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A unified picture of medium-induced radiation

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We revisit the picture of jets propagating in the quark-gluon plasma. In addition to vacuum radiation, partons scatter on the medium constituents resulting in induced emissions. We achieve full analytical control of the relevant scales and map out the dominant physical processes in the full phase space for the first time. This covers the whole phase space from early to late times, and from hard splittings to emissions down to the thermal scale. Based on the separation of scales, a space-time picture naturally emerges: at early times, induced emissions start to build from rare scatterings with the medium. At a later stage, induced emissions due to multiple soft scatterings result in a turbulent cascade that rapidly degrades energy down to the thermal scale. Our work serves to improve our understanding of jet quenching from small to large systems and for future upgrades of Monte Carlo generators. Moreover, our factorized picture leads to the possibility for power counting and thus defining accuracy for medium-induced jets for the first time.

References:
J.H.Isaksen, A.Takacs, K.Tywoniuk, arXiv:2206.02811

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