Übungen zur Astroteilchenphysik 1
Wintersemester 2010/2011

Dicember 6, 2010

Exercise 1: Luminosity and Angular Distances.

While redshift, flux, and angular diameter of a cosmological source are directly measurable, we have no direct way to obtain the distance. Discuss how the cosmological distance of a source can be estimated by using the redshift and the angular distance.

Exercise 2: Feynman Diagrams.

Discuss if the following processes are allowed in the standard model. If they are allowed draw the Feynman Diagram. If not, explain why the process is forbidden.

$p\ \nu \rightarrow p\ \nu$
$e^+\ e^- \rightarrow e^+\ e^-$
$n\ \nu_e \rightarrow p\ e^-$
$t \rightarrow \nu_\mu$
$n \rightarrow e^+\ e^-$
$\tau^- \rightarrow \mu^-\ \nu_\tau \bar{\nu}_\mu$
$\mu^- \rightarrow \pi^+\ \pi^-\ \pi^-\ \nu_\mu$
$\pi^0 \rightarrow \nu\ \bar{\nu}$

$n\ \nu \rightarrow n\ \nu$
$\mu^- \rightarrow e^-\ \nu_e\ \nu_\mu$
$u\ s \rightarrow u\ s$
$\pi^0 \rightarrow \gamma\ \gamma$
$n\ \bar{\nu}_e \rightarrow p\ e^-$
$\tau^- \rightarrow \pi^+\ \pi^-\ \pi^-\ \nu_\tau$
$e^+\ e^- \rightarrow u\ \bar{u}$