Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

**Exploring the radiation reaction at $10^{21}$W/cm$^2$** MARIJA VRANIC, JOANA L. MARTINS, JORGE VIEIRA, GoLP/IPFN, Instituto Superior Técnico, Lisbon, Portugal, RICARDO A. FONSECA, DCTI, ISCTE, Lisbon University Institute, Portugal, LUIS O. SILVA, GoLP/IPFN, Instituto Superior Técnico, Lisbon, Portugal — The experimental confirmation for the domain of validity of classical radiation reaction theory, as well as demonstration of the radiation reaction process is still missing. The thresholds for radiation reaction dominated regime are under a constant scientific debate. We present a theoretical and numerical study of the experimental conditions that would provide an answer to some of these questions in an all-optical configuration with laser systems available today (i.e. I$\sim 10^{21}$W/cm$^2$). We preformed 3-dimensional full-scale particle-in-cell (PIC) simulations of linear wakefield accelerators accounting for the radiation reaction, allowing the electron beam to interact with an intense laser after it leaves the plasma. We discuss measurable signatures of radiation reaction both in the electron spectra, and the backscattered laser photons, encompassing current and near-future laser technology. Electron energy loss of 40% due to the radiation reaction was obtained using a laser of intensity $10^{21}$W/cm$^2$ and an LWFA electron beam of 1 GeV. The theoretical predictions for energy loss are in excellent agreement with the simulation results for various configurations presented.

Marija Vranic
GoLP/IPFN, Instituto Superior Técnico, Lisbon, Portugal

Date submitted: 23 Jul 2012 Electronic form version 1.4