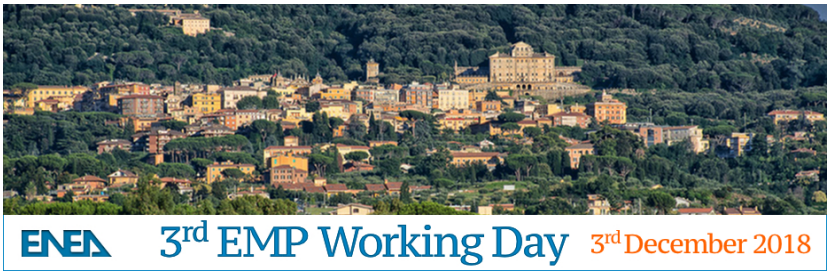

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Characterization of strong electromagnetic pulses generated in high-intensity laser-matter interactions at various laser parameters

The process of laser-target interaction at high laser energies and high intensities may lead to generation of strong electromagnetic pulses (EMP), with frequencies in the GHz range. There are several physical processes that may result in the generation of EMP, but at present a complete quantitative description of this phenomenon is lacking. An important contribution to this process comes from the electric polarization of the target and the resulting neutralization current [1,2,3], but the detailed dynamics of this process is different in the case of fs, ps and ns lasers. Recently the IPPLM team performed experiments on EMP generation at various laser facilities:
1. The IPPLM laser facility (0.4 J, 50 fs), together with the CELIA team (J.-L. Dubois, S. Hulin, V. Tikhonchuk); the aim was primarily to extend the investigations of the electric charge deposition and EMP generation of micrometer foils started in [4] to higher energies on target, in correlation with proton acceleration measurement.
2. The PALS laser facility in Prague (700 J, 300 ps), together with the PALS team (J. Cikhardt, M. Pfeifer, J. Krása, M. Krůs, J. Dostál); the aim was to perform direct measurement of the electric field in correlation with the neutralization current measurement.
3. The Vulcan laser facility at RAL (700 J, 600 fs), together with teams from RAL and Univ. of Strathclyde (D. Carroll, S. Giltrap, D. Neely, R. Wilson, P. McKenna); the aim was to study EMP generation off ultra-thin foil targets in the PW range.
4. The ILIL facility in Pisa (3 J, 35 fs), together with the ILIL team (L. Gizzi, F. Baffigi, L. Labate, P. Koester, F. Brandi, D. Giove, A. Fazzi).
Results from these experiments are summarized and confronted with the results obtained by other research groups. Then an attempt is made to provide some model explaining EMP generation in various regimes.

References:
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