CHARACTERISATION OF MAGNETIC FIELD FLUCTUATIONS AT DIFFERENT LOCATIONS WITHIN THE LABORATOIRE SOUTERRAIN À BAS BRUIT

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We have carried out a series of magnetic field measurements using a portable three-axis SQUID magnetometer at the Laboratoire Souterrain à Bas Bruit (LSBB), Rustrel, France. The magnetometer was originally developed as part of the cryoEDM neutron electric dipole moment experiment [1], where we need to monitor drifts in the magnetic field at a level of ≤0.1pT. The cryoEDM SQUID system is a 12-channel magnetometer designed to operate in a large cryostat with extensive magnetic shielding [2]. We have tested smaller prototype systems during a series of trips to LSBB [3], primarily to test the SQUIDs, and control and DAQ electronics in a low noise environment. However this investigation also provided an opportunity to characterise the magnetic environment at different locations within the LSBB complex.

We monitored the magnetic field at various positions inside the underground laboratory, including the Capsule, the Galerie Anti-Souffle (GAS) and the Galerie Gaz-Brûlés (GGB). We recorded several hours of data at each location to compare with that recorded at the same time by the LSBB [SQUID]^2 system permanently installed in the Capsule, and from this we have characterised the relative amplitudes of magnetic field fluctuations in the different locations. SQUID resets are corrected using software, but as this process is not perfect an accurate comparison can only be done during stable periods.

Software development and data analysis are still in progress. Preliminary analysis suggest the magnetic field measured in the Capsule is approximately 75% that measured in the GAS and GGB.

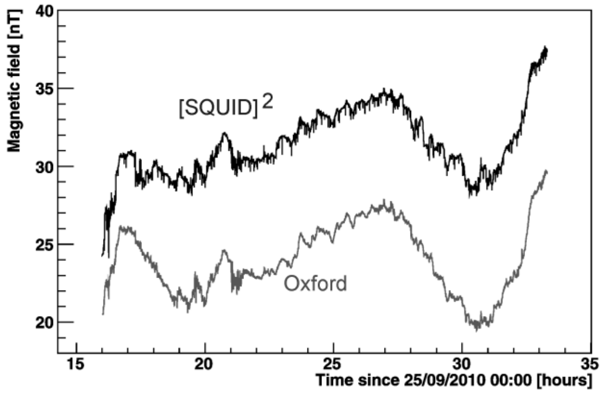

Fig. 1 Magnetic field signal measured in the LSBB Capsule by the [SQUID]^2 and Oxford systems

REFERENCES

[1] http://www.neutronedm.org/
[2] S N Balashow et al. arXiv:0709.2428v1
[3] S Henry et al. *J. Instrum.* **3** (2008) P11003.