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The Distributed Electronic Cosmic-ray Observatory (DECO)

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The Distributed Electronic Cosmic-ray Observatory (DECO) is a project that enables users to detect cosmic rays and other ionizing radiation with their own cell phones. The DECO app treats cellphone cameras as silicon track detectors. Event images are uploaded to a web-based database where users and other members of the public can query, download, and analyze them. A convolutional neural network automatically classifies events by morphology for particle identification. DECO detects atmospheric muons through their ionization loss in camera image sensors. It also detects radioactive decay products, including electrons that undergo multiple Coulomb scattering and gamma rays that Compton scatter. Our GEANT-based detector Monte Carlo simulation produces images qualitatively and quantitatively similar to those of DECO experimental data. The simulation is well suited for training image classifiers based on machine learning and quantifying the performance of image classifiers and event reconstruction algorithms. DECO makes otherwise invisible particles and phenomena visible to members of the public using their own devices, applying the same concepts and technologies as professional particle physics detectors. We present an overview of the DECO project, which lies at the nexus of education, outreach, and research.

Collaboration(s)

DECO

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