Including a 4-Dimensional Equation of State in Smoothed Particle Hydrodynamics TRAVIS DORE, DEBORAH MROCZEK, LYDIA SPYCHALLA, JACQUELYN NORONHA-HOSTLER, MATT SIEVERT, University of Illinois at Urbana-Champaign — The Beam Energy Scan program at RHIC is currently searching for a QCD thermodynamic critical point that is conjectured to exist at a large value of baryonic chemical potential, μ_B. It is also the case, that at finite baryon densities, one necessarily has finite densities of both strangeness and electric charge, which are both good conserved quantities throughout the hydrodynamic evolution. These come with their own respective chemical potentials, μ_S and μ_Q, making it necessary to incorporate these quantities into the hydrodynamics by both including a 4-D equation of state $\{T, \mu_B, \mu_S, \mu_Q\}$, and charge current and diffusion evolution for all four quantities. In this work, we focus on the application and derivation of the charge current evolution equations in the context of Smoothed Particle Hydrodynamics.

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