

## EMP measurements from MF to UHF at VEGA

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We present and compare experimental studies of electromagnetic pulses (EMP) produced at the high-power 30 fs lasers VEGA-2 with 200 TW and VEGA-3 with 1 PW. The seed space charge fields are triggered by the interaction of the laser pulses focused to relativistic intensities onto solid density and gas targets, at intensities ranging from several  $10^{19}$  W/cm<sup>2</sup> to several  $10^{20}$  W/cm<sup>2</sup>. The detection of EMP is achieved by passive calibrated B-field and E-field antennas with large bandwidth from 9 kHz to 400 MHz and 300 MHz to 8 GHz respectively.

Outstanding features are the excited cavity modes, clearly detected by the compact antenna system, that can be tailored by modification of the experimental geometry. The detected magnetic fields inside the interaction chamber show amplitudes ranging from tens to hundreds of  $\mu$ m, which is up to ten times stronger than earth's magnetic field. Electric fields in the vicinity of the interaction chamber show amplitudes of hundreds of V/m, which is of the order of fields encountered in cm distance to GSM mobile phones. In the experimental hall, amplitudes hint at a dipole-like radiation field that bears the order of one ten-thousandth of the laser pulse energy.

Building upon the study, we present prospects for a target geometry mitigating EMP and perspectives to make use of systematic quantitative evaluation of EMP.