
Contribution ID: **800** Type: **Poster**

# A system of evolution equations for scattering and medium induced radiation of quarks and gluons

*Wednesday, 6 April 2022 18:58 (4 minutes)*

Partonic jets, i.e. highly energetic collimated sprays of strongly interacting particles, provide an excellent means to study the hot and dense medium
of a quark gluon plasma (QGP), since the highly energetic jet particles interact with the medium particles, however do not thermalize.
Jet particles in the medium undergo both processes of scatterings off medium particles as well as emission processes induced by the medium.
Medium induced radiation processes are created over time scales long enough that simultaneously multiple scattering processes off medium particle can
occur, which gives rise to interference effects. The resulting spectra were first described by Baier, Dokshitzer, Mueller, Peigné, Schiff and
independently Zakharov (BDMPS-Z). A resulting evolution equation for the fragmentation functions of gluons in jets was found by Blaizot,
Dominguez, Iancu, and Mehtar-Tani (BDIM). We extend this approach to a system of evolution equations for the in-medium evolution of both kinds of
jet partons, quarks and gluons, via coherent medium induced radiations as well as scatterings off medium particles[1].
The system of equations is solved numerically by a Monte-Carlo algorithm that also allows to obtain results for individual jets that propagate in the
medium[2]. Thus, we are able to study the in-medium angular jet-broadening of quark and gluon jets, where we find that the latter are less collimated
than the former.

References:
[1] E. Blanco, K. Kutak, W. Płaczek, M. Rohrmoser, K. Tywoniuk, arxiv: 2109.05918 [hep-ph]
[2] M. Rohrmoser, arxiv: 2111.00323 [hep-ph]

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**Session Classification:** Poster Session 2 T04_1

**Track Classification:** Jets, high-pT hadrons, and medium response