

Axion-photon conversion of GRB221009A

The newly observed gamma ray burst GRB221009A exhibits the existence of 10~TeV-scale photons, and the axion-photon conversion has been suggested as a candidate to explain such energetic features of GRB221009A. In this work we adopt a model to calculate the conversion probability of the energetic photons from GRB221009A to the Earth. The result shows that the penetration probability of photons with energy above 10^1 ~TeV can be up to 10^{-2} to 10^{-4} depending on the coupling constant $g_{a\gamma}$ and the axion mass m_a , together on the magnetic field parameters of the source galaxy of GRB221009A. We show that the parameters of the source galaxy, with the magnetic field handled by a cellular model, contribute a lot of uncertainties to the penetration probability, so we have more freedom to reconcile a variety of axionlike particle parameters from other observations with the Large High Altitude Air Shower Observatory observation. By comparing the results in this article with the data from Large High Altitude Air Shower Observatory, we can obtain more precise constraints on the ranges of these parameters.

Primary author(s) : WANG, Luohan

Presenter(s) : WANG, Luohan