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Laser Ranging Interferometers in GRACE-FO and for NGGM - Status

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The Laser Ranging Interferometer (LRI) onboard the GRACE Follow-On mission is operational for almost four years. It provides high-quality ranging data with a noise below 1 nm/√Hz at Fourier frequencies around 1 Hz, as well as attitude information with respect to the line-of-sight between the two spacecraft. Future missions are being developed by ESA under the name Next Generation Gravity Mission (NGGM) and on US-side as so-called Mass Change Mission (MCM), and in a joint frame as Mass Change and Geosciences International Constellation (MAGIC).

In this presentation, we discuss the basic working principle of the LRI and show some advantages of the design. The low ranging noise below 35 mHz Fourier frequency allows to retrieve finer structures of Earth's gravity field than possible with conventional microwave ranging. In contrast, the low fluctuations at higher frequencies are useful to characterize the satellite platforms, e.g., thrusters and impulse-like non-gravitational accelerations, potentially from impacts of micrometeorites. We address the learned lessons from the instrument so far and sketch the challenges and development efforts ongoing for the upcoming missions.