The first cross-calibration of Imaging Atmospheric Cherenkov Telescopes with a UAV-based airborne calibration platform

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Test campaign & data analysis

❖ Cross-calibration of relative efficiencies of H.E.S.S. Cherenkov telescope array with novel UAV-based method

❖ First cross-calibration of Cherenkov telescopes with a single light source

❖ 2 successful runs in May 2018 with about 350 UAV events recorded in 4 smaller H.E.S.S. telescopes in each run

1. Event selection based on number of telescopes which record an event
2. Determination of UAV position by triangulation
3. Relative efficiencies from intensity of light recorded in each telescope
4. Consistency of telescopes' pointing from residuals on position determination

Image from https://www.mpi-hd.mpg.de/hfm/HESS/pages/about/telescopes/

Results

- ❖ Event-by-event relative efficiencies for 2 UAV runs compared to run-by-run muon efficiencies over whole observation period

- ❖ Deviation of relative efficiency between runs: 3.1% (taken in different night)

- ❖ Deviation of relative efficiencies between UAV & muon calibration: 5.5% and 6.3% respectively for the 2 runs

- ❖ UAV data allows to determine best pointing model when comparing pointing models from different epochs → Allows verification of pointing models

- ❖ No room for improvement of pointing models left with UAV data as best pointing model reduces residual size to level that non-operational camera pixels start dominating their size → Amelioration would need better recovery of non-operational pixels