Contribution ID : **26** Type : **not specified**

Magnetic field modulation for space: from MELISA to ILIADA

Wednesday, 16 October 2024 13:20 (20)

Measurement of magnetic field fluctuations is one of the key objectives in many space missions. In LISA mission, magnetometers are key to characterize the force and torque disturbances generated on the test masses by the magnetic field fluctuations. For LISA it is necessary to achieve a noise amplitude spectral density (ASD) below 10 nT/sqrt(Hz) from 0.1 to 0.1 Hz, below the interplanetary magnetic field. In those low frequencies, the intrinsic 1/f noise is the predominant issue when trying to have a low noise floor.
In order to reach that noise goal, a magnetometer system has been developed using a microelectromechanical system (MEMS) cantilever, resonating over a Tunneling Magnetic Resistor (TMR). A high magnetic permeability material has been deposited on the tip of the cantilever. Then, by exciting the MEMS at its resonance, the low-frequency content of the magnetic field can be modulated to frequencies where the 1/f noise fades, to be afterwards demodulated computationally, therefore drastically mitigating any 1/f noise contribution.
First results obtained within the internal IEEC project named MELISA (MEMS for LISA) indicated that is possible to obtain a noise floor below 10nT/sqrt(Hz) between 0.1mHz and 0.1Hz. A maximum modulation depth of 39% was also been obtained. Now, this design is being adapted to be incorporated in the ILIADA (In-Orbit Lisa Diagnostics Demonstrator), to raise its TRL level.

Presenter(s) : MANYOSA, Xavier (UPC)

Session Classification : Contributed Talks