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Multiple electron generation in a sea of electronic states WAYNE WITZEL, Sandia National Laboratory, NM, ANDREW SHABAEV, George Mason University, ALEXANDER EFROS, CARL HELLBERG, JACOBS VERNE, Naval Research Laboratory — In traditional bulk semiconductor photovoltaics (PVs), each photon may excite a single electron-hole, wasting excess energy beyond the band-gap as heat. In nanocrystals, multiple excitons can be generated from a single photon, enhancing the PV current. Multiple electron generation (MEG) may result from Coulombic interactions of the confined electrons. Previous investigations have been based on incomplete or over-simplified electronic-state representations. We present results of quantum simulations that include hundreds of thousands of configuration states and show how the complex dynamics, even in a closed electronic system, yields a saturated MEG effect on a femtosecond timescale. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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