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Anomaly-free leptophilic axionlike particle and its flavor violating tests

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Motivated by the Xenon1T result, we study here a leptophilic flavor-dependent anomaly-free axionlike particle (ALP) and its effects on charged-lepton flavor violation. We present two representative models. The first one considers that the ALP originates from the flavon that generates the charged-lepton masses. The second model assumes a larger flavor symmetry such that more general mixings in the charged-lepton are possible, while maintaining flavor-dependent ALP couplings. We find that a keV ALP explaining the Xenon1T result is still viable for lepton flavor violation and stellar cooling astrophysical limits. On the other hand, if the Xenon1T result is confirmed, future charged-lepton flavor violation measurements can be complementary to probe such a possibility.

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