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A Linear Accelerator for TA-FD calibration

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Abstract content

The energy of the primary cosmic ray can be calculated from fluorescence photons detected by fluorescence telescope. However, since we can not know the true energy of primary cosmic ray, it is difficult to calibrate between number of photons and energy directly. In TA project, we will create pseudo- cosmic ray events by using accelerated electron beam which is injected in the air. The injected electron beam creates an air shower and fluorescence photons are emitted. We can calibate between electron beam energy which is known exactry and detected photons. We are developping a small linear accelerator (Linac) at High Energy Accelerator Research Organization (KEK) in Japan. The maximum energy is 40MeV, the typical current is 0.16nC, and the intensity per pulse is 6.4mJ. The accuracy of beam energy is less than 1%. The Linac consists of a -100kV pulse type electron gun, a 1.5m pre-buncher and buncher tube, a 2m S-band accelerator tube, a quadrupole magnet, a 90 degree bending magnet, and a S-Band(2856MHz) 50MW high power klystron as RF source. We chekced the performance of the electron beam, energy resolution, beam spread, beam current, and beam loss by PARMELA simulation, and checked the air shower by electron beam and number of the detected photons by detector simulation which are made by GEANT4. In this Spring, we will do the full beam test in KEK. The beam operation in Utah will be started from this Autumn. In this talk, we will report about the results of the beam test and calibration method by this Linac.

If this papers is presented for a collaboration, please specify the collaboration

the Telescope Array Collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 5 (HE part 2), pages 1069-1072

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