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On the Use of Convolutional Neural Networks for Turbulent Magnetic Field Helicity Classification

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The presence of non-zero helicity in intergalactic magnetic fields (IGMF) is a smoking gun for their primordial origin. Helical magnetic fields break CP invariance, what can be sued as an experimental signature. An estimator Q based on the triple scalar product of the wave vectors of photons generated in electromagnetic cascade from, e.g., TeV blazars has been suggested previously. Here, we propose the application of deep learning to helicity classification, by means of a Convolutional Neural Network (CNN), and show that this method outperforms the Q estimator.

Keywords

intergalactic magnetic fields; helical magnetic fields; TeV photons; electromagnetic cascades; machine learning

Collaboration

other Collaboration

Subcategory

Theoretical Methods

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