

## **MmeMss08-001**

## Obtained by finite element modeling the vibrational quadrupole mode frequencies of the Schenberg detector spherical antenna including macrostructure due the sphere casting.

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Schenberg is a resonant mass gravitational wave (GW) detector built in Brazil, it works by the detection of vibrations when a GW passes through a spherical mass and excites it quadrupole vibrational modes. The sphere is a 65 cm in diameter made of Cu 6% Al alloy casted in Brazil, this alloy was chosen because it can be cooled down to mili Kelvin temperatures. The quadrupole mode frequencies were measured at 4 Kelvin and presented a frequency band of about 70 Hz. This sphere was simulated in SolidWork FEM software and the band calculated was of about 30 Hz. Another simulation was made with Ansys and the same result was obtained. Then the suspension was included in the simulation and the same results persisted, then gravity was included which made the bandwidth even smaller. Finally a close bandwidth to the measured one was obtained including variation on the sphere macrostructure due to differences in cooling time during the sphere casting. In order to reach the correct frequency modes distribution a small deviation from the vertical axle was needed and a reasonable frequencies distribution was found.