



Contribution ID: 933

Type: **Talk in the parallel session**

## The Ginger project - preliminary results

*Thursday, 8 July 2021 18:10 (20 minutes)*

The debate on gravity theories to extend or modify general relativity is very active today and research efforts are devoted to test theories of gravity. Here, we present the GINGER experiment, which, being Earth based, requires little modeling of external perturbation, allowing a thorough analysis of the systematics, crucial for experiments where sensitivity breakthrough is required.

We recently proposed the GINGER (Gyroscopes IN General Relativity) experiment a tri-axial array of Ring Lasers (RL) that can reach the sensitivity, accuracy, and long term stability required to measure the inertial frame dragging induced by the rotating Earth, as predicted by General Relativity. This effect, also known Lense-Thirring effect, amounts for the Earth to 1 part in  $10^9$  of its rotation rate, thus requiring an unprecedented sensitivity and accuracy of experimental apparatus. The proposed array of at least 3 RLs would allow us to measure both the rotation rate, and the orientation of the instantaneous rotation axis. A top class Sagnac gyroscope prototype, GINGERINO, was built and its sensitivity investigated with standard statistical means and the available geodesic measurements of the Earth angular rotation rate. All features of the Earth rotation rate are correctly reproduced. The unprecedented sensitivity of fractions of  $\text{frac}/\text{s}$  is attained for long term runs. Work is in progress in order to further confirm this excellent sensitivity and stability, which certainly would put Sagnac gyroscopes at the forefront for fundamental physics.

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**Session Classification:** Experimental Gravitation

**Track Classification:** Precision Tests: Experimental Gravitation