Special Seminar on Large Hadron Collider Research

Ultrarelativistic Heavy-Ion Physics in the RHIC and LHC Eras

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Now a member of the ALICE experiment, one of the four major LHC experiments

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At high temperatures, strongly interacting matter is expected to undergo a phase transition to a state of matter, the "quark-gluon plasma" (QGP). A QGP is believed to have existed in the first few microseconds after the Big Bang, and has been produced experimentally in ultrarelativistic heavy-ion collisions at the Relativistic Heavy ion Collider (RHIC) and at the Large Hadron Collider (LHC). Ultrarelativistic heavy-ion physics is primarily focused on studying this state of matter and the later stages of heavy-ion collisions, in which several unique behaviors have been seen. It has been observed that jets and high-momentum hadrons are suppressed in a way that cannot be accounted for if nucleus-nucleus collisions were simple superpositions of nucleon-nucleon collisions (or by lower-temperature bulk nuclear matter). The QGP also appears to behave as a perfect fluid, with its flow well described by hydrodynamic models with a very low viscosity. After making the transition to hadronic matter, the abundances of various hadron species can be well described by models that assume a thermally equilibrated system with a temperature in the vicinity of 160 MeV. The speaker will give an overview of ultrarelativistic heavy-ion physics and discuss the most important results in the field during the RHIC and LHC eras.

Dr. Anders Knospe, a Bozeman native and former member of the Ion Beams group at MSU-Bozeman, earned his Ph.D. in Physics from Yale University in 2011. He is currently a Postdoctoral Fellow with the University of Texas at Austin and is stationed full-time at CERN. His research has focused on using heavy quarks and hadronic resonances to probe ultrarelativistic heavy-ion collisions and learn more about the properties of the matter produced. Dr. Knospe worked on the STAR experiment at Brookhaven National Laboratory from 2005-2011 and is now a member of the ALICE experiment, one of the four major LHC experiments.