ON THE LIGHT SIGNAL IN A FLUORESCENCE DETECTOR OF EXTREMELY HIGH ENERGY COSMIC RAYS

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The analysis of fluorescence light, emitted by the atmosphere when an extensive air shower passes through it, serves as a method of detection of high energy cosmic rays. The accuracy of the determination of the primary energy depends on the proper reconstruction of the cascade curve (the number of charged particles varying with atmospheric depth). To this end it is necessary to detect an unbiased fluorescence image of the shower.
Here we have studied the effect of the shower lateral distribution on the image formed in the fluorescence detector with angular resolution 1.5^{o} and PMT sensitivity as that in the Pierre Auger Observatory. We have also calculated time profile of the light signals in individual pixels (PMTs) and the influence of the finite shower disk thickness and its curvature on signal shapes. The calculations include the spherical aberration effect, blurring the image. We show that quite often a non-negligible part of the signal may be hidden in the 'side' pixels as a background increase.