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Testing lepton flavor universality with the $B^0 \rightarrow K^* \tau^+ \tau^-$ decay at LHCb

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Lepton flavor universality is a property of the Standard Model (SM) of particle physics according to which the coupling constants of the three families of leptons to the weak bosons are the same. The difference between the leptons is consequently due only to their masses. Even though this property has been experimentally tested, recently some tensions between SM predictions and measured values have arisen, pointing in the direction of a violation of lepton flavor universality. Modes with τ leptons in the final state are experimentally challenging and still largely unexplored, with lots of room left for possible new physics effects. In particular the $B^0 \rightarrow K^* \tau^+ \tau^-$ decay is expected to be suppressed in the SM, with a predicted branching ratio of 10^{-7} , but which could be enhanced by up to factors of 10^3 in new models, especially those involving the existence of leptoquarks.

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