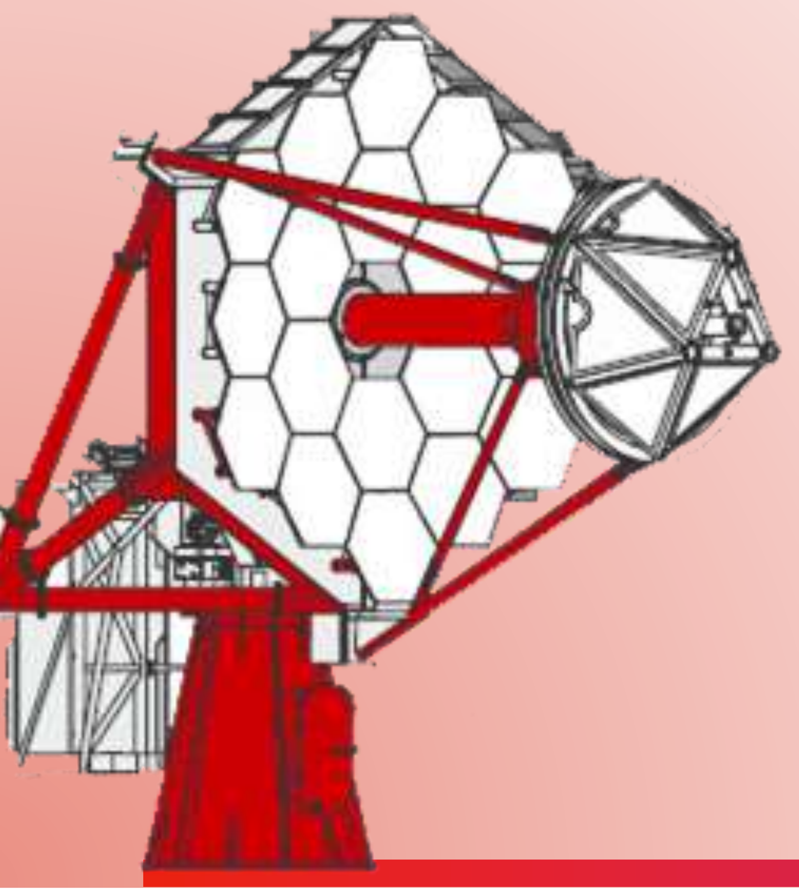

The ASTRI-Horn telescope: comparison with the auxiliary UVscope measurements as calibration tool

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ASTRI-Horn is a dual-mirror Cherenkov telescope installed on Mt.Etna, Italy, at the INAF "M.C. Fracastoro" observing station. The photo on the right shows the small **Uvscope** instrument a photon counter whose sensor is a multi-anode photomultiplier, devoted to measurements of the night sky background.
UVscope is mounted under the primary mirror structure of the ASTRI-Horn telescope and coaligned with its Cherenkov camera.

STEP OF THE ANALYSIS

1. Select, with a negative cleaning, ASTRI-Horn pixels containing the night sky background (NSB).
2. Remove stars from the images (see Fig.1)
3. Compute the distribution of the NSB photoelectrons (p.e.)
4. Fit this distribution with a Gaussians (see Fig. 2)
5. Correlate the sigma of the Gaussian (RMS) with UVscope measurements

