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

A Data Management Plan created using DMPTool

Creator: Yousef Salamin

Affiliation: American University of Sharjah (AUS)

Template: American University of Sharjah (AUS)

ORCID iD: <http://orcid.org/0000-0003-2343-4031>

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

Copyright information:

The above plan creator(s) have agreed that others may use as much of the text of this plan as they would like in their own plans, and customize it as necessary. You do not need to credit the creator(s) as the source of the language used, but using any of the plan's text does not imply that the creator(s) endorse, or have any relationship to, your project or proposal

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

Data Collection

Mathematica codes and figures.

Storage and Back-up

Digital.

Access and Use Rights

No access concerns.

Sharing Data and Controlling Access

Data will be shared by email and online shared workspace.

Data Organization, Documentation and Metadata

Network Drive.

Data Preservation and Archiving

No.