

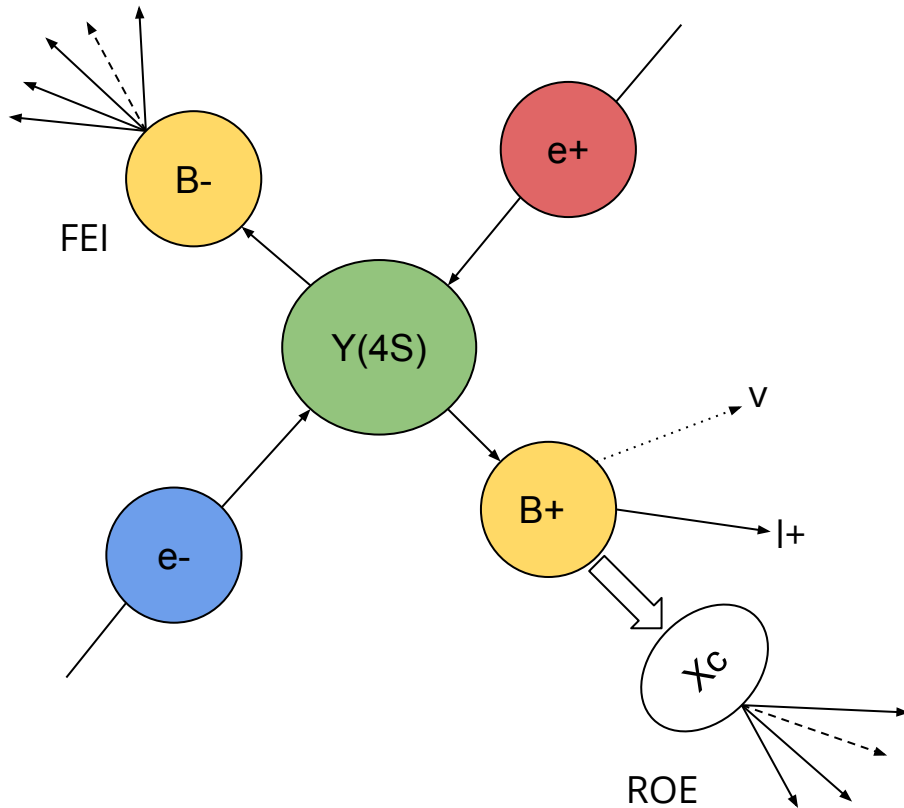


Kinematic Fit of $B \rightarrow Xcl\nu$ Decays

Prototype Edition



Situation



- tag-side reconstruction via FEI
- select high momentum lepton
- X system identified with ROE of ($B_{tag} + l$)

➔ poor resolution and bias of observables related to X system, e.g. hadronic mass M_X

Kinematic Fit

- minimize $\chi^2(\mathbf{y}')$ function with physical constraints

$$\chi^2(\mathbf{y}') = (\mathbf{y}' - \mathbf{y})V^{-1}(\mathbf{y}' - \mathbf{y})$$

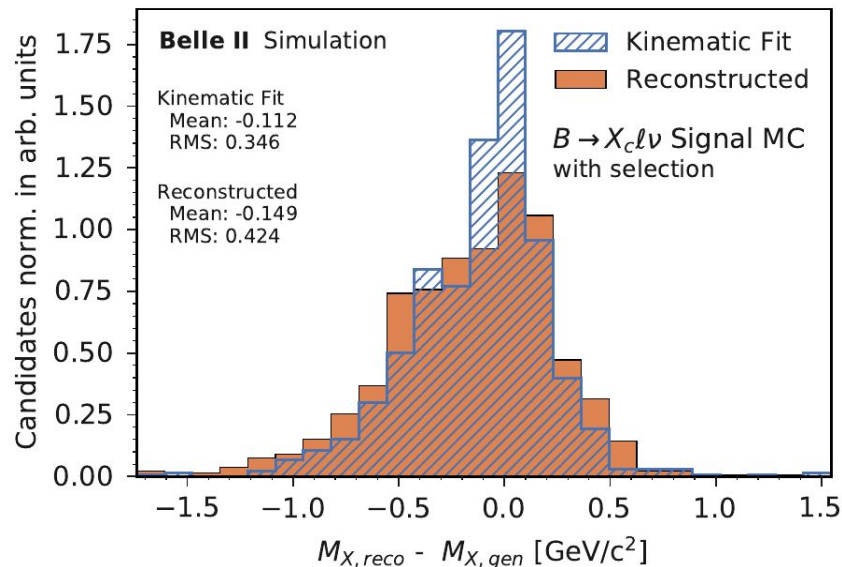
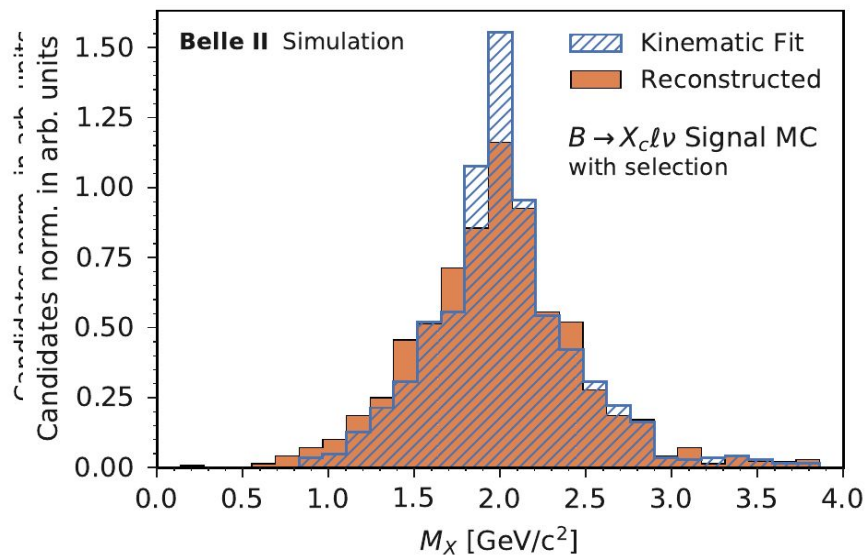
- in total 11 measured parameters \mathbf{y} (4 four momenta of tag-side and X system, 3 momentum of lepton)
- tag-side covariance from vertex-fit, lepton covariance from track fit and X system covariance from MC
- 3 unmeasured parameters (neutrino 3 momentum)

