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Jet Physics Program at RHIC

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Jets are produced in heavy-ion and nucleon-nucleon collisions from hard-scattered partons of the incoming beams. We can infer the property of hot-dense QCD matter, known as Quark-Gluon Plasma (QGP), by studying the modified jet properties in heavy-ion collisions to their vacuum reference. Relativistic Heavy-Ion Collider (RHIC), at BNL, New York, USA, can collide heavy-ions (like Au+Au and other species) up to the center of mass energy 200 GeV, and proton-proton up to 500 GeV. These collision systems provide a unique opportunity to study the finite temperature QCD medium created in heavy-ion collisions and its vacuum expectations in p+p collisions. I will shed light on the discovery of jet-quenching during the early RHIC accelerator operation and the recent progress that provides a deeper understanding of the medium-induced parton energy loss at RHIC energy. Furthermore, p+p collisions data are analyzed to study the QCD parton shower and jet evolution in a vacuum environment. In the coming years, ongoing STAR and a new upcoming sPHENIX experiments plan to take high luminosity data to have dedicated high precision jet measurements to study the hot-dense and cold QCD medium and its vacuum expectation.

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