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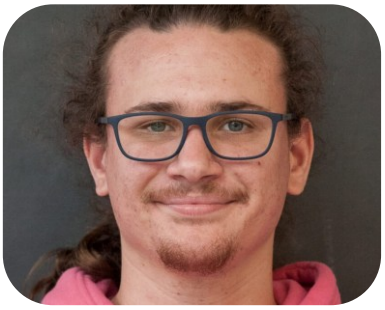
S E M I N A R

Using Heavy Quarks to Study the Primordial Liquid



Jean du Plessis
(Massachusetts Institute of Technology (MIT), USA)

ABSTRACT:

Heavy quarks provide a valuable probe of the quark-gluon plasma in heavy-ion collisions. Produced in the earliest hard scatterings and approximately conserved throughout the subsequent evolution, they are sensitive to the medium over a wide range of momentum scales. At the same time, describing their dynamics in a unified way remains a major theoretical and phenomenological challenge, since one must connect ultra-relativistic energy loss to the late time Brownian-like motion of almost thermalised heavy quarks within a single framework.

In this talk I will present our recent extension of the hybrid strong/weak-coupling model of jet quenching to heavy flavour, including momentum broadening and in-medium hadronisation, and explain how it captures the relevant physics across these regimes. I will discuss the underlying transport picture, the theoretical issues that arise in matching the different dynamical limits, and the implications for heavy-flavour observables and for our broader understanding of heavy-quark transport in QCD matter. I will also touch on recent theoretical and ongoing phenomenological work on the effects of non-Gaussianities in the distribution of momentum transfers on our understanding of quark-gluon plasma.

Jean du Plessis is a doctoral student at the Massachusetts Institute of Technology (MIT) Center for Theoretical Physics, where his research focuses on quantum chromodynamics, strong interaction dynamics, and quark-gluon plasma.
Prior to joining MIT, he completed his Bachelor's degree at Stellenbosch University and a Master's degree at the University of Cape Town. His academic contributions include co-authored research on holographic heavy quark energy loss and transport properties in dense nuclear matter.

Date:
Tuesday, 14 July 2026

Time:
13h15-14h15 SAST

Venues:
- Honours Presentation Room P213,
  2nd floor, School of Physics
  East Campus
  University of the Witwatersrand
- Online

Who should attend?
All are welcome!

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NRF National Research Foundation | SAASTA South African Agency for Science and Technology Advancement

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