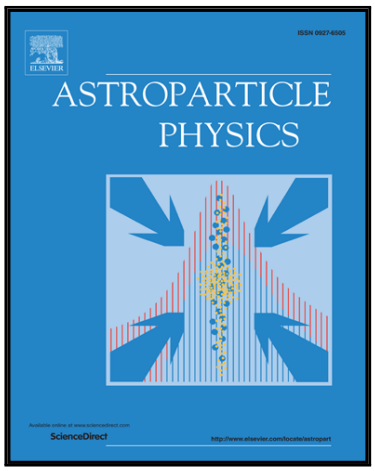


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Tobias Winchen, Stijn Buitink

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

Tobias Winchen[a,*], Stijn Buitink[a]

[a] *Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium*

**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

## 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

*Corresponding author
*Email address:* tobias.winchen@rwth-aachen.de (Tobias Winchen)