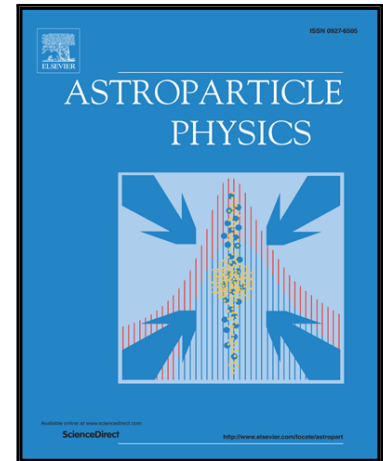


## Accepted Manuscript

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PII: S0927-6505(17)30267-0  
DOI: [10.1016/j.astropartphys.2018.04.004](https://doi.org/10.1016/j.astropartphys.2018.04.004)  
Reference: ASTPHY 2290



To appear in: *Astroparticle Physics*

Received date: 18 September 2017  
Revised date: 15 February 2018  
Accepted date: 17 April 2018

Please cite this article as: Tobias Winchen, Stijn Buitink, Energy Spectrum of Fast Second Order Fermi Accelerators as Sources of Ultra-High-Energy Cosmic Rays, *Astroparticle Physics* (2018), doi: [10.1016/j.astropartphys.2018.04.004](https://doi.org/10.1016/j.astropartphys.2018.04.004)

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# Energy Spectrum of Fast Second Order Fermi Accelerators as Sources of Ultra-High-Energy Cosmic Rays

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## Abstract

Stochastic acceleration of cosmic rays in second order Fermi processes is usually considered too slow to reach ultra-high energies, except in specific cases. In this paper we present the energy spectrum obtained from second order Fermi acceleration in highly turbulent magnetic fields as e.g. found in the outskirts of AGN jets in situations where it can be sufficiently fast to accelerate particles to the highest observed energies. We parametrize the resulting non-power-law spectra and show that these can describe the cosmic ray energy spectrum and mass-composition data at the highest energies if propagation effects are taken into account.

*Keywords:* High energy cosmic rays, UHECR, Acceleration of particles, Fermi-acceleration, Cosmic ray sources, Spectrum, Hillas' Plot

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## 1. Introduction

Cosmic rays are observed with energies from approximately 10 GeV up to energies above 100 EeV with a distribution commonly parametrized as a

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