

Quantum interference in showering: Progress on IR-safe calculations

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High-energy particles passing through matter lose energy by showering via splitting processes such as hard bremsstrahlung and pair production. There has been a great deal of research in the last 5 years on what happens if two successive splittings in such a shower overlap quantum mechanically, so that their splitting probabilities cannot be treated independently. The effects of soft bremsstrahlung have been shown to be significant for QCD applications but are also absorbable into effective running of a parameter \hat{q} that describes the medium. Is that enough? What about interference effects that cannot be absorbed, such as from interference between two successive hard bremsstrahlung splittings – are those small effects? And what's a clean, infrared-safe thought experiment for separating hard from soft bremsstrahlung interference effects on shower development, in order to cleanly address this question? This talk will explain these issues and discuss recent progress on explicit calculations, which require computing virtual corrections to double-splitting processes without taking the soft limit.

Primary author(s) : ARNOLD, Peter (University of Virginia)

Presenter(s) : ARNOLD, Peter (University of Virginia)

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