

Prospects of measuring $D \rightarrow K_1 \ell \nu$ @ LHCb & STCF

The angular distributions for the decay cascade $D \rightarrow K_1(1270, 1400)\ell^+\nu_\ell \rightarrow (K\pi\pi)\ell^+\nu_\ell (\ell = e, \mu)$ have been derived, and we found that the measurement of up-down asymmetry in $D \rightarrow K_1 e^+\nu_e \rightarrow (K\pi\pi)e^+\nu_e$ and angular distributions in $D \rightarrow K_1 \ell^+\nu_\ell \rightarrow (K\pi\pi)\ell^+\nu_\ell$ can help to determine the hadronic amplitude requested in $B \rightarrow K_1(\rightarrow K\pi\pi)\gamma$, which allows us to extract the photon polarization. Based on the first observation of the $D^0 \rightarrow K_1(1270)^- e^+\nu_e$ semileptonic decay currently presented at BESIII, we expect that the angular analysis on $D \rightarrow K_1 \ell^+\nu_\ell \rightarrow (K\pi\pi)\ell^+\nu_\ell (\ell = e, \mu)$ at LHCb and STCF can give us a precise determination of photon polarization in $b \rightarrow s\gamma$ transitions in combination with the $B \rightarrow K_1(1270)\gamma$ up-down asymmetry measurements.

Presentation type

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