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Mirror facets alignment calibration in WFCTA telescope

The wide field of view Cherenkov telescope array (WFCTA) is one part of large high-altitude air shower observatory (LHAASO), its main scientific goal is to detect the single component of the cosmic rays energy spectrum around the knee with other parts of LHAASO. There are 18 telescopes in WFCTA and each telescope consists of 5 square meters sphere reflector which is made of 25 mirror facets. The alignment quality of 25 mirror facets will influence the properties of the telescope. After three years operation, the reflector of each telescope needs to be calibrated and aligned. However, the telescope cannot track the stars, meanwhile the conditions on site is very terrible, the traditional method cannot be adopted. We put up forward one new method to calibrate the reflector based on the Unmanned Aerial Vehicle (UAV). The UAV can fly with a light in the field of views in the long distance from 300 meters to 600 meters. At the same time, the camera and the white board are installed in the telescope to record the light spot. According to the shape of the spot, we can calibrate the directions of 25 mirror facets in each telescope. Based on the method above, we calibrate the reflectors of 18 telescopes and the sizes of light spots are all below 1 pixel, meeting the specifications.

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