PROPOSITIONS

accompanying the dissertation

STUDY OF COSMIC-RAY COMPOSITION WITH IMAGING ATMOSPHERIC CHERENKOV TELESCOPES

1. A novel approach that takes advantage of a detailed description of the extensive air shower enhances the capabilities of imaging atmospheric Cherenkov telescopes (IACTs) to measure cosmic rays. (Chapter 2)

2. A detailed description of extensive air showers, including the Cherenkov light emission, is an important improvement to the reconstruction of IACT data. (Chapter 3)

3. One of the main advantages of our shower profile reconstruction method lies in the simultaneous use of the data from dozens of telescopes without the computational expenses required by Monte Carlo template-based analysis. (Chapter 3)

4. Details of the instrumentation and data analysis, including systematic uncertainties, should be considered when analysing data measured by IACT towards composition studies. (Chapter 3)

5. The shower universality is a powerful concept to describe and reconstruct the shower evolution. (Chapters 3 and 4)

6. The resolution stated in our analysis does not represent the final shower maximum resolution expected by the entire CTA array at the end of the construction phase. Its interpretation, however, provides a baseline for iron and proton event separation. (Chapter 4)

7. CTA can distinguish between iron and proton images using convolutional neural networks with high classification efficiency. Its interpretation towards composition studies, however, will require a careful analysis, including other relevant cosmic-ray nuclei species. (Chapter 5)

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