

Fall 2022 Colloquium

Department of Physics & Astronomy, A&M-Commerce

Dec 1, Thursday, 4-5 PM in Science Building 127

(coffee and cookies will be served at 3:50 PM)

Nuclear Physics

Deblurring for Nuclei:

3D Characteristics of Heavy-Ion Collisions

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Dr. Pawel Danielewicz earned his MS (1977) and Ph.D. (1981) degrees in Theoretical Physics at the University of Warsaw in Poland. His Ph.D. topic was entitled Quantum Description of Heavy Ion Collisions in an Interpenetrating Nuclear Matter Model. He worked as a post-doc at the Lawrence Berkeley Laboratory in California. Dr. Danielewicz began his appointment as an Assistant Professor at the Warsaw University in 1985 and in 1988 as an Associate Professor at the Michigan State University. Since 1996, he has been a Full Professor at the latter institution. His research focuses on the theory of nuclear reactions. More information about Dr. Danielewicz and his research can be found at

www.nscl.msu.edu/~daniel/home.html

Abstract

As reaction plane direction in heavy-ion collisions can be determined only coarsely, any attempt to measure 3D differential distributions, including over azimuthal angle, will yield blurred results. Deblurring procedures, analogous to those in optics, are proposed to correct for the coarse reaction-plane procedures and, simultaneously, for any instrumental inefficiencies, to arrive at 3D distributions tied to the true reaction plane. The refined 3D picture of the collisions can yield better access to the physics than the current method of azimuthal moments. Broader applications of deblurring in nuclear physics are expected in other cases where signals in measurements are degraded by instrument performance or methodology, with the three-body decay-energy spectrum of 260 provided as a direct example. Progress has been made in the space-time inference from two-particle correlations through deblurring.