

# The ROMY project: A 4-component ring laser for geophysics and geodesy

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The ROMY ring laser was constructed with 4 non-orthogonal triangular-shaped cavities of 12 m side length in the Geophysical Observatory outside Munich, Germany, in 2016. The large dimensions of the individual rings have the benefit of allowing high sensitivity surpassing in principle the sensitivity of the G-ring at the Fundamentalstation Wettzell. However, the concrete construction of ROMY is geometrically slightly less stable than the G-ring that is built on a rigid Xerodur plate. Each of the four rings has its own Sagnac frequency. The horizontal triangular ring laser at the top of the inverted tetrahedral ROMY structure allows direct comparison of teleseismic signals and noise with the G-ring at a distance of 200km. It also serves as redundant component. In principle, three orthogonal components of rotational ground motion can be obtained by linear combination from any combination of three rings, that - due to the variable Sagnac frequency - have different noise characteristics. We report on the behavior and observations of ROMY from a seismological point of view. It is fair to say that ROMY provides the most accurate direct 3-component rotational ground motions to date. In combination with a collocated broadband seismometer as well as a surrounding small-scale seismic array, we analyse regional, teleseismic events, and ocean-generated noise and compare with array-derived rotation.