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# Possible New Physics on $D_s^+ \to \eta^{(\prime)} l^+ \nu_l$ Decays in Scalar Leptoquark Model

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Recent measurements in flavour changing charged current (FCCC) $b \to c\bar{l}\nu_l$ transitions hint existence of new physics (NP) beyond the standard model (SM). The lepton flavour universality (LFU) ratios $R_{D^{(*)}}$ measured by BaBar, Belle and LHCb have shown around $3.3\sigma$ deviation between theory and experiment [1]. These anomalous results connected to the $b$ hadron decays indicate some signal of NP. Hence, a simple question arises in our mind, is there any possibility to find such anomalous results in charm decays? Although, most of the experimental results in the pure leptonic and semileptonic $D$ meson decays agree with the SM predictions, but significant deviations have been observed for branching ratio of $D_{(s)}^+ \to \eta^{(\prime)} l^+ \nu_l$ decays [2]. Therefore, there are some possibilities for existence of some NP. Several theoretical efforts [3-5] have been done recently to find the NP contribution in $D$ meson decays. In this work, we will investigate $D_s^+ \to \eta^{(\prime)} l^+ \nu_l$ decays in scalar leptoquark (LQ) model [6,7] to find possible NP footprint. Leptoquarks are the hypothetical beyond SM particles that couple a quark directly to a lepton unlike any particle within the SM and they have both spin zero $(s = 0)$ –scalar leptoquarks and one $(s = 1)$ –vector leptoquarks, they also carry colour and fractional electric charges. This model is the relics of grand unified theories. In this model for $c \to s\bar{l}_l$ transitions, we will predict the new Yukawa coupling parameters using recent experimental results of branching fraction for the semileptonic $D$ meson decays [2]. Using our predicted new couplings, we will study branching fraction of the above decays. To determine whether this NP model is accepted, a comparison between the SM, the experiment and our model will be conducted. We will be able to better comprehend the existence of NP with the help of the impending measurement of $D$ meson decays in the BESIII and Belle II experiments.

**References**

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