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Electromagnetic investigation at the site of the Matra Gravitational and Geophysical Laboratory

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The Matra Gravitational and Geophysical Laboratory (MGGL) has been established by the MTA Wigner Research Centre for Physics, Institute of Particle and Nuclear Physics in 2015. The primary goal of the subsurface laboratory is to organize proper environment for accurate estimation of geophysical noise at the potential installation site of a third generation gravitational wave detector. Besides seismic and infrasound monitoring electromagnetic (EM) background noise measurement has also been performed by the Geodetic and Geophysical Institute, RCAES, HAS to ensure the expected sensitivity of the detector. In addition to 1kHz sampling of the local origin background signal, natural source EM spectral components has also been proposed to be identified at certain frequencies.

The equipment of the MGGL has been complemented by a surface observation site too, to enable the accurate estimation of the EM transfer parameters of the overlying andesite rock. The focus interval of frequency is in the lower ELF. In the 1-20Hz range the natural origin signal is partly related to the global thunderstorm activity, which excites the Earth-ionosphere cavity and results in standing waves at its eigenfrequencies, the so called Schumann components. Individual lightning discharges also provide contribution to the natural background with few millisecond long broadband transient impulses, determined by the local meteorological conditions.

Furthermore magnetotelluric exploration has also been performed to find out the spatial distribution of the electric conductivity in the close vicinity of the subsurface laboratory.

In the presentation we provide a brief summary of this comprehensive electromagnetic study of the close environment of MGGL.