

Reconstruction of stereoscopic CTA events using deep learning with CTLearn

Tuesday, July 13, 2021 1:18 PM (12 minutes)

The Cherenkov Telescope Array (CTA), conceived as an array of tens of imaging atmospheric Cherenkov telescopes (IACTs), is an international project for a next-generation ground-based gamma-ray observatory, aiming to improve on the sensitivity of current-generation instruments by an order of magnitude and provide energy coverage from 20 GeV to more than 300 TeV. Arrays of IACTs probe the very-high-energy gamma-ray sky. Their working principle consists of the simultaneous observation of air showers initiated by the interaction of very-high-energy gamma rays and cosmic rays with the atmosphere. Cherenkov photons induced by a given shower are focused onto the camera plane of the telescopes in the array, producing a multi-stereoscopic record of the event. This image contains the longitudinal development of the air shower, together with its spatial, temporal, and calorimetric information. The properties of the originating very-high-energy particle (type, energy and incoming direction) can be inferred from those images by reconstructing the full event using machine learning techniques. In this contribution, we present a purely deep-learning driven, full-event reconstruction of simulated, stereoscopic IACT events using CTLearn. CTLearn is a package that includes modules for loading and manipulating IACT data and for running deep learning models, using pixel-wise camera data as input.

Keywords

Collaboration

CTA

other Collaboration

Subcategory

Experimental Methods & Instrumentation

Primary author: MIENER, Tjark (IPARCOS, UCM)

Co-authors: Dr NIETO CASTAÑO, Daniel (IPARCOS, UCM); Mr BRILL, Aryeh (Columbia University); FOR THE CTA COLLABORATION

Presenter: MIENER, Tjark (IPARCOS, UCM)

Session Classification: Discussion

Track Classification: Scientific Field: GAI | Gamma Ray Indirect