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Abstract for an Invited Paper
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Herman Feshbach Prize in Theoretical Nuclear Physics Talk: The quest for Quark-Gluon Plasma

EDWARD SHURYAK¹, State Univ of NY- Stony Brook

The first half of the talk reviews historical evolution of the physics of heavy ion collisions and the main theoretical and experimental findings. The three periods of it are: (i) the pre-RHIC, 1970's-2000; (ii) the RHIC era, 2000-2010; and (iii) the current one, in which all four LHC detectors joined it. The second half is a brief summary of theory of strongly coupled QGP, including a number of studies using the AdS/CFT duality and the electric-magnetic duality. The former “holographic” approach use mapping of the strongly coupled gauge theory to weakly coupled (super)gravity in higher dimensional space-time. The latter emphasizes that the growth of the gauge “electric” coupling $\alpha_s(T)$ as T is lowered implies, via Dirac condition, a decrease in the magnetic coupling. QGP is described as a dual plasma, containing both “electric” quasiparticles, quarks and gluons, and magnetic monopoles. The role of monopoles is growing at lower T and, at $T < T_c$, the monopoles Bose-condense and expel electric fields into the confining flux tubes. Both approaches explain an unusual kinetic properties of QGP, with the mean free path (viscosity) being much smaller than that given by perturbative estimates.

¹invited talk to Feshbach prize recipient at special session