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Axion-Photon Coupling Distributions for Non-Minimal DFSZ-type Axion Models

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We present a first combined theory prediction for the distribution of axion-photon couplings for non-minimal DFSZ and KSVZ models. Couplings of DFSZ models with more than one additional Higgs doublet are comparable to the non-minimal KSVZ literature values. They extend over a large range of parameters, reaching values up to almost three orders of magnitude larger than the ones observed in minimal models. The distributions of both DFSZ- and KSVZ-types of models display similar, very specific patterns. For the subset of DFSZ models with domain wall number of unity we find significantly enhanced axion-photon couplings. Our findings are relevant for axion searches like haloscopes, helioscopes, or light-shining-through-a-wall experiments.

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