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Charged Lepton Flavor Violation and the new Mu2e and COMET experiments.

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Charged lepton flavor violating (CLFV) transitions are powerful probes of physics beyond the standard model, addressing the question of particle generations and the physics of flavor. Unlike weak decays, CLFV transitions among the muon, electron, and tau proceed without neutrinos. Such processes are extremely suppressed in the standard model, and an observation would be a clear sign of new physics. Worldwide efforts with new experiments will greatly improve on current data. Among future initiatives, the Mu2e experiment at Fermilab and the COMET experiment at J-PARC will search for the neutrinoless muon-to-electron conversion with unprecedented sensitivity. These experiments are expected to improve upon previous bounds by four order of magnitude, probing a wide range of new physics scenarios up to mass scales of nearly 10000 TeV, far beyond the direct reach of current colliders. Several approaches to CLFV searches will be reviewed, focusing on the Mu2e and COMET experiments.