

On the possibility of motion with the speed greater than the speed of light

Vankov, Anatoli (2003) On the possibility of motion with the speed greater than the speed of light.

Full text available as:

[Microsoft Word](#) - Requires a viewer, such as [Microsoft Word Viewer](#)

Abstract

We investigated gravitational properties of particles within the Lagrangian formulation of Relativistic Mechanics. It was found that the speed of a particle having a rest mass increases while the speed of a photon decreases with gravitational field strength. Consequently, the particle in a gravitational field can reach the speed greater than the speed of light. Corresponding conditions were specified, in particular, for cosmic ray particles around Earth. Opportunities of superluminal particle observation by Cherenkov radiation detection with the use of satellite gamma-ray instrumentation are discussed.

We paid attention to the so-called Terrestrial Gamma Flashes (TGF) phenomenon accidentally discovered during the NASA program "Burst and Transient Source Experiment". The program was organized to study gamma ray bursts originating in deep space. The TGF events were observed during the BATSE mission and thought to be associated with upward breakdown emission in electron showers triggered by energetic electrons in upper atmosphere. Our analysis showed that this explanation has no physical ground. The TGF pattern looks very similar to what is expected from gamma bursts due to Cherenkov radiation from superluminal cosmic ray protons. This hypothesis can be verified in further experiments.

Keywords: superluminal particles, gravitational field, cosmic rays, terrestrial gamma flashes, BATSE, HESSI.

Subjects: [Specific Sciences: Physics: Relativity Theory](#)

ID Code: 1015

Deposited By: [Vankov, Anatoli](#)

Deposited On: 26 February 2003