

Title: *Progress in high resolution Sagnac Interferometry*

Authors: Ulrich Schreiber¹, André Gebauer¹, Jan Kodet¹, J.P. Wells³, H. Igel²

¹*Forschungseinrichtung Satellitengeodäsie, Technical University of Munich, Geodetic Observatory Wettzell, Germany*

²*Department of Earth and Environmental Sciences, Ludwig-Maximilians-University, Munich, Germany*

³*University of Canterbury, School of Physical and Chemical Sciences, Christchurch, New Zealand*

The stability of large ring lasers has improved significantly over recent years. This includes the mitigation of error sources that are not directly related to the rotation sensing process in the interferometer. As a result of that, we were able to reduce the measurement error of the 16 m² G ring laser of the Geodetic Observatory Wettzell by a factor of two. At the same time the residual sensor drift could be reduced as well. Furthermore, we have found a way that reduces backscatter induced biases significantly. Nevertheless, we still observe a considerable sensitivity of the entire interferometer to environmental changes. These effects are in part caused by very small imbalances in the two counter-propagating laser beams and in the beam combiner installation outside of the actual interferometer. It turns out, that the actual optical frequency inside the Sagnac resonator and the laser intensity of the rotation sensing cavity requires a tight control. This talk outlines the state of the art of Sagnac gyroscopy and illustrates what the consequences for the ROMY installations are.