology and fundamental physics tests. Here we report on a passive resonant gyroscope (PRG) by injecting an external laser to a passive cavity. A prototype PRG with a side length of 1 m is demonstrated, and we achieve a sensitivity of  $2 \text{ nrad/s}/\sqrt{\text{Hz}}$  in the 5-100 Hz region. After using an ultrastable laser as a frequency reference to remove the cavity drift contribution, we obtain a rotation resolution of  $7 \times 10^{-10} \text{ rad/s}$  at 4000 s. Our result reveals the potential of the PRGs for high-resolution Earth rotation sensing. Meanwhile, a larger PRG with a side arm of 3 m is under development. A fully digital stabilized laser source with a stability of better than  $2 \times 10^{-14}$  between 1 to 10000 s will be used as its arm length reference.