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(POS-25) Jets as a probe of dissipative processes in the Quark-Gluon Plasma

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Relativistic heavy-ion collisions are reaching temperatures where the quarks and gluons, making up the nuclei, become deconfined and enter a state called the Quark-Gluon plasma (QGP). Its properties are a window into the underlying nature of the strong force at extreme conditions and can be inferred from experimental measurement. During heavy-ion collisions, a collimated spray of energetic particles, known as jets, is formed and will be used to study the QGP. The quarks and gluons (i.e. partons) in the jet, are initially highly excited and will decay through multiple radiations (or splits) into partons of ever-increasing lifetime, while also exchanging energy and momentum with the QGP. As jets have been extensively studied in vacuum (i.e. without a QGP being present), they act as calibrated probes to study how energy-momentum is exchanged with the QGP, thereby providing insight into the properties of the QGP. The QGP medium thus causes jet quenching (energy loss to the medium) and transverse momentum broadening (a broadening of the initially narrow jet cone). A robust theoretical description of the QGP has been achieved through the usage of fluid dynamics. It has been found that the QGP is not an ideal fluid, and its dissipative properties, such as its shear and bulk viscosities, have recently been constrained, using Bayesian analysis relying solely on lower energy (i.e. not jet-related) hadrons. This work aims to include jet observables when constraining QGP viscosity through jet-medium interactions. The nature of these interactions changes as the excitation energy of the partons decrease (or as parton lifetime increases), going from perturbative at high excitation energy to non-perturbative at very low energy scales. Thus, this poster explores how jets are used as a tomographic probe to extract the temperature dependence of QGP viscosities, having access to both its early-time (partonic) and late-time (hadronic) contributions.

Keyword-1

Quark-Gluon plasma

Keyword-2

Heavy-Ion collisions

Keyword-3

Jets

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