Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Relativistic Thomson scattering: a tool for pulse diagnostics and exploring inner-shell dynamics[1] CALVIN HE, WENDELL T. HILL, III, University of Maryland, College Park, ANDREW LONGMAN, ROBERT FEDOSEJEVS, University of Alberta, LUIS ROSO, JOS A. PREZ-HERNNDEZ, MASSIMO DE MARCO, GIANCARLO GATTI, Centro de Lseres Pulsados — The new LaserNetUS together with several international facilities offering extreme pulse conditions have placed the intense-field and ultrafast communities on the cusp of opportunities to address our thirst for novel physics. The much-anticipated features (e.g., intensities at 10^{23} W/cm^2 and beyond, subfemtosecond pulse durations, high rep rates) offer several channels through which to explore a host of new phenomena from inner-shell ultrafast dynamics to new tests of QED, and perhaps the Standard Model. These opportunities come with a cost – the need to develop unique tools both to characterize the focused laser pulses at full energy and to capture the new physics. One promising tool, which was suggested about 50 years ago, is relativistic Thomson scattering (RTS), a low-energy ($\hbar\omega << m_e c^2$), multiphoton analogue of Compton scattering. Frequency and angular shifts of RTS relative to the laser frequency and propagation direction, respectively, are intimately linked to the pulse intensity, the electron insertion energy and the electron density. Recently, we explored the utility of RTS as an intensity gauge. The results of that experiment will be discussed along with simulations that reveal possibilities for investigating inner-shell dynamics.

[1]This work was supported in part by NSF grant PHY1806584.

Wendell Hill
University of Maryland, College Park

Date submitted: 04 Feb 2019 Electronic form version 1.4