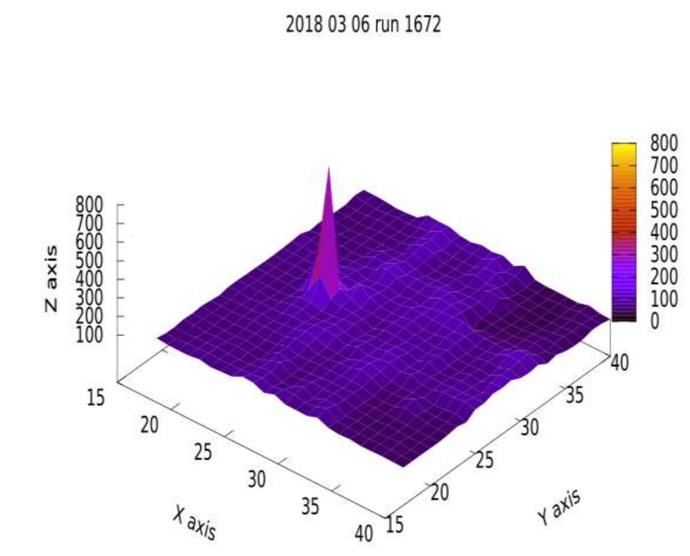

Fig.1: RMS image relative to the night of 2019 March 6-7. The peak is Zeta Tauri, 1° off axis from the pointed source (Crab)

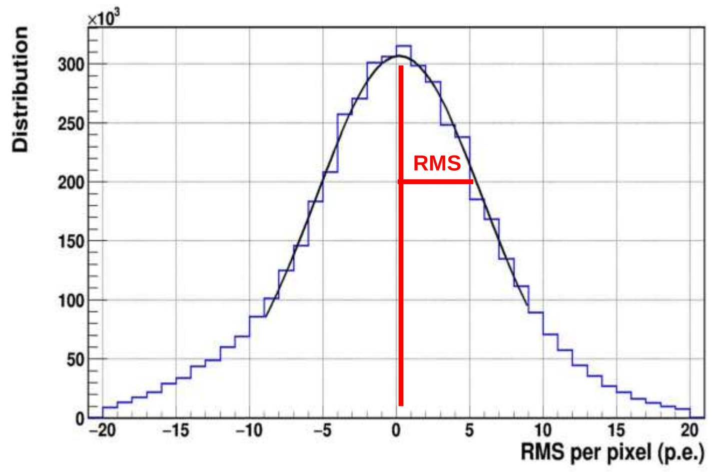

Fig.2: Distribution of the NSB p.e. detected by ASTRI-Horn in one of the Crab observations. The black curve is the Gaussian fit of the central region.

