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In Pursuit of the Narrow Cone; Prospects for 2-photon and n-type Photoemission from $\text{Al}(x)\text{Ga}(1-x)\text{N}$

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Although low effective mass semiconductors offer the promise of photocathodes with subthermal mean transverse energy (MTE), the effect has never been observed in practice. One proposed explanation for this is that the cesium coating used on many photocathodes, while decreasing their work function, increases the MTE of the photoemitted electrons. In this talk, we discuss the ongoing effort at Cornell to observe cesium-free photoemission from AlGa_N, a low effective mass semiconductor, through two novel techniques. In the first, n-type doping is used to populate the conduction band with electrons that may be emitted with an appropriately energetic photon. Similarly, in the second technique an initial pump pulse of photons is used to excite electrons from the valence band to the conduction band where they may be emitted using a probe pulse at a later time.

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