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Theory of Relaxor Ferroelectric Electrocalorics GIAN GUZMAN-VERRI, Materials Science Division, Argonne National Laboratory, PETER LITTLEWOOD, Physical Sciences and Engineering, Argonne National Laboratory — Conventional perovskite ferroelectrics are the material of choice in many modern day technologies such as capacitive energy storage devices, infrared sensors, and random access memories. Conventional ferroelectrics, however, have not been exploited in cooling applications mainly because their narrow region of critical fluctuations of polarization results in a small electrocaloric effect (a few miliKelvin per volt). Relaxor ferroelectrics, on the other hand, exhibit a broad region of critical fluctuations which makes them promising candidates for large electrocalorics. In this talk, we present a theoretical study of electrocalorics in relaxor ferroelectrics. We compute isothermal changes in entropy and adiabatic changes in temperature within a model of polarizable unit cells with local short-range forces, dipolar forces, and compositional disorder.

Gian Guzman-Verri
Materials Science Division, Argonne National Laboratory

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