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Giant-FOG: road-map and first seismic records

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Based on recent experiences developing very low noise fiber-optic gyroscopes (FOG), first performance results on very large fiber-optic coils of up to 1m diameter are presented, and distant earthquake records obtained with these new instruments are compared to Array Derivated Rotation (ADR) measurement method.

The goal for constructing large FOGs is to evaluate experimentally the physical limits of this kind of technology and to reach the lowest possible noise. While these experiments are probing the fundamental limits of the FOG technology, they also serves as a first step for a cost effective very low noise laboratory rotational seismometer, which could be a game changer in instrumentation of ground motion.

To demonstrate the on-site performance, the low noise inter-disciplinary underground laboratory (LSBB, Rustrel, France), with a dense array of precisely oriented broad-band seismometers, provides the possibility to compare Large FOG rotation records with Array Derivated Rotation measurement method.

Results of different prototypes during the development process will be presented to underline the applicability of each technological response to the Large-FOG requirements, and to draw the line for next steps.

Finally we conclude with presentation of the achieved results with a 1m scale diameter FOG having more than 10km of fiber length, and with presentation or the comparison of FOG records with ADR to asset the quality of the sensor on seismic events (Dodecanese,M6.6, 20July2017, 23°distance and Komandorskiye, M7.7, 17July2017, 80°distance).