

# Inclusive $V_{ub}$ at Belle II

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Maximilian Welsch - [mwelsch@uni-bonn.de](mailto:mwelsch@uni-bonn.de)

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Physikalisches Institut  
University of Bonn

# Introduction

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- Master at KIT workin on a b2bii R(D<sup>(\*)</sup>) (hadr. FEI)
  - Study of  $B \rightarrow D^{**}(\rightarrow D^{(*)}\pi^0)\ell\nu_\ell$  background
  - Form factor reweighting
  - Template Fit including sys. uncertainties
- Started Phd in October
  - Goal: Measurement of  $|V_{ub}|$  using incl.  $B \rightarrow X_u\ell\nu_\ell$  decays and study of differential kinematic distributions

**b2luigi**

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# Tomorrow

## Hybrid MC

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# Introduction

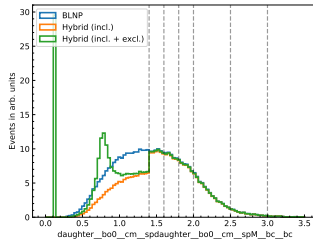
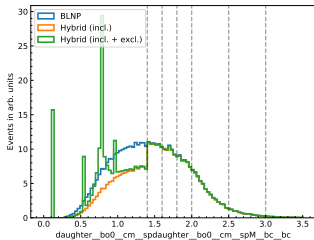
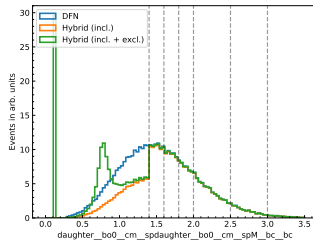
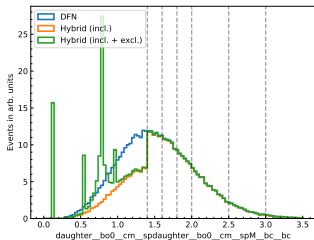
- Inclusive predictions include resonant contributions, but resonant structure in mass spectrum is lost
- Goal: simulate data sample which properly reflects both ( $\rightarrow$  inclusive and exclusive predictions have to be properly combined)
- Reweighting in bins of  $m_X$ ,  $q^2$  and  $E_\ell^*$
- Hybrid Weights:
  - In each bin, subtract the partial rate from the resonances from the inclusive prediction (remainder only predicts non-resonant final states)
  - Add resonant structures using exclusive predictions
  - Hybrid Model prediction: Number of events in bin  $i$  given by

$$H_i = R_i + w_i I_i$$

$H_i$  - total number of events,  $R_i$  - number of resonant events,  $I_i$  number of events by inclusive prediction,  $w_i$  - weight assigned such that  $H_i = I_i$

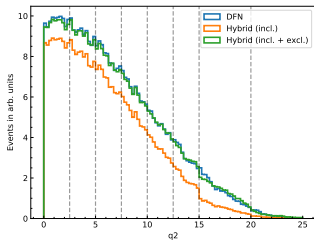
Charged

Mixed

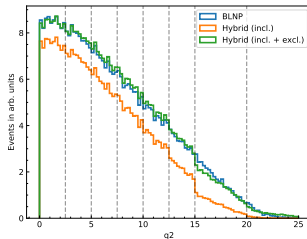
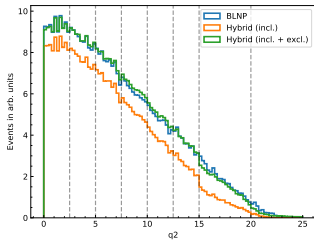
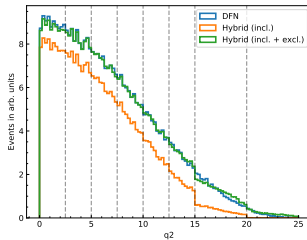




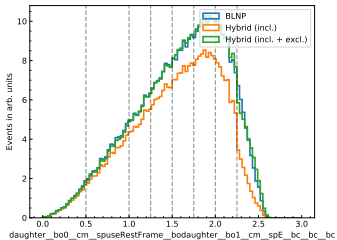
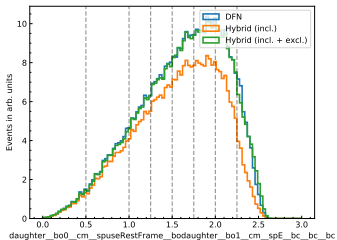
## Charged



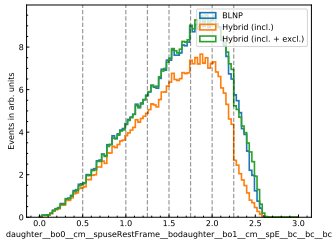
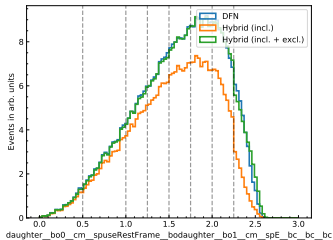
## Mixed



## Charged



## Mixed



**BACKUP**

# $m_X$ , $q^2$ and $E_\ell^*$ bins

- Bins are theoretically motivated
- Inclusive predictions only reliable in bins with resonances integrated out
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