

ROMY: On the operation and monitoring of a heterolithic large ring laser array

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The large ring laser array ROMY (ROTational Motions in seismologY) consists of four Sagnac interferometer, each representing an individual, high-sensitive rotation rate sensor, joined as a tetrahedral, heterolithic structure, due to its triangular rings of 12 meter side length. This size and the heterolithic construction introduces new challenges in the operation and monitoring of a large ring laser. Currently high performing ring lasers, such as G-ring, are individual, monolithic large ring lasers, that are less affected by mechanical instability, however, suffer from orientation changes that contribute to the variation in Sagnac frequency. Exploiting the full potential of a large ring laser array, such as ROMY, would enable to observe rotational ground motions close to the rotational low noise model for all three components of rotation.

We discuss required steps towards a stable and enhanced performance of the heterolithic ring laser array ROMY, especially for seismology and present implemented tilt and environmental monitoring (temperature, humidity, pressure) as well as the influence of the signal processing chain on the obtained signals.

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