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Indications for a Critical End Point in the Phase Diagram for Hot and Dense Nuclear Matter

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Excitation functions for the Gaussian emission source radii difference ($R^2_{out} - R^2_{side}$) obtained from two-pion interferometry measurements in Au+Au ($\sqrt{s_{NN}} = 7.7$–200 GeV) and Pb+Pb ($\sqrt{s_{NN}} = 2.76$ TeV) collisions are studied for a broad range of collision centralities. The observed nonmonotonic excitation functions validate the finite-size and finite-time scaling patterns expected for the deconfinement phase transition and the critical end point (CEP), in the temperature versus baryon chemical potential (T, μ_B) plane of the nuclear matter phase diagram [1]. A Dynamic finite-size scaling (DFSS) analysis of these data suggests a second order phase transition with the estimates $T^{cep} \sim 165$ MeV and $\mu_B^{cep} \sim 95$ MeV for the location of the critical end point. The critical exponents ($\nu \approx 0.66$ and $\gamma \approx 1.2$) extracted via the same DFSS analysis place this CEP in the 3D Ising model universality class.

[1] Roy. A Lacey, Phys.Rev.Lett. 114, 142301, (2015)

On behalf of collaboration:

NONE

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