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Beyond the Standard Model with Lepton Flavor Universality Violation

In recent years, exciting (indirect) hints for physics beyond the Standard Model (SM) have been accumulated. In particular, semi-leptonic B decays show deviations from the SM predictions, which, due to the ratios $R(K^{(*)})$ and $R(D^{(*)})$ are obviously related to lepton flavour universality violation (LFUV). However, {we point out} there are more anomalies which admit an interpretation in terms of LFUV: The anomalous magnetic moment of the muon, the Cabibbo angle anomaly, the CMS measurements of non-resonant di-electrons, the difference of the forward-backward asymmetry in $B \rightarrow D^* \ell \nu$ and leptonic tau decays. In this letter we discuss the experimental and theoretical status of these anomalies, {compare their strength and weaknesses} and examine {and synthesize} how they can be explained in terms of possible extensions of the SM by new particles and interactions. Even though not all anomalies might be confirmed in the future, this unified view of the anomalies in terms of LFUV significantly strengthens their relevance, which is crucial in order to construct a convincing physics case for future colliders.

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