

A POSSIBLE HIGH ALTITUDE HIGH ENERGY GAMMA RAY OBSERVATORY IN INDIA

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Recently an Indian Astronomical Observatory has been set up at Hanle ($32^{\circ} 46' 46''$ N, $78^{\circ} 57' 51''$ E, 4515m above msl) situated in the high altitude cold desert in the Himalayas. The Observatory has 2-m aperture optical-infrared telescope, recently built by the Indian Institute of Astrophysics.

We have carried out systematic simulations for this observation level to study the nature of Cerenkov light pool generated by gamma ray and proton primaries incident vertically at the top of the atmosphere. The differences the shape of the lateral distributions of Cerenkov light with respect to that at lower altitudes is striking. This arises primarily due to the proximity of the shower maximum to the observation site. The limited lateral spread of the Cerenkov light pool and near 90% atmospheric transmission at this high altitude location makes it an ideal site for a gamma ray observatory. This results in a decrease in the gamma ray energy threshold by a factor of 2.4 compared to that at an observation altitude of 1000 m amsl. Local and medium range photon density fluctuations as well as photon arrival time jitter, being relatively more pronounced at this altitude could be efficiently used to discriminate gamma rays from more abundant cosmic rays at tens of GeV energies. The larger curvature of the Cerenkov light front enables one to estimate the height of shower maximum more accurately which in turn results in improved estimate of shower arrival direction, core location as well as primary energy resolution.