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Using machine learning to understand the properties of the QCD critical point[1] DEBORA MROCZEK, University of Illinois at Urbana-Champaign, MORTEN HJORTH-JENSEN, Michigan State University, CLAUDIA RATTI, Univ of Houston, PAOLO PAROTTO, Bergische Universitt Wuppertal, JACQUELYN NORONHA-HOSTLER, University of Illinois at Urbana-Champaign — One of the main goals of the second phase of the Beam Energy Scan program at RHIC is to search for the QCD critical point. In order to study the thermodynamic effects of the presence of a critical point, we constructed a family of equations of state using a model that couples Lattice QCD results to a parameterized critical point from the 3D Ising model universality class. The mapping of the Ising critical point onto the QCD phase diagram gives rise to free parameters that control its position and size/shape of the critical region. We use machine learning to identify choices of free parameters that result in inconsistent thermodynamics. This approach can rule out pathological parameter sets at a low computational cost. Large scale implementation of our procedure can eliminate possible locations of the QCD critical point and guide experimental searches at RHIC.

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