

Light by Light Scattering as a Probe for Axion Dark Matter

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The main goal of this work is to probe axion or axion-like particles (ALPs) in light-by-light forward scattering process. We consider the polarization effects caused by off-shell axions in the photon-photon scattering process. We show that the circular polarization signal generated in light-by-light scattering in the current/future laser experiments can shed more light on different aspects of these mysterious particles. Our results show a large enhancement in the conversion rate between circular and linear polarizations at the domain close to the resonance point of axions. This signal enhancement can be used in order to discriminate between the axion contribution to photon-photon scattering and one originates from the virtual electron-positron pairs in the pure QED framework.

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