

Radiative and Rare Charm Decays at BESIII

Tuesday, 28 July 2020 17:00 (15 minutes)

In this talk, we present the latest result on radiative and rare/forbidden decays for D mesons at the BESIII experiment based on 2.92 fb⁻¹ and 3.19 fb⁻¹ data taken at the center-of-mass energy 3.773 4.178 GeV with the BESIII detector, respectively. Based the data at 4.178 GeV, a search for the rare radiative leptonic decay $D_s \rightarrow \gamma e^+ \nu$ is performed for the first time with negative result and an upper limit (UL) of the branching fraction (BF) is set to be less than $1.310E-4$ at 90% confidence level (CL). With this data sample, we also search for the rare decay $D_s \rightarrow p \bar{e}^+ \nu$. No significant signal is observed, and an UL $B(D_s \rightarrow p \bar{e}^+ \nu) < 2.010E-4$ is determined at the 90% CL. Using the dataset at 3.773 GeV, we search for rare decays of $D \rightarrow h(h') e^+ e^-$ with double tag method, where $h(h')$ are hadrons. No significant excess over the expected backgrounds is observed, the ULs on the signal BFs at the 90% CL are determined. For the D^+ decays, the searches are performed for the first time, while for D^0 decays, the ULs are improved in general by a factor of 10, compared to previous measurements. All the ULs on the BF, at the level of $10E - 5$ $10E - 6$, are above the SM predictions, which include both LD and SD contributions. Also, we search for the Majorana neutrino in the leptonic $K \pi e^+ e^-$. No significant signal is observed, and the ULs on the BF at the 90% CL are set to be less than few $10E - 6$. The Majorana neutrino is searched for with different mass assumptions ranging from 0.25 to 1.0 GeV / in the decays $D^0 \rightarrow K^- e^+ \nu_N (\pi^+ e^-)$ and $D^+ \rightarrow K^0 e^+ \nu_N (\pi^- e^+)$, and the UL on the BF at the 90% CL are extracted to be at the level of $10E - 7 \sim 10E - 6$. The constraints on the mixing matrix element $|V_{eN}|^2$ are also evaluated.

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Primary author: Dr ZHENG, Bo (University of South China)

Presenter: Dr ZHENG, Bo (University of South China)

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