Outline

Introduction:

Cover the outline of the presentation

Interaction of particles with matter:

* Ionization loss, radiation loss, if it’s a photon: three ways by which it loses energy, strong interaction
  + Ionization loss: a brief explanation; expression, dependence on the medium and incident particle; examples (numbers)
  + Bremsstrahlung: a brief explanation; expression; dependence on the medium and incident particle; examples (numbers)

(A brief talk about critical energy)

* + Strong interaction: a brief introduction, reactions (multiplicity of particles produced), dependence on the medium and incident particle; examples of the particles that undergo strong interaction.
  + Interaction of photon: Three ways of losing energy, energy values for the three, order of energy loss for the three ways, scenarios in which we come across the three means.
* Showers:
  + Electromagnetic shower:
    - Show the picture and explain
    - Talk about size of the shower, propagation of shower and the variation of measurable quantities as the shower progresses
    - Talk about radiation length (assignment 3; problem 5), intuitive origin, expression, dependence on the incoming particle and medium, examples (numbers), number of radiation lengths to contain the whole shower.
    - When do we come across an electromagnetic shower
  + Hadronic shower:
    - Show the picture and explain
    - Difference between electromagnetic and hadronic shower
    - Propagation of shower
    - Longitudinal and lateral growth of the shower
    - Talk about variables related to shower (see assignment 2)
    - Interaction length and examples (numbers), intuitive origin, expression, dependence on the incoming particle and medium
    - (at high energies, interaction length becomes almost constant and for iron he said it’s 90gcm-2, look into the notebook)
    - When do we come across hadronic showers
  + Incorporate photon absorption length:
    - Expression, intuitive origin, dependence of expression on the medium, examples(numbers), where do we come across this term

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Interaction of particles matter:

Energy loss mechanism:

If a particle is traversing the medium, it can lose it’s energy in multiple ways:

1. It might cause ionization in the medium depending upon it’s incident energy
2. It can undergo coulombic collisions with the nuclei and lose it’s energy in the form of radiation. Provided that it is having sufficient energy to do that.
3. If the particle is composed of quarks, it can undergo strong interaction with the nuclei and produce hadronic shower.
4. If it’s a photon, then it can lose it’s energy in three ways: Photoelectric effect, Compton Scattering, Pair production
5. If the particle is unstable, then it will decay, but before that, it will undergo above mentioned interactions depending on it’s type.

Here we will briefly talk about all of the ways, a particle can lose it’s energy.

1. Energy loss by ionization: