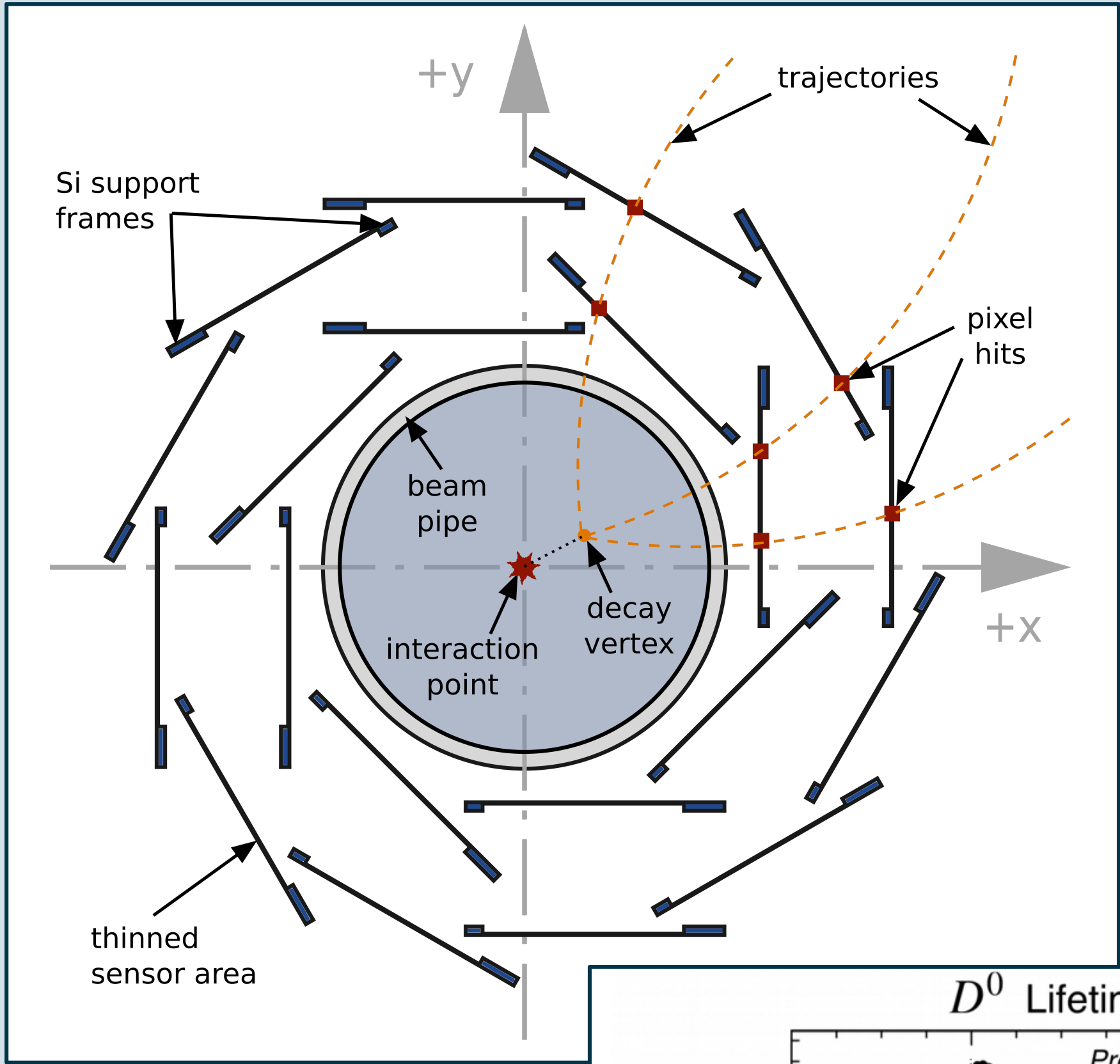
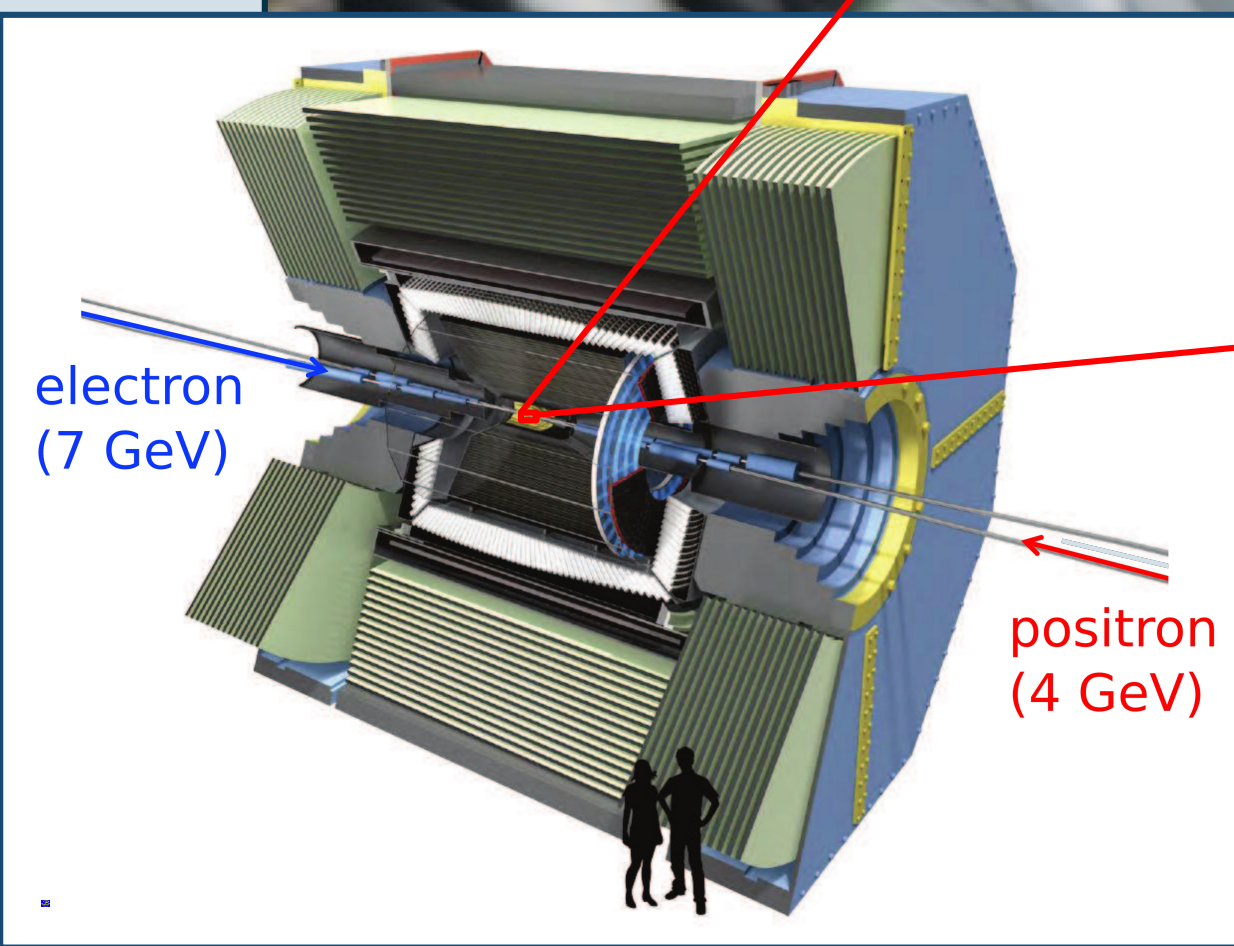
