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Implementing an equation of state with baryon number, strangeness, and electric charge in relativistic hydrodynamics LYDIA SPYCHALLA, JACQUELYN NORONHA-HOSTLER, TRAVIS DORE, MATT SIEVERT, DEBORA MROCZEK, University of Illinois at Urbana-Champaign — The search for the critical point of the quark gluon plasma (QGP) is limited by our theoretical models at large baryon densities. Relativistic viscous hydrodynamical models have been very successful at describing experimental data at zero baryon density. This project seeks to incorporate the effects of three conserved charges of quantum chromodynamics (baryon number B, strangeness S, and electric charge Q) into the equation of state used in relativistic hydrodynamic simulations in order to study the QGP at large baryon densities. We develop a code with a multidimensional interpolation function and rootfinder, which is done over a 4-dimensional grid and provides a mapping between temperature and chemical potentials, into entropy and the densities of conserved quantities. We couple this code to ICCING, which is a new code that initializes conserved charges from gluon-splitting-generated sea quarks at the LHC, and find that even at these energies the QGP explores a wide range in chemical potentials in the quantum chromodynamics phase diagram.

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