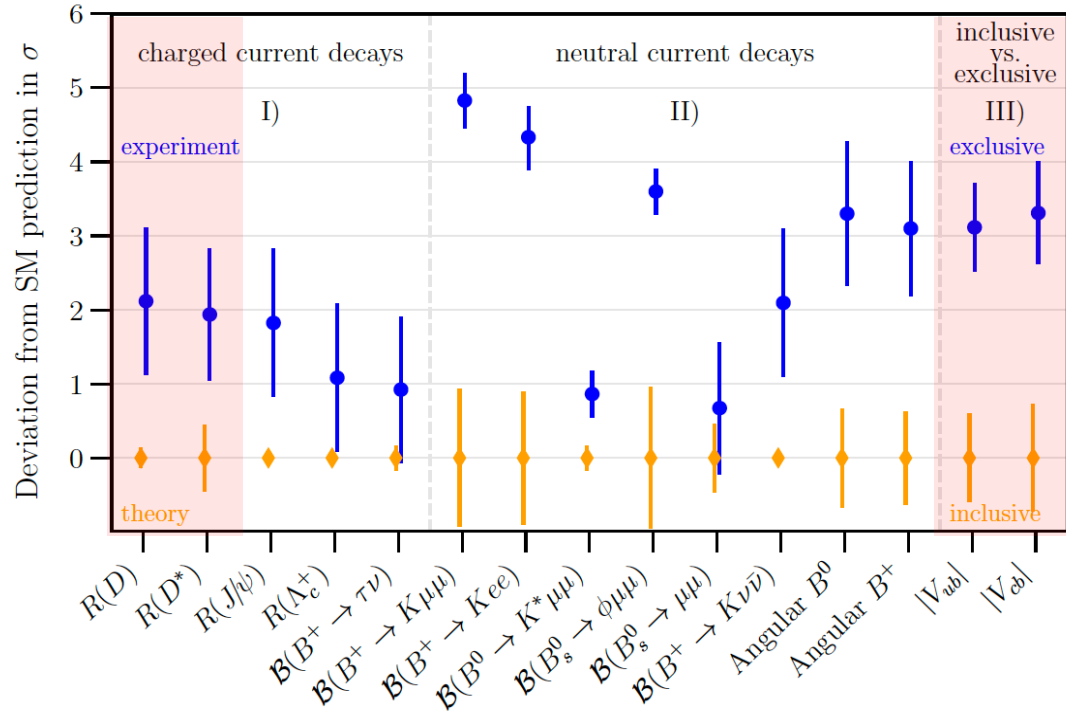


# color meets flavor

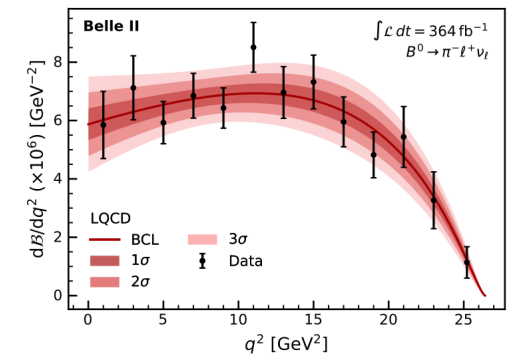
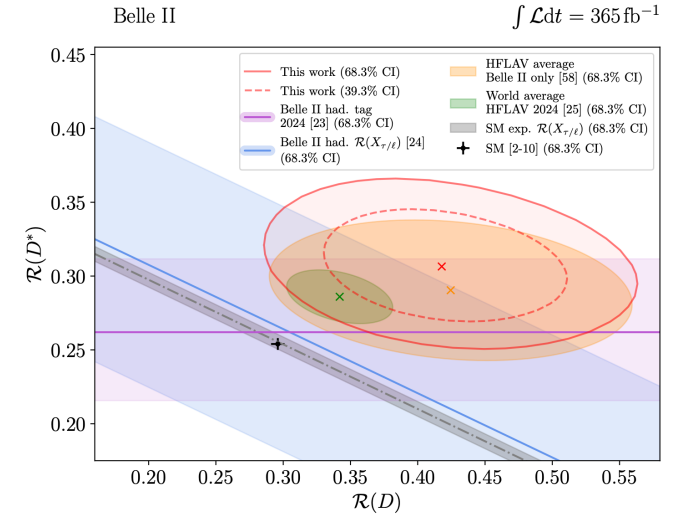
## Semileptonic decays and exclusive $|V_{ub}|$

RA2 Kick-off meeting  
Jochen Dingfelder

# Semileptonic decays



- Ph.D. Henrik Junkerkalefeld:  
First Measurement of  $R(X_{\tau/e})$  as an Inclusive Test of the  $b \rightarrow c\tau\nu$  Anomaly,  
*Phys. Rev. Lett.* 132, 211804 (2024)
- Ph.D. Alina Manthei:  
Test of lepton flavor universality with measurements of  $R(D^+)$  and  $R(D^{*+})$   
using semileptonic Btagging at the Belle II experiment  
*Phys. Rev. D* 112, 032010 (2025)
- Ph.D. Svenja Granderath:  
Determination of  $|V_{ub}|$  from simultaneous measurements of untagged  
 $B^0 \rightarrow \pi^- \ell^+ \nu_\ell$  and  $B^+ \rightarrow \rho^0 \ell^+ \nu_\ell$  decays  
*Phys.Rev.D* 111, 112009 (2025)



## Exclusive Determination of $|V_{ub}|$

### Next rounds of exclusive (tagged) determination of $|V_{ub}|$

$B \rightarrow \pi^+/\pi^0 lv$

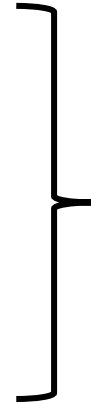
$B \rightarrow \eta lv$

$B \rightarrow \eta' lv$

$B \rightarrow \rho^+/\rho^0 lv$

$B \rightarrow \omega lv$

$B \rightarrow (\text{higher resonances})lv$



Combined analysis to address crossfeed  
using advanced ML methods for classification

### Important issues:

- Understanding **background from non-res.  $B \rightarrow X_u lv$ , higher charm resonance ( $D^{**}, \dots$ )**  $\rightarrow$  EN group Ms. Prim
- Precise measurement of **form factor shapes** ( $q^2$  & angular dependences)
- **Non-resonant  $\pi\pi$**  contributions to  $B \rightarrow \rho^+/\rho^0 lv$
- **From factor predictions** from theory