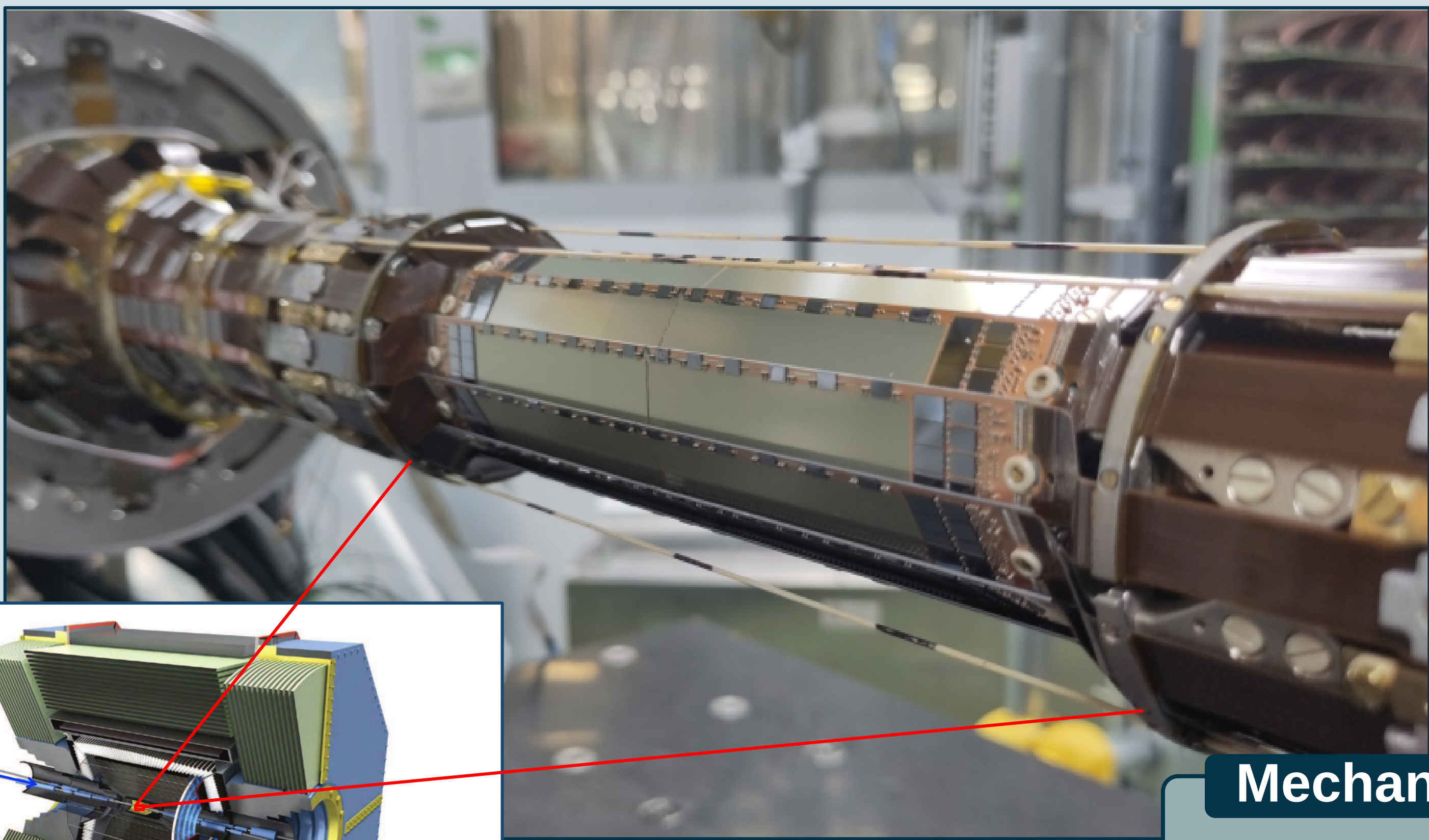


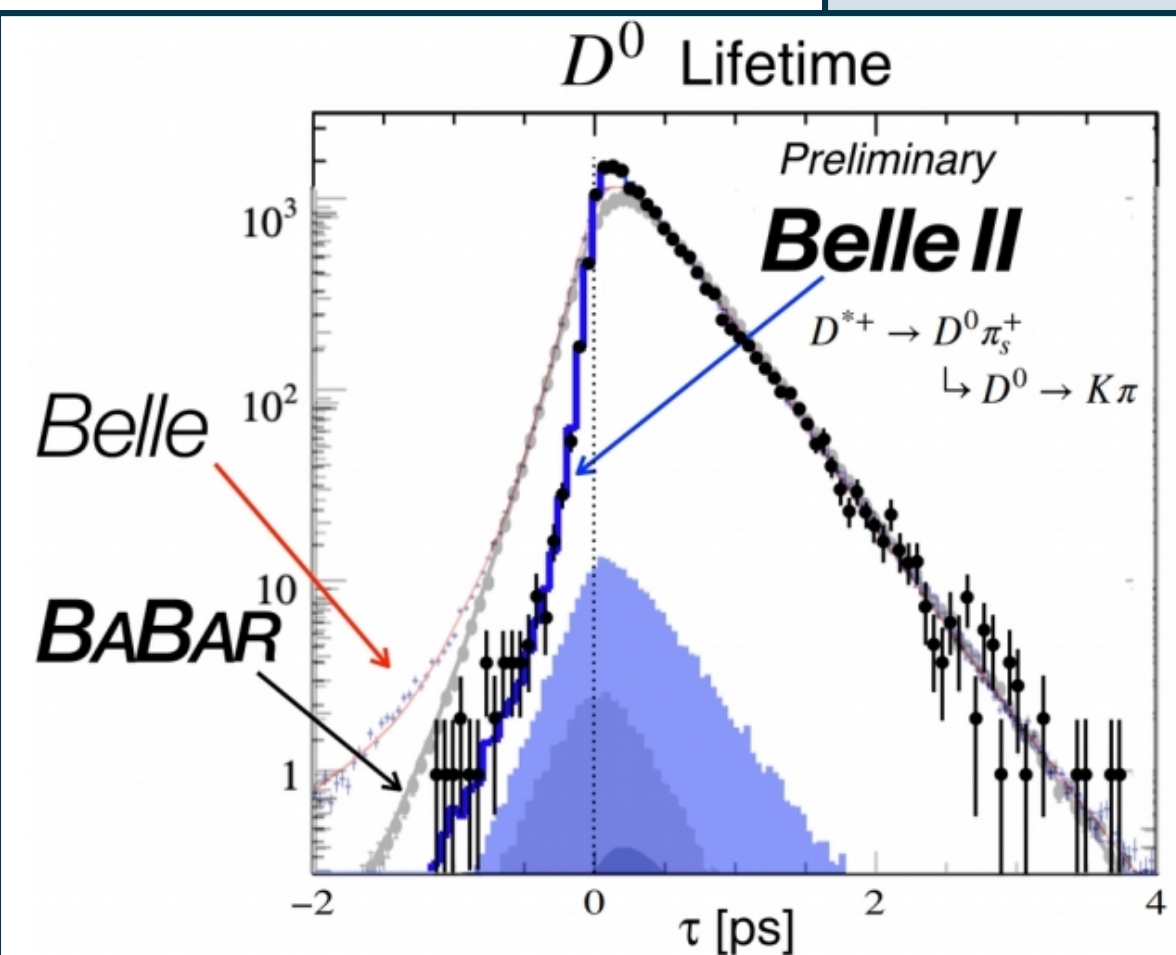
Tau Lepton Lifetime