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Lepton Flavor Violation from diphoton effective operators

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We consider lepton flavor violating transitions mediated by the diphoton effective interaction $\ell\ell'\gamma\gamma$ and explore which processes can probe it better. Our analysis includes single and double radiative decays, $\ell \rightarrow \ell'\gamma(\gamma)$, as well as $\ell \rightarrow \ell'$ conversions in nuclei for all possible flavor combinations. We find that using the current upper bounds on the rate for $\ell \rightarrow \ell'\gamma$, we can derive model-independent upper limits on the rates for $\ell \rightarrow \ell'\gamma\gamma$. We conclude that currently, the best limits for the diphoton effective operators provides from the $\ell \rightarrow \ell'\gamma$ process, while the best future sensitivities are from $\mu \rightarrow e$ conversion in aluminum and potential $\tau \rightarrow \ell\gamma(\gamma)$ searches at Belle II or a Super Tau Charm Facility.

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