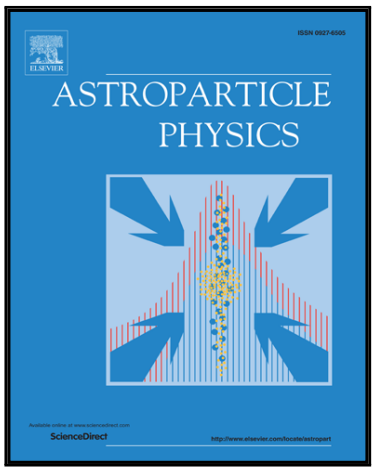

Influence of solar flares on behavior of solar neutrino flux

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Influence of solar flares on behavior of solar neutrino flux

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Abstract

Limiting ourselves to two flavor approximation the motion of the neutrino flux in the solar matter and twisting magnetic field is considered. For the neutrino system described by the 4-component wave function $\Psi^T = (\nu_{eL}, \nu_{XL}, \overline{\nu}_{eR}, \overline{\nu}_{XL})$, where $X = \mu, \tau$, an evolution equation is found. Our consideration carries general character, that is, it holds for any SM extensions with massive neutrinos. The resonance transitions of the electron neutrinos are investigated. Factors which influence on the electron neutrino flux, crossing a region of solar flares (SF) are defined. When the SF is absent a terrestrial detector records the electron neutrino flux weakened at the cost both of vacuum oscillations and of the MSW resonance conversion only. On the other hand, the electron neutrino flux passed the SF region in preflare period proves to be further weakened in so far as it undergoes one (Majorana neutrino) or two (Dirac neutrino) additional resonance conversions, apart from the MSW resonance and vacuum oscillations.

The hypothesis of the ν_e-induced decays which states that decreasing the beta decay rates of some elements of the periodic table is caused by reduction of the solar neutrino flux is discussed as well.

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Keys words: Neutrinos, Solar matter, Resonance transitions, Solar flares, ν_e-induced decays, MSW effect.

1 Introduction

The solar flares (SF) represents itself the most powerful of all the solar activity events. The energy released during the SF is about $10^{28} - 10^{32}$ erg. It is now widely accepted that the magnetic field provides a main energy source of the solar activity including

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