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Measurement of the Proton and Helium spectrum with KM2A and WFCTA of the LHAASO experiment

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We report on the measurement with high statistics of the energy spectrum of light component (Proton plus Helium nuclei) in cosmic rays by Large High Altitude Air Shower Observatory (LHAASO) around the knee region. LHAASO is a composite cosmic ray observatory, which consists of three detector arrays, including the square meter Kilometer Array (KM2A), the Water Cherenkov Detector Array (WCDA), and the Wide Field of View Cherenkov Telescope Array (WFCTA). The LHAASO experiment with multiple types of detectors can achieve the multi-parameter measurement of the cosmic ray air shower, the parameters including N_0, $Dist_0$, which are sensitive to the component of the cosmic ray were defined and can be used for the mass separation. The data used in this work were taken from Nov 1, 2020, to Mar 31, 2021. During that period the LHAASO consisted of the first six WFCTA telescopes, the first half KM2A array, and the first water pool of WCDA. The analysis was performed using only information from combined observations of WFCTA and KM2A. The energy spectrum of the light component measurement process is reported in this paper.

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