POETIC VI
September 7th-11th 2015
Palaiseau, France
6th International Conference on Physics Opportunities at an Electron-Ion Collider

Contribution ID: **96** Type: **Oral Presentation**

# Thermalization of mini-jets in a quark-gluon plasma

*Friday 11 September 2015 09:40 (20 minutes)*

We complete the physical picture for the evolution of a high-energy jet
propagating through a weakly-coupled quark-gluon plasma
by investigating the thermalization of the soft components of the jet.
We argue that the following scenario should hold:
the leading particle emits a significant number of mini-jets which promptly evolve via
quasi-democratic branchings and thus degrade into a myriad of soft gluons,
with energies of the order of the medium temperature $T$.
Via elastic collisions with the medium constituents, these soft gluons relax to local thermal equilibrium with the plasma
over a time scale which is considerably shorter than the typical lifetime of the mini-jet.
The thermalized gluons form a tail which lags behind the hard components of the jet.
We support this scenario, first, via parametric arguments and, next, by studying
a simplified kinetic equation, which describes the jet
dynamics in longitudinal phase-space.
We solve the kinetic equation using both (semi-)analytical and numerical methods.
In particular, we obtain the first exact, analytic, solutions to the ultrarelativistic
Fokker-Planck equation in one-dimensional phase-space.
Our results confirm the physical picture aforementioned
and demonstrate the quenching of the jet via multiple branching followed by the
thermalization of the soft gluons in the cascades.

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**Session Classification:** pp-pA-AA Parallel

**Track Classification:** Connection with pp, pA and AA physics