

# 31st International Symposium on Lepton Photon Interactions at High Energies



Contribution ID: 62 Contribution code: P58

Type: Poster

## A combined study of the exclusive mesonic modes to extract $|V_{ub}|/|V_{cb}|$

Monday 17 July 2023 18:05 (1 minute)

The precise estimate of the ratio  $|V_{ub}|/|V_{cb}|$  is of utmost importance since it plays an essential role in the determination of the sides of the Unitarity Triangle and is an important ingredient in understanding the CKM picture of the

Standard Model. It can be measured directly or indirectly from the extraction of  $|V_{ub}|$  and  $|V_{cb}|$  from the respective exclusive and inclusive  $b \rightarrow ul\nu_l$  and  $b \rightarrow cl\nu_l$  decays. We have worked on the  $b \rightarrow ul\nu$  modes, for eg.  $B \rightarrow (\pi, \rho, \omega)\ell\nu_\ell$  and  $B_s \rightarrow K\mu\nu_\mu$  for a combined extraction of  $|V_{ub}|^{exc}$  and the exclusive  $b \rightarrow cl\nu$  channels for eg.  $B(B_s) \rightarrow D^{(*)}(D_s^{(*)})l\nu$  for combined extraction of  $|V_{cb}|^{exc}$ . There has been a recent measurement of the ratio  $BR(B_s \rightarrow K\mu\nu)/BR(B_s \rightarrow D_s\mu\nu)$  from LHCb which is proportional to  $|V_{ub}|^2/|V_{cb}|^2$ . Thus, from a simultaneous analysis of  $b \rightarrow ul\nu$  and  $b \rightarrow cl\nu$  modes in different fit scenarios with or without the inputs on the ratios of the branching fractions in the two bins, we obtain the ratio  $|V_{ub}|/|V_{cb}|$ . We have also extracted the correlation between  $|V_{ub}|$  and  $|V_{cb}|$  for different cases and provided the predictions of  $\mathcal{BR}(B_s \rightarrow K\mu\nu_\mu)$  and  $\mathcal{BR}(B \rightarrow (\rho, \omega)\ell\nu_\ell)$  in the Standard Model in small  $q^2$ -bins. We find a value for  $|V_{ub}|/|V_{cb}|$  which is consistent with the determination from the ratio of partial rates of baryonic decays  $BR(\Lambda_b \rightarrow p\mu\nu)/BR(\Lambda_b \rightarrow \Lambda_c\mu\nu)$  from LHCb.

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**Session Classification:** Reception and poster presentation

**Track Classification:** Flavour physics