

Synopsis

What is the nature of the matter produced in proton-proton, proton-nucleus and nucleus-nucleus collisions? The traditional pictures of soft multi-particle production in proton-proton (pp) and nucleus-nucleus (AA) collisions are qualitatively different. In the latter, the mean-free path is much shorter than the system size, thus leading to fluid-like behavior, while for the former, a picture of free-streaming supplemented by fragmentation has been at the basis of successful phenomenological modeling. Recent observations of heavy-ion-like behavior (such as flow and strangeness enhancement) in pp and pA collisions challenge now this sharp qualitative distinction between large and small collision systems. In AA collisions, observations of large jet quenching effects are qualitatively consistent with a system of small mean-free path that exhibits fluid-like behavior, while in pp and pA collisions, current measurements of jet quenching constrain its magnitude to be much less than observed in AA collisions, and consistent with zero. What are the expectations for jet quenching in small systems? How is it possible that this hallmark of finite mean-free path is not seen so far in pp and pA, if it needs to be invoked for the explanation of flow-phenomena in these smaller systems?

This 3rd QCD ting will focus on all aspects of the search of jet quenching phenomena in small collision systems, including discussion of the experimental issues in identifying quenching effects in small systems; discussion of what is and what is not yet known theoretically about the system size dependence of jet quenching; and what precision theory and experiment need to achieve for a meaningful theory/data comparison in this newly emerging field.