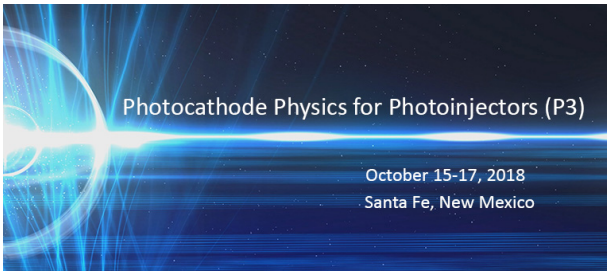

Contribution ID: **81** Type: **not specified**

Ab initio many-body calculations of the mean transverse energy for proposed high-brightness photocathode materials

Wednesday 17 October 2018 10:15 (20 minutes)

The state of the art in creating next-generation high-brightness electron beams requires that electrons emerge with mean transverse energy (MTE) of ˜10 meV or lower. Identification of new, promising materials requires predictive understanding of the physics underlying photoemission. This talk will present our first-principles ab initio solid-state calculations of MTE for a variety of proposed photocathode materials. Within the approximation that the vast majority of photoelectrons come from transitions among the bulk electronic states of the material, our calculations accurately reproduce the experimentally measured MTE as a function of photon energy for emission from PbTe(111), producing results that are significantly more accurate than previous theories [arXiv:1704.00194v1 [physics.acc-ph] (2017)] that underestimate these measured MTEs by a factor of 10–20. Using our new approach, we further find that the MTE from single-crystal Cs3Sb(001) is around 1–10 meV near the emission threshold, without any limitation being placed by the thermal ˜ kB T energy scale.

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Session Classification: Session 10

Track Classification: Session 10: Theory and Computation - continued