

EUSO-SPB2 Telescope Optics and Testing

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The Extreme Universe Space Observatory - Super Pressure Balloon (EUSO-SPB2) mission will fly two custom telescopes that feature Schmidt optics to measure Čerenkov- and fluorescence-emission from extensive air-showers at the PeV and EeV-scale. Both telescopes have 1-meter diameter apertures and UV/UV-visible sensitivity. The Čerenkov telescope uses a bifocal mirror segment alignment, to distinguish between a direct cosmic ray that hits the camera versus the Čerenkov light from outside the telescope. Telescope integration and laboratory calibration will be performed in Colorado. To estimate the point spread function and efficiency of the integrated telescopes, a test beam system that delivers a 1-meter diameter parallel beam of light is being fabricated. End-to-end tests of the fully integrated instruments will be carried out in a field campaign at dark sites in the Utah desert using cosmic rays, stars, and artificial light sources. Laser tracks have long been used to characterize the performance of fluorescence detectors in the field. For EUSO-SPB2 an improvement in the method that includes a correction for aerosol attenuation is anticipated by using a bi-dynamic Lidar configuration in which both the laser and the telescope are steerable. We plan to conduct these field tests in Fall 2021 and Spring 2022 to accommodate the scheduled launch of EUSO-SPB2 in 2023 from Wanaka, New Zealand.

37th International Cosmic Ray Conference (ICRC 2021)
July 12th – 23rd, 2021
Online – Berlin, Germany

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