



# Application of pattern spectra and convolutional neural networks to the analysis of simulated Cherenkov Telescope Array data

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**J. Aschersleben,<sup>a,\*</sup> R. F. Peletier,<sup>a</sup> M. Vecchi<sup>a</sup> and M. H. F. Wilkinson<sup>b</sup> on behalf of the CTA Collaboration**

<sup>a</sup>*Kapteyn Astronomical Institute*

*University of Groningen, PO Box 800, 9700 AV Groningen, The Netherlands*

<sup>b</sup>*Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*

*University of Groningen, PO Box 407, NL-9700 AK Groningen, The Netherlands*

*E-mail: [j.j.m.aschersleben@rug.nl](mailto:j.j.m.aschersleben@rug.nl), [r.f.peletier@rug.nl](mailto:r.f.peletier@rug.nl), [m.vecchi@rug.nl](mailto:m.vecchi@rug.nl),*

*[m.h.f.wilkinson@rug.nl](mailto:m.h.f.wilkinson@rug.nl)*

## Executive Summary

In this work, we generate pattern spectra from simulated gamma-ray events for the Cherenkov Telescope Array (CTA) in order to train a convolutional neural network (CNN) for energy reconstruction. Pattern spectra provide the distributions of the shapes and sizes of various objects comprising an image and promise to further improve the performance of the CNN. For the very first time, we show that pattern spectra can be used to reconstruct the energy of gamma rays and achieve a significant reduction in computational power and time needed to train our CNN, indicating the potential of pattern spectra in full gamma-ray event reconstruction.

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\*Presenter