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Interplay of ALP couplings at a future muon collider

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A future muon collider with TeV scale center of mass energy can provide a clean high-energy environment with advantages in searches for TeV-scale axion like particles (ALPs). Although the ALP couplings with the electroweak vector bosons have been considered in the literature at depth, its direct couplings with fermions remain unexplored. Further, the interplay of ALP-gluon and ALP-fermion couplings dictate the ALP decay channels. It is found that a large parameter space of TeV-scale ALPs with TeV-scale decay constants can be probed by utilizing the ALP-top quark and gluon coupling.

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