Belle II Prospects for R_K

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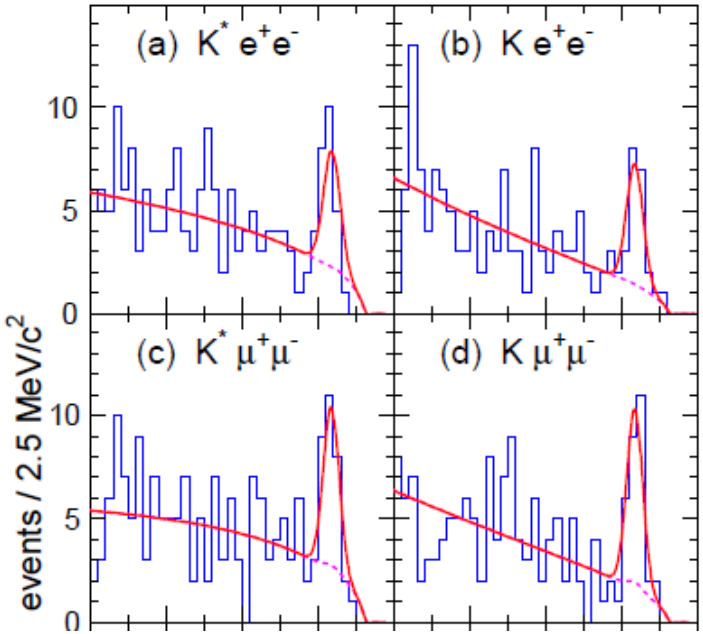
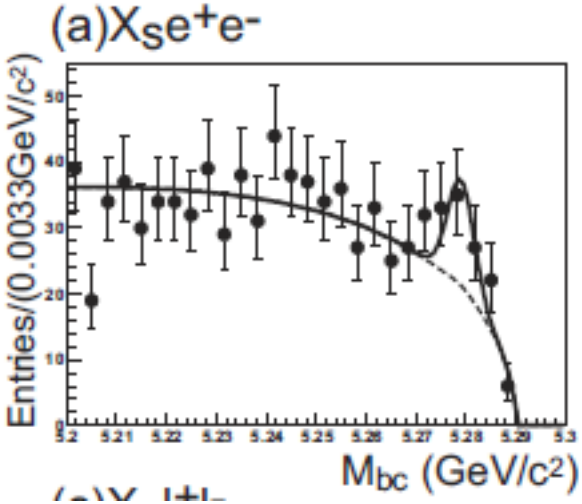
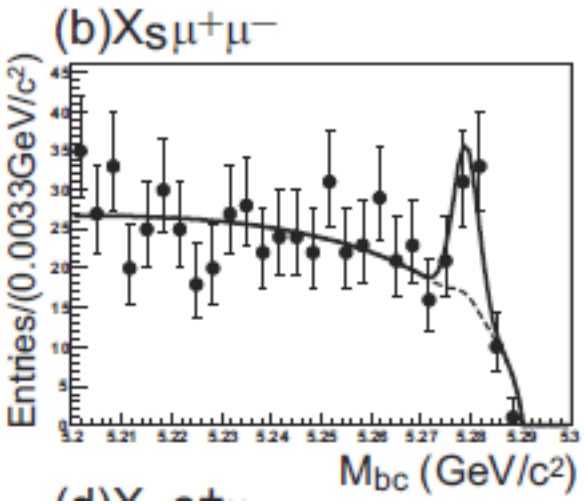
B→Xsee at Belle/BelleII

- Belle/Belle II can measure B→Xsee and B→Xsμμ with almost the same efficiencies.







$R_{K(*)}$ and R_{Xs} at Belle

- $R_{K(*)}$ Reported with 605fb^{-1} for full q^2 range [PRL 103, 171801 (2009)]

