

Fall 2018 Colloquium

Department of Physics & Astronomy, TAMU-Commerce

Nov 8, Thursday, 4-5 PM in Science Building 127

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

Astrophysics, Nuclear physics

Mass Generation in the Early Universe

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Dr. Rapp earned MS (1993) degrees in Physics at the University of Bonn Germany, and a Ph.D. degree (1996) in Physics at Univ. of Illinois (Urbana-Champaign). His Ph.D. research topic was on Theoretical Nuclear/Hadron Physics. He worked as a post-doc at : Research Center Julich, Theo and SUNY at Stony Brook. In 2003, Dr. Rapp began his appointment as an assistant professor at Texas A&M University - College Station, where he is currently doing research in Astrophysics Nuclear physics. More information about Dr. Rapp and his research can be found at <https://physics.tamu.edu/people/rapp/>

Abstract

In the framework of the Standard Model of elementary particles, the generation of the visible mass in the Universe is closely related to condensation phenomena of originally massless particles and fields. These mechanisms, in turn, are believed to be accompanied by phase transitions associated with the fundamental forces in Nature. In the electroweak phase transition, at about 10 picoseconds after the Big Bang, the recently discovered Higgs Boson condensed, giving rise to large W- and Z-boson masses, but to only small masses of the light up- and down-quarks. On the other hand, in the strong-force transition, at about 10 microseconds after the Big Bang, quark and gluon fields condensed giving rise to the confinement of color charges into hadrons, and generating $\sim 98\%$ of their mass. We discuss ideas and possible mechanisms underlying these phenomena, and how they can be tested, 14 billion years later, in the laboratory using high-energy collisions of heavy nuclei.