



Contribution ID: 66

Type: Oral

## Search for the decay $B \rightarrow D^{(*)}\eta\pi$ at Belle and Belle II

We present a search for the yet-unobserved  $B \rightarrow D^{(*)}\eta\pi$  decay at Belle and Belle II. This search aims to provide insights into the semi-leptonic (SL) gap, which refers to the deficit in the sum of the branching fractions of known exclusive decays compared to the measured inclusive  $b \rightarrow c\ell\nu$  branching fraction. Common models addressing this deficit suggest the existence of  $B \rightarrow D^{(*)}\eta\ell\nu$  decays with a branching fraction of the order of  $10^{-3}$ , which could imply a branching fraction of  $B \rightarrow D^{(*)}\eta\pi$  of the order of  $10^{-4}$  based on a naive prediction derived from the ratio of branching fractions of  $B \rightarrow D^{(*)}\pi$  and  $B \rightarrow D^{(*)}\ell\nu$ . The study of  $B \rightarrow D\eta\pi$  will also aid in understanding the two pole structure of  $D_0^*(2400)$  meson through the coupled channel  $D\eta$ . Utilizing the  $\sim 1.1 \text{ ab}^{-1}$  of data collected at Belle and Belle II combined, we are initiating a preliminary search to investigate and potentially observe these decays for the first time. This search is also expected to significantly enhance our understanding of the  $B$  hadronic sector.

### Field of contribution

Experiment

**Author:** V S, VISMAYA (Indian Institute of Technology(IIT) Hyderabad)

**Co-authors:** TRABELSI, Karim (TYL - KEK); SANDILYA, Saurabh (Indian Institute of Technology Hyderabad)

**Presenter:** V S, VISMAYA (Indian Institute of Technology(IIT) Hyderabad)

**Track Classification:** Quark and lepton flavour physics