Constraints:

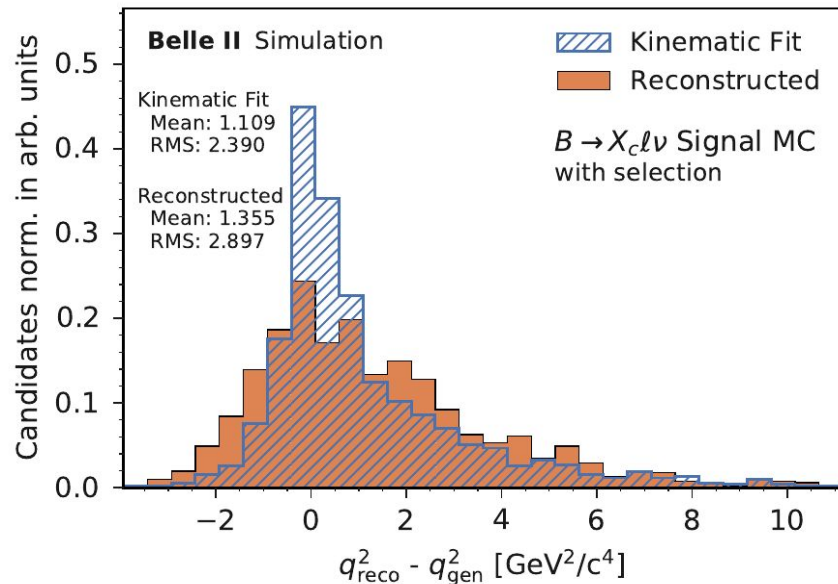
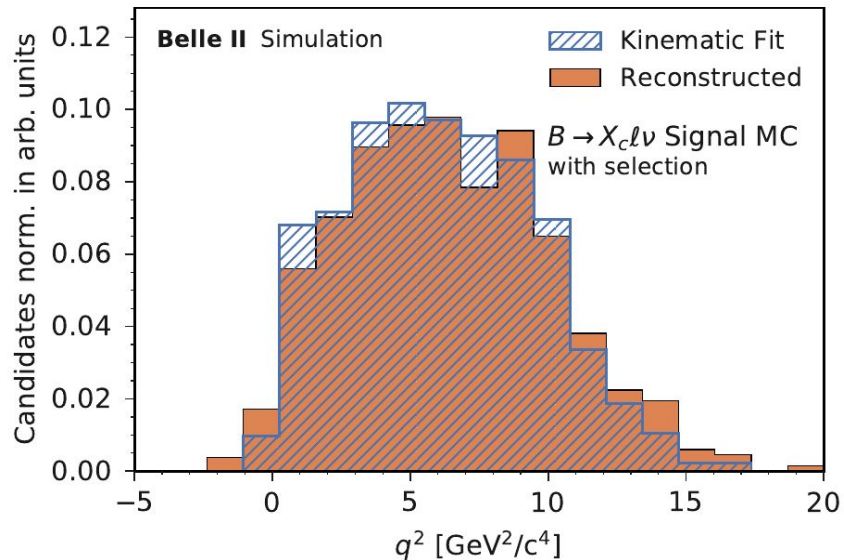
$$f_{1,2,3,4} = p_X^\mu + p_{\text{tag}}^\mu + p_\ell^\mu + p_\nu^\mu - p_{e^+e^-}^\mu = 0$$

$$f_5 = m_{B_{\text{tag}}} - m_{B_{\text{sig}}} = 0$$

Hadronic Mass M_X ($B \rightarrow X_c \ell \nu$ Signal MC)



q^2 ($B \rightarrow X_c \ell \nu$ Signal MC)



p-Value

