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The scalar field of screening models and neutrinos' helicity flip

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Investigating neutrinos'helicity flip that could be caused by the curvature of spacetime becomes more involved when the neutrinos are, in addition, allowed to couple to a scalar field. It is, nevertheless, of great importance to investigate such a possibility if one wishes to keep up with multi-messenger astronomy and explore novel ways of bringing into evidence any eventual existence of cosmological scalar fields in Nature. I will discuss neutrinos'helicity flip within well-known screening models from the literature, such as the chameleon and the symmetron models. Technical subtleties will be pointed out, and the main difficulties one encounters when dealing with rotating gravitational sources will be exposed.

Keyword-1

Curved spacetime

Keyword-2

Neutrino spin oscillation

Keyword-3

Screening models

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