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# Linear Power Corrections in Collider Processes

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Understanding leading non-perturbative corrections, showing up as linear power corrections, is crucial to properly describe observables both at lepton and hadron colliders.
Using an abelian model, we examine these effects for the transverse momentum distribution of a $Z$ boson produced in association with a jet in hadronic collisions, that is one of the cleanest LHC observables, where the presence of leading non-perturbative corrections would spoil the chance to reach the current experimental accuracy, even considering higher orders in the perturbative expansion.
As we did not find any such corrections exploiting numeric techniques, we looked for a rigorous field-theoretical derivation of them, and explain under which circumstances linear power corrections can arise.
We apply our theoretical understanding to the study of event-shape observables in $e^+e^-$ annihilation, focusing in particular on $C$-parameter and thrust, and obtaining for them an estimate of non-perturbative corrections in the three-jet region for the first time.
These observables are routinely used to extract the strong coupling constant of $\alpha_s$ and they constitute an environment to test perturbative QCD.
It is then extremely important to obtain reliable estimates of non-perturbative corrections in the whole kinematic region relevant for the $\alpha_s$ fits.

## In-person participation

Yes

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