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Implications of Br(μ-> e γ) and Δa_mu on muonic lepton flavour violating processes

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We study the implications of the experimental results on the \mu -> e\gamma decay rate and the muon anomalous magnetic moment, on muonic lepton flavor violating processes, such as \mu -> 3 e and \mu N -> e N. We use a model independent approach in this analysis, where these processes are considered to be loop induced by exchanging spin 1/2 and spin 0 particles. We explore two complementary cases, which has no or has an internal (built-in) cancellation mechanism in amplitudes. Our main results are as following. (a) Bounds from rates are used to constrain parameters, such as coupling constants and masses. These constraints can be easily updated by simple scalings, if the experimental situations change. (b) The muon g-2 data favors non-chiral interactions. (c) In \mu -> 3 e and \mu N -> e N processes, Z-penguin diagrams may play some role, while box diagrams contributions are usually highly constrained. (d) In the first case (without any built-in cancellation mechanism), using the recent \mu -> e\gamma bound, we find that \mu -> 3e and \mu N -> e N rates are bounded below the present experimental limits by two to three orders of magnitudes in general. Furthermore, by comparing \Delta a_\mu and Br(\mu->e\gamma) data, the couplings of \mu and e are found to be highly hierarchical. Additional suppression mechanism should be called for. (e) In the second case (with a built-in cancellation mechanism), mixing angles can provide additional suppression factors to satisfy the \Delta a_\mu and Br(\mu -> e\gamma) bounds. While the \mu-> 3 e rate remains suppressed, the bounds on \mu N -> e N rates, implicated from the latest \mu -> e\gamma bound, can be relaxed significantly and can be just below the present experimental limits.

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