Department of Physics and Materials Science

SEMINAR

Back to fundamental QCD - a tale of quarks and gluons!

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Abstract: Collider experiments have proven themselves immensely useful in studying the behavior of fundamental particles such as quarks and gluons. The last few years in particular have seen a push towards an exploration of QCD, the theory of strong interactions, that has hitherto been inaccessible. Innovative experimental techniques allow access to the multi-scale evolution of quarks and gluons via jets. In the context of heavy ion collisions, jets have been advertised for the past two decades as a useful tool for quark-gluon plasma (QGP) tomography. This quest has had its fair share of roadblocks but I share the community's roadmap to the next-generation of measurements, with untapped potential to extract of the QGP's properties. Lastly, I highlight the impact of the upcoming Electron Ion Collider where these novel techniques and experimental precision lead to imaging both the perturbative and non-perturbative QCD regimes, allowing us unprecedented access into color confinement.

Bio: Dr. Raghav (Rithya) Kunnawalkam Elayavalli is an assistant Professor of Physics in the department of Physics and Astronomy at Vanderbilt University since fall of 2022. Currently they are a Ruff Fans Dean's faculty fellow from 2024-2026. They work primarily in the field of high energy nuclear physics since their masters at Stony Brook University back in 2011. Their masters thesis was in the setup of a simulation package for the future Electron Ion Collider called EICROOT where they studied the interaction of lepton-flavor violating processes. After doing their PhD work at Rutgers University (2013-2017) with measurements of QCD jets in varying collision systems at the CMS experiment at CERN, they moved their research back to RHIC science during postdoc positions at Wayne State University (2017-2022) and Yale/BNL (2020-2022) with the STAR collaboration. At Vanderbilt University, their main focus is on the new sPHENIX experiment at RHIC and the CMS experiment at LHC along with EIC physics heading into the future. They were recently awarded the DOE Early Career award for 2023 focused on measurements of the space-time evolution of quarks and gluons at RHIC. They are also an NSF funded co-PI of the JETSCAPE collaboration which includes both theorists and experimentalists focused on creating advanced analysis and statistical toolkits to extract fundamental properties of the QGP.

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