$$R_{K^*} = 0.83 \pm 0.17 \pm 0.08, \qquad R_{K^*}^{\mathrm{SM}} = 0.75$$

$$R_K = 1.03 \pm 0.19 \pm 0.06. \qquad R_K^{\mathrm{SM}} = 1$$

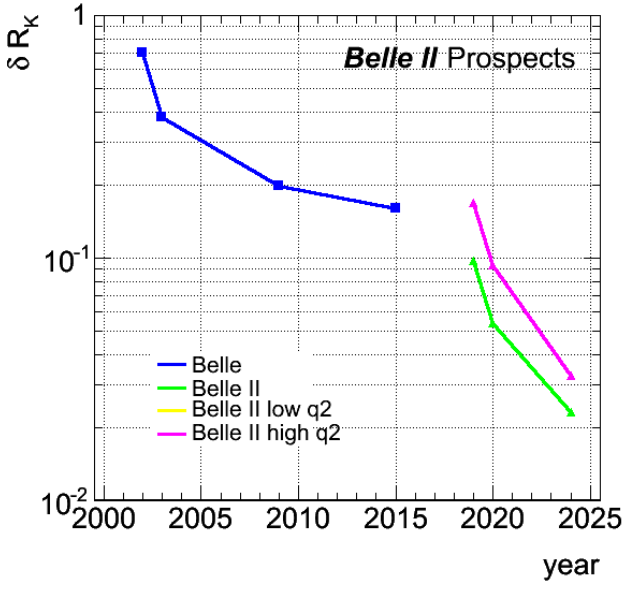
- No measurement on R_{Xs} yet but can be obtained from BF analysis with 140fb^{-1} [PRD 72, 092005 (2005)]
  - $R_{Xs} = 1.0 \pm 0.4$
  - Analysis for BF with 605fb^{-1} shown as preliminary stalled for publication, and new analysis with full data on-going

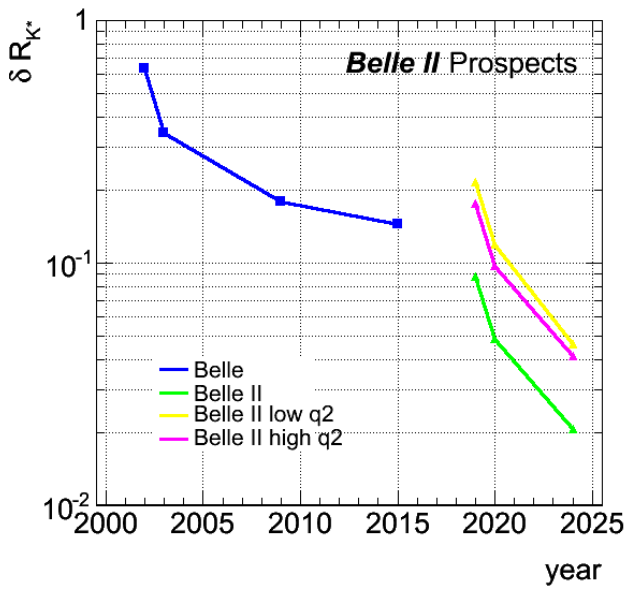
Mode	N_{sig}	Significance	ϵ (%)	$\mathcal{B}$ ($\times 10^{-6}$)
$X_s e^+ e^-$	$31.8 \pm 10.2 \pm 3.1$	3.2	$2.59 \pm 0.20^{+0.45}_{-0.42}$	$4.04 \pm 1.30^{+0.87}_{-0.83}$
$X_s \mu^+ \mu^-$	$36.3 \pm 9.3 \pm 2.1$	4.4	$2.89 \pm 0.24^{+0.52}_{-0.49}$	$4.13 \pm 1.05^{+0.85}_{-0.81}$
$X_s \ell^+ \ell^-$	$68.4 \pm 13.8 \pm 5.0$	5.4	$2.74 \pm 0.22^{+0.48}_{-0.45}$	$4.11 \pm 0.83^{+0.85}_{-0.81}$

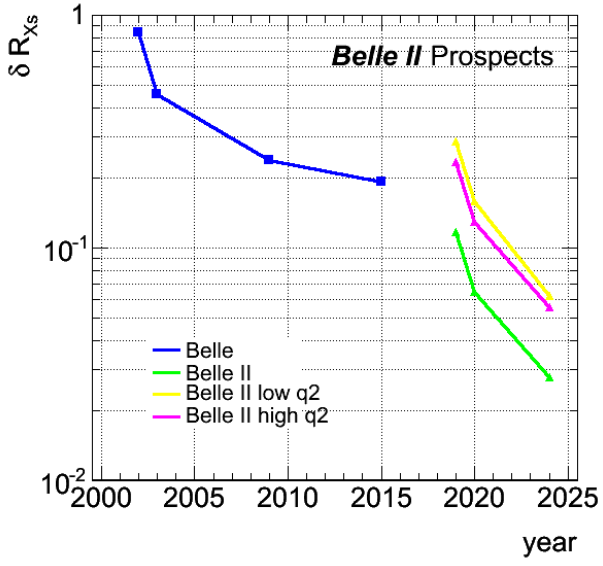
- We can measure both low (1-6GeV^2) and high q^2 (>14.4GeV^2)region
- Ultimately, almost all systematics cancel except lepton ID systematics

Prospects for $R_{K(*)}$ and R_{Xs}

- Assign 0.25% syst error per lepton → in total 1% for 4 leptons
- Assuming $2ab^{-1}$ in 2019, $7ab^{-1}$ in 2020, $50ab^{-1}$ in 2024
- Even with $50ab^{-1}$, still statistically dominated.
  - $\delta R_K = 0.023$
  - $\delta R_{K^*} = 0.020$
  - $\delta R_{Xs} = 0.027$







No Summary