

## Übungen “Physik am LHC” Blatt I

### Rapidity:

1. Consider a heavy particle at rest decaying isotropically, which pseudo-rapidity distribution do you expect for the decay products?
2. Show that the whole rapidity distributions shifts by a constant when the particle moves with a velocity  $\beta$  along the  $z$ -axis. What is this constant?
3. In which rapidity range do you expect  $Z$  bosons at the LHC, in which range their decay products?
4. Answer the same question for a hypothetical  $Z'$  boson with a mass of 1 TeV!
5. Assume that the Parton Distribution Functions are proportional to  $\frac{1}{x}$ . What rapidity distribution do you expect for  $Z$  Production?