Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Relativistic flying mirrors in the nonlinear and large wavelength difference regime[1] JAMES KOGA, SERGEI BULANOV, TIMUR ESIRKEPOV, MASAKI KANDO, National Institutes for Quantum and Radiological Science and Technology (QST) — The up-shifting and longitudinal compression of electromagnetic waves has been shown possible with relativistic mirrors (see review [1]). These relativistic mirrors have been generated with ultra-high power laser pulses (driver pulses) propagating in plasma and generating breaking plasma waves. Ultra-short high frequency laser pulses were shown to be generated by counter-propagating lower power laser pulses (source pulses) with the relativistic mirrors both theoretically and experimentally (see review [1]). The source pulses had low enough intensity so that they did not significantly modify the mirror and nearly the same wavelength as the driver. Here, we investigate a new regime where the source pulse is of high enough power to significantly modify the mirror and has significantly longer wavelength than the driver. In this case the driver pulse can be in a significantly underdense plasma resulting in high upshift factor while the source is in a near critical plasma allowing for greater reflection with relatively small density perturbations. Results from 1D particle-in-cell simulations and theory will be presented. [1] S. V. Bulanov,el al., Phys. Usp. 56, 429 (2013).

[1]This work was supported by JSPS KAKENHI Grant Number 16K05639

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Date submitted: 15 Jul 2016 Electronic form version 1.4