

# Search for Axion-Like-Particle (ALP) with the ATLAS Forward Proton (AFP) Detector with Di-photons

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A search for forward proton scattering in association with light-by-light scattering mediated by an axion-like particle is presented, using the ATLAS Forward Proton spectrometer to detect scattered protons and the central ATLAS detector to detect pairs of outgoing photons. Proton-proton collision data recorded in 2017 at a centre-of-mass energy of  $\sqrt{s} = 13$  TeV were analysed, corresponding to an integrated luminosity of 14.6 fb<sup>-1</sup>. A total of 441 candidate signal events were selected. A search was made for a narrow resonance in the diphoton mass distribution, corresponding to an axion-like particle (ALP) with mass in the range 150-1600 GeV. No excess is observed above a smooth background. Upper limits on the production cross section of a narrow resonance are set as a function of the mass, and are interpreted as upper limits on the ALP production coupling constant, assuming 100% decay branching ratio into a photon pair. The inferred upper limit on the coupling constant is in the range 0.04-0.09 TeV<sup>-1</sup> at 95% confidence level.

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