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THE UNIVERSITY of WISCONSIN MADISON

Department of Physics Colloquium

Friday, May 7, 2010 • 4:00 P.M. • 2241 Chamberlin Hall

cookies & coffee served at 3:30 p.m

Once and Future Science at RHIC

Steven Vigdor

Associate Laboratory Director for Nuclear and Particle Physics, Brookhaven National Laboratory

The Relativistic Heavy Ion Collider has pioneered laboratory study of condensed matter systems governed by a force of a different color. An overarching theme of RHIC research is to unveil unique quantum many-body manifestations of the underlying color force, and their possible implications for the early universe and for other systems based on non-Abelian particle interactions. I will review the status - techniques, results, interpretations, implications and plans - associated with three particular lines of inquiry: the discovery of nearly perfect liquid flow of the extremely hot matter produced fleetingly in RHIC heavy-ion collisions; possible evidence for high-temperature vacuum fluctuations (sphalerons) characterized by local violation of symmetries; and the search for evidence of density saturation for low-momentum gluons in cold nuclear matter. In the process, I will also discuss some aspects of the innovative accelerator physics that drives ongoing and planned upgrades of the RHIC facility.