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Search for axion-like particles at Electron-ion collider: higher luminosity, brighter perspective

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We study the promising perspective of search for axion-like particles (ALP) at the future electron-ion collider experiments. ALP could be the candidate for the dark matter of the universe. We calculate the production rate for those ALPs which are coupled to photons at electron-ion collider. Because of the large gamma factor for the electron but more prominently due to the achievable high luminosity at EIC, the number of such ALPs produced per year through light-by-light scattering at EIC can be sizable if their masses are within the range between 10 GeV and 100 GeV. This in turn would provide unprecedented constraint on ALP in this mass range. Furthermore, we also show the possibility of constraining Axion-gluon coupling if gluon saturation scenario is achieved at EIC.

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