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First Results from Hybrid Hadronization in Small and Large Systems

Thursday, June 4, 2020 10:55 AM (20 minutes)

"Hybrid Hadronization" is a new Monte Carlo package to hadronize systems of partons. It smoothly combines quark recombination applicable when distances between partons in phase space are small, and string fragmentation appropriate for dilute parton systems, following the picture outlined by Han et al. [PRC 93, 045207 (2016)]. Hybrid Hadronization integrates with PYTHIA 8 and can be applied to a variety of systems from $e^+ + e^-$ to A+A collisions. It takes systems of partons and their color flow information, for example from a Monte Carlo parton shower generator, as input. In addition, if for A+A collisions a thermal background medium is provided, the package allows to sample thermal partons that contribute to hadronization. Hybrid Hadronization is available for use as a standalone code and is also part of the JETSCAPE 2.0 release.
In this presentation we review the physics concepts underlying Hybrid Hadronization and demonstrate how users can use the code with various parton shower Monte Carlos. We present calculations of multiplicities, hadron chemistry, fragmentation functions and jet shapes in $e^+ + e^-$, $p + p$ and A+A collisions when Hybrid Hadronization is combined with different parton shower Monte Carlos (PYTHIA 6, PYTHIA 8 and JETSCAPE/MATTER). We compare to calculations using pure Lund string fragmentation as well as to data from LEP, RHIC and LHC. In particular, we discuss observable effects of the recombination of shower partons with thermal partons.

Collaboration (if applicable)

JETSCAPE

Track

Jets and High Momentum Hadrons

Contribution type

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