RESULTS

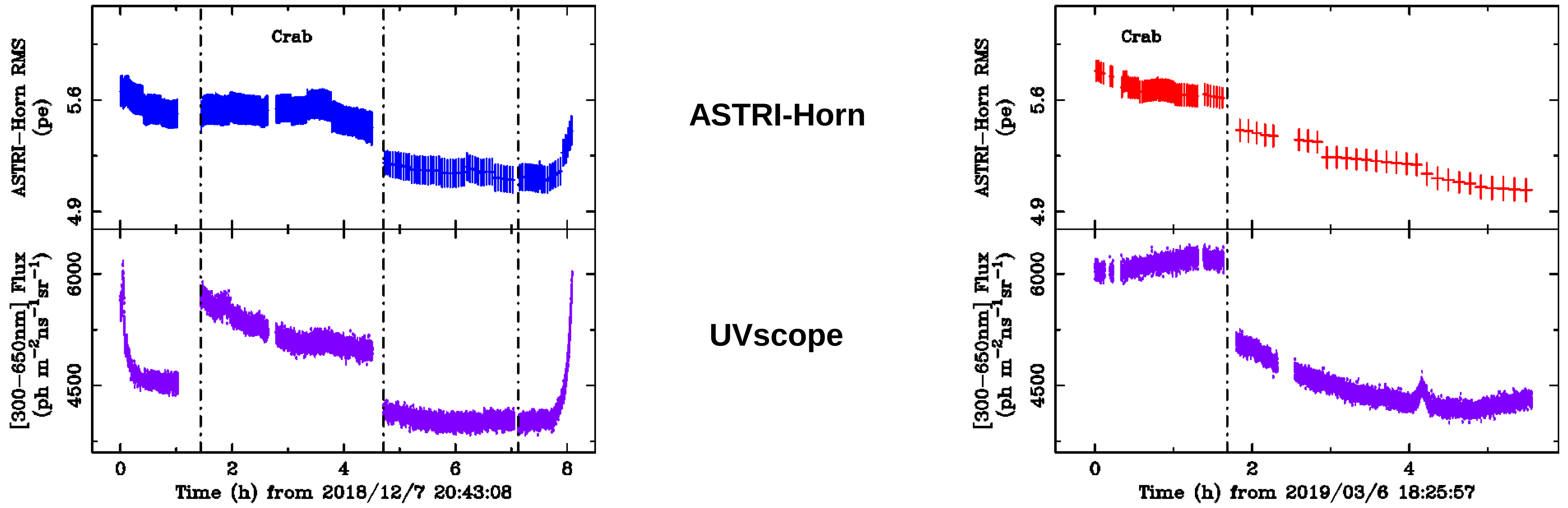

Fig.3: Temporal evolution of the **RMS** as measured by ASTRI-Horn (top panels) in about 2 minutes and the diffuse NSB **flux measured by UVscope** every second (bottom panels) relative to the observing night 2018 December 7–8 (left plot) and 2019 March 6-7 (right plot). The vertical dashed lines indicate variations of the telescope pointings. It is evident that ASTRI-Horn RMS follows the flux measured by UVscope. **Two regimes are detected: linear and saturated**

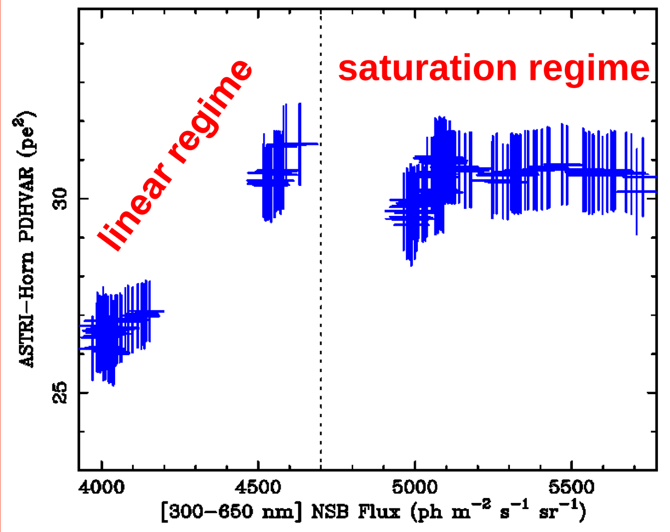

Fig.4: ASTRI-Horn RMS^2 (PDHVAR) vs the NSB flux measured by UVscope for the 2018 December 7-8 night. The dashed black vertical line indicates the level we used to distinguish the linear regime from saturation

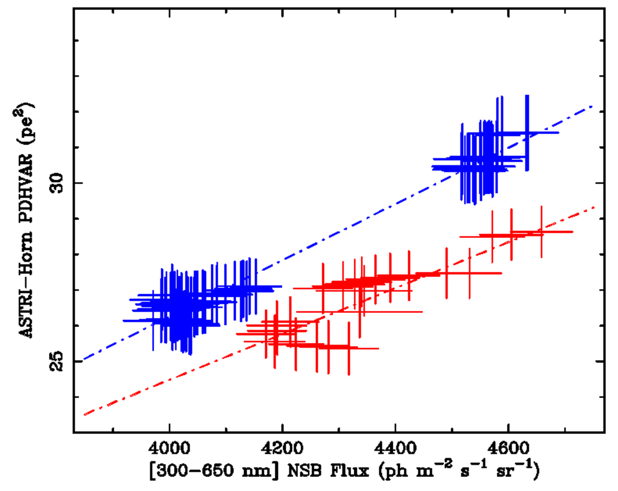

Fig.5: ASTRI-Horn RMS^2 as function of the diffuse NSB flux contemporarily measured by Uvscope for the 2018 December 7-8 (blue) and for the 2019 March 6-7 (red) night in the linear regime. The dash-dotted lines indicate the correlation lines.

The correlation factor measured on December 2018 is different from that measured on March 2019 because of a degrade of the ASTRI-Horn optics. The loss of efficiency measured with the ratio of the two correlation factors is in agreement with the value measured with muons. This results makes the correlation between the ASTRI-Horn RMS and the UVscope NSB flux measurements a good parameter for checking the stability of the telescope optical throughput.