

Technical proposal cosmic ray setup

Theory

Due to the magnetic field of the earth, particles that are created in an airshower are bent along their path. Positive particles and negative particles are bent towards east and west, respectively. See figure 1.

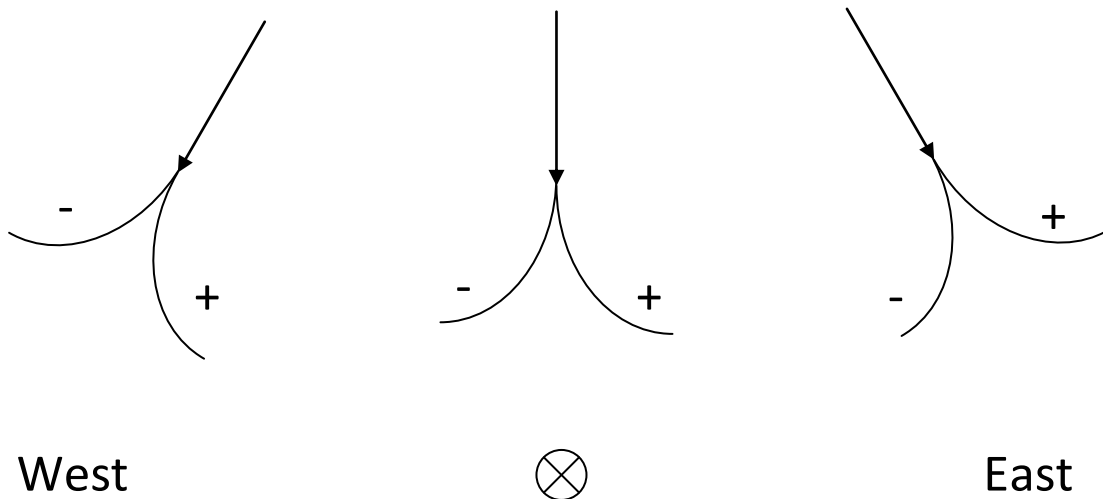


Figure 1: illustration of bending tracks for positive and negative particles. The magnetic field is pointed towards the arctic.

On earth, a positive particle has a higher probability to enter from the west. If there is charge asymmetry in cosmic rays, it is expected that there is a difference in the yield of particles coming from west with respect to the east.

The setup we propose aims at measuring this difference. We make use of two coincidence counters and four scintillation plates to measure particles coming from east and west simultaneously. The setup is shown in figure 2. Similar colours are used for one coincidence unit. In order to cover the largest range of angles, the scintillator plates are placed very close together. The 'blue' ('red') coincidences will give the number of particles coming from the west (east). The setup will be rotated 180° in order to account for systematic effects, such as differences in efficiencies or geometric asymmetries.

The result will be $(N(\text{West}) - N(\text{east})) / (N(\text{west}) + N(\text{east}))$, and the statistical error will be determined by propagating the poissonian errors on the yields.

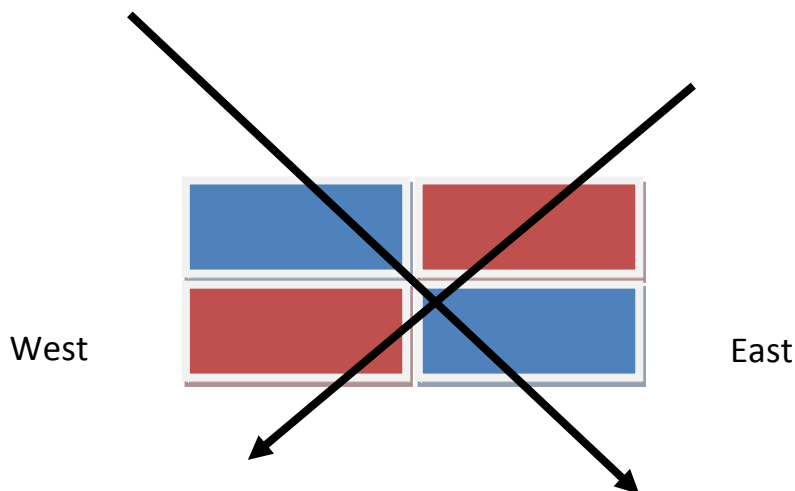


Figure 2: schematic of the setup.