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## Universality of perturbative QCD soft radiation in ee, ep, and pp collisions

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Soft radiation consists of coherent low energy gluons that interact with initial and final state jets at wide angles from the jet axis, and we show that this soft radiation in ee, ep and pp collisions is universal to order  $\alpha_s^2$  in perturbation theory. We factor this soft radiation out of the multi-scale cross-section using Soft Collinear Effective Theory, which is an effective field theory of QCD for processes with high energy, light-like degrees of freedom interacting via soft degrees. The universality of soft radiation suggests that low energy QCD radiation is independent of the process and can be decoupled from the high-energy, short-distance jet structure.

### Summary

**Presenter(s)** : ZHANG, Ou (University of Arizona and IPN-Orsay)

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