Measurement & Pixel Vertex Detector at Belle II

Pixel Vertex Detector



Mechanical Structure

- 20 ladders (windmill formation)
- Low material budget $\sim 0.2\% X_0$
- Radius = {1,4 cm; 2,2 cm}
- Pixel size 50 x 50-85 μm^2



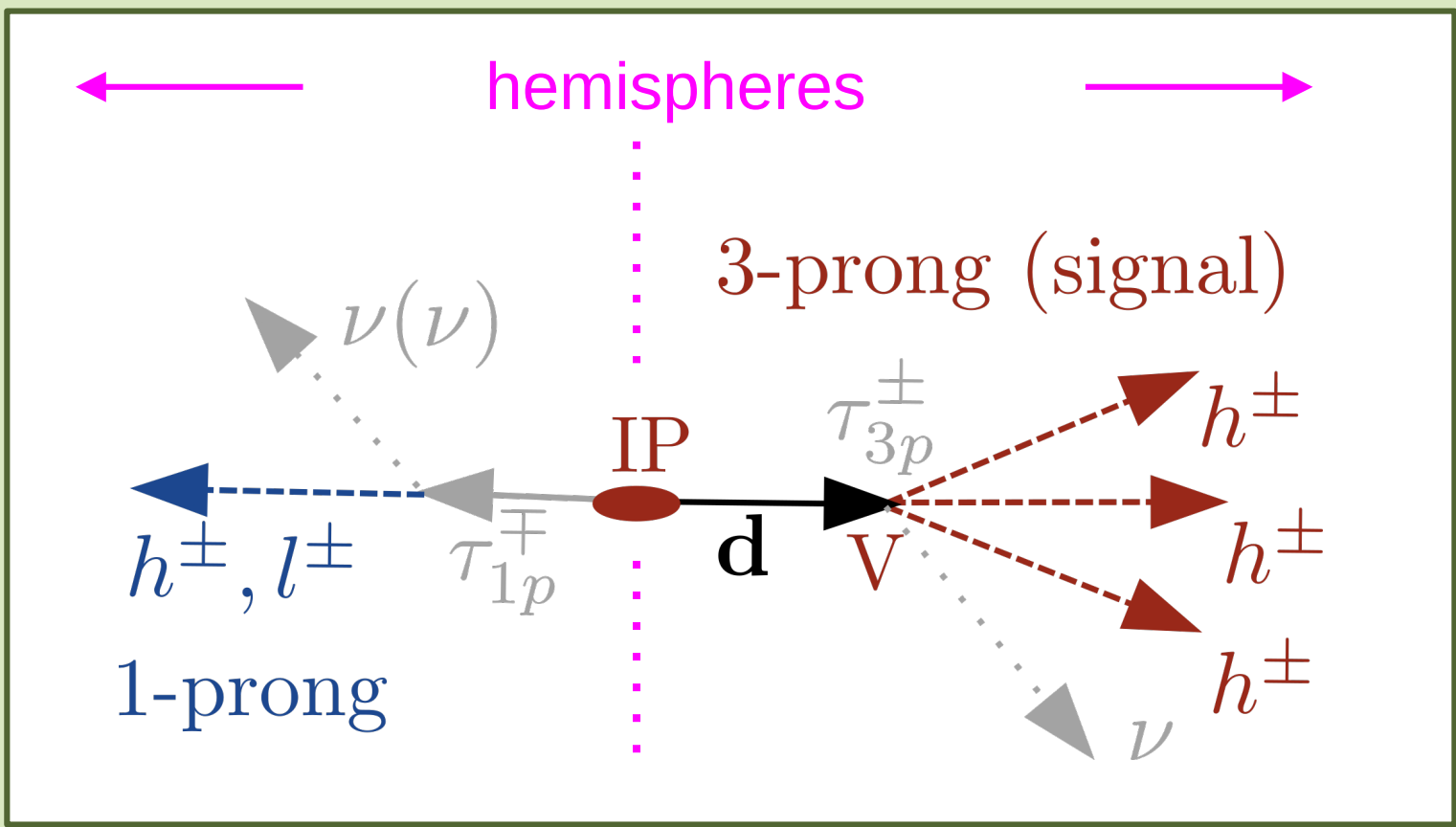
Measuring the Lifetime of the Tau Lepton

World Average

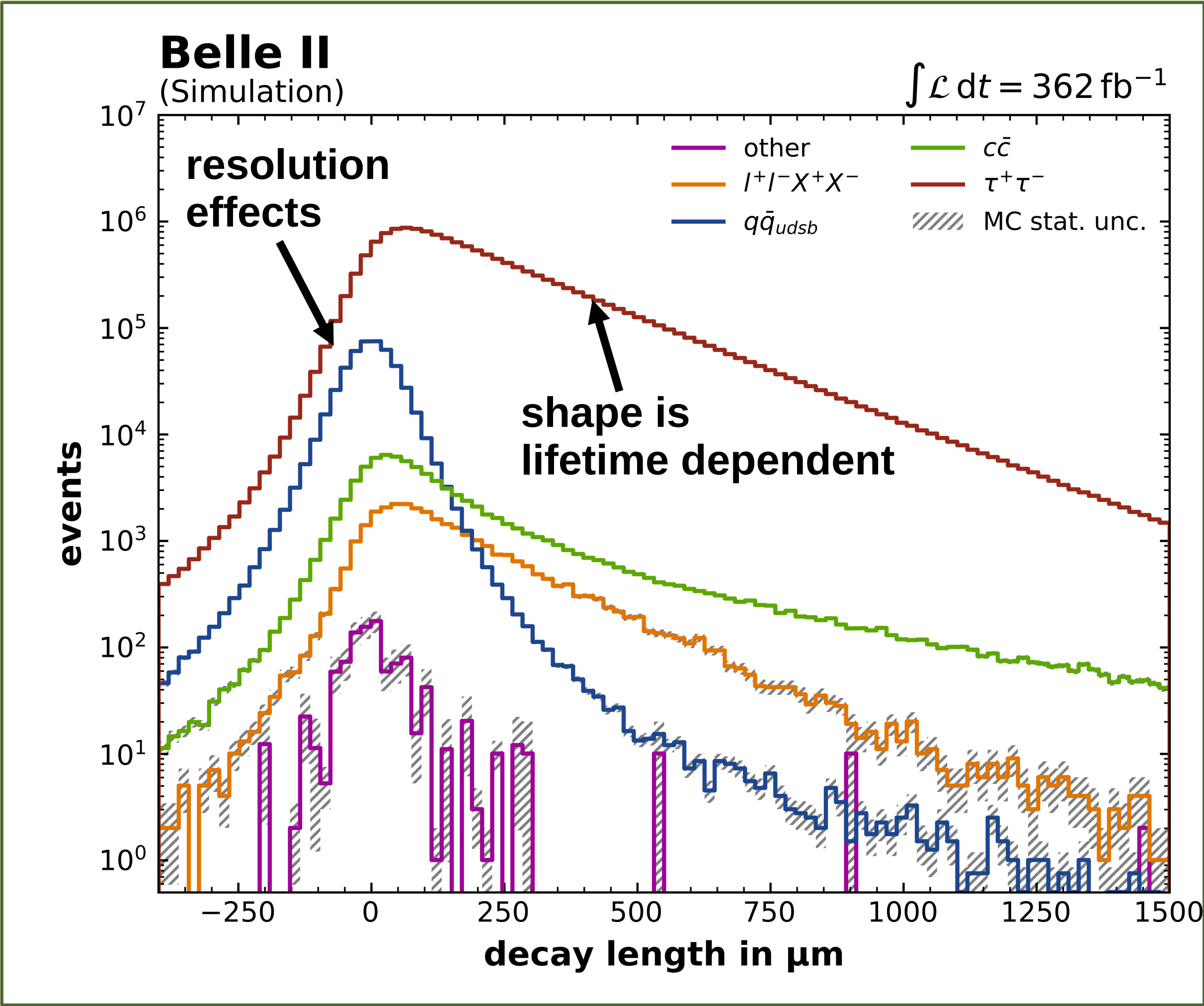
