
Plan Overview

A Data Management Plan created using DMPTool

Title: FRG20-S: Cosmic-Ray Acceleration Based on Cyclotron Auto-Resonance

Creator: Yousef Salamin

Affiliation: American University of Sharjah (aus.edu)

Funding opportunity number: 43716

Template: Data Management Plan - AUS Funded Research

Project abstract:

A Zevatron is an accelerator scheme envisaged to accelerate particles to ZeV energies ($1 \text{ ZeV} = 10^{21} \text{ eV}$). Schemes, most notably the internal shock model, have been proposed to explain the acceleration of ultra-high-energy-cosmic-ray (UHECR) particles detected on Earth since 1962. Here, the cyclotron auto-resonance acceleration (CARA) mechanism is tailored and used to demonstrate acceleration of particles ejected as a result of violent astrophysical processes such as the merger of a binary system or a supernova explosion. Such events result in emission of highly-energetic particles and intense beamed radiation. In the simultaneous presence of a super-strong magnetic field, the condition of cyclotron auto-resonance may be met. Thus CARA acts like a booster accelerator for particles pre-accelerated inside their progenitor by shock waves, possibly among other means. As examples, it is shown here that nuclei of hydrogen, helium, and iron-56, may reach ZeV energies by cyclotron auto-resonance acceleration, under which conditions the particles, while gyrating around the lines of an ultra-strong magnetic field, also surf on the waves of a super-intense radiation field. It is shown here, too, that the ZeV energy gained by a particle does not fall by more than an order of magnitude if the resonance condition is missed by (1-2)%.

Last modified: 07-22-2019

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Data Collection

Give a summary of the data to be collected or produced.
Mathematica codes and figures.

Storage and Back-up

How will the data (digital or non-digital formats) be stored and backed up during the research?
Digital.

Access and Use Rights

What steps will be taken to protect privacy, confidentiality, intellectual property or other rights?
No access concerns.

Sharing Data and Controlling Access

Will data be shared during the course of the project?
Data will be shared by email and online shared workspace.

Data Organization, Documentation and Metadata

What documentation and / or metadata (information about the data) will ensure data can be retrieved and used?
Network Drive.

Data Preservation and Archiving

Should the data be considered for permanent retention / archiving?
No.