Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

**Cherenkov wakefield excitation by relativistic electron beams in plasma channels** TIANHONG WANG, Cornell University, VLADIMIR KHUDIK, University of Texas at Austin, GENNDAY SHVETS, Cornell University — We report on our theoretical investigations of Cherenkov radiation excited by relativistic electron bunches propagating in plasma channels and in polaritonic channels [1]. Two surface plasmons (SPs) modes of the radiation are analyzed: the longitudinal (accelerating) and the transverse (deflecting) ones. Both form Cherenkov cones that are different in the magnitude of the cone angle and the central frequency. We show that the Cherenkov field profile change dramatically depending on the driver velocity and the channel size, and the longitudinal mode forms a reversed Cherenkov radiation cone due to the negative group velocity for sufficiently small air gaps. In addition, we find that when the channel surface is corrugated, a strong deflecting wake is excited by a relativistic electron bunch. A trailing electron bunch experiencing this wake is forced to undergo betatron oscillations and thus to emit radiation. Numerical simulation showed that intense x-ray radiation can be generated. [1] B. Neuner, D. Korobkin, G. Ferro, and G. Shvets, Phys. Rev. ST Accel. Beams 15, 031302 (2012).

Tianhong Wang
Cornell University

Date submitted: 14 Jul 2017 Electronic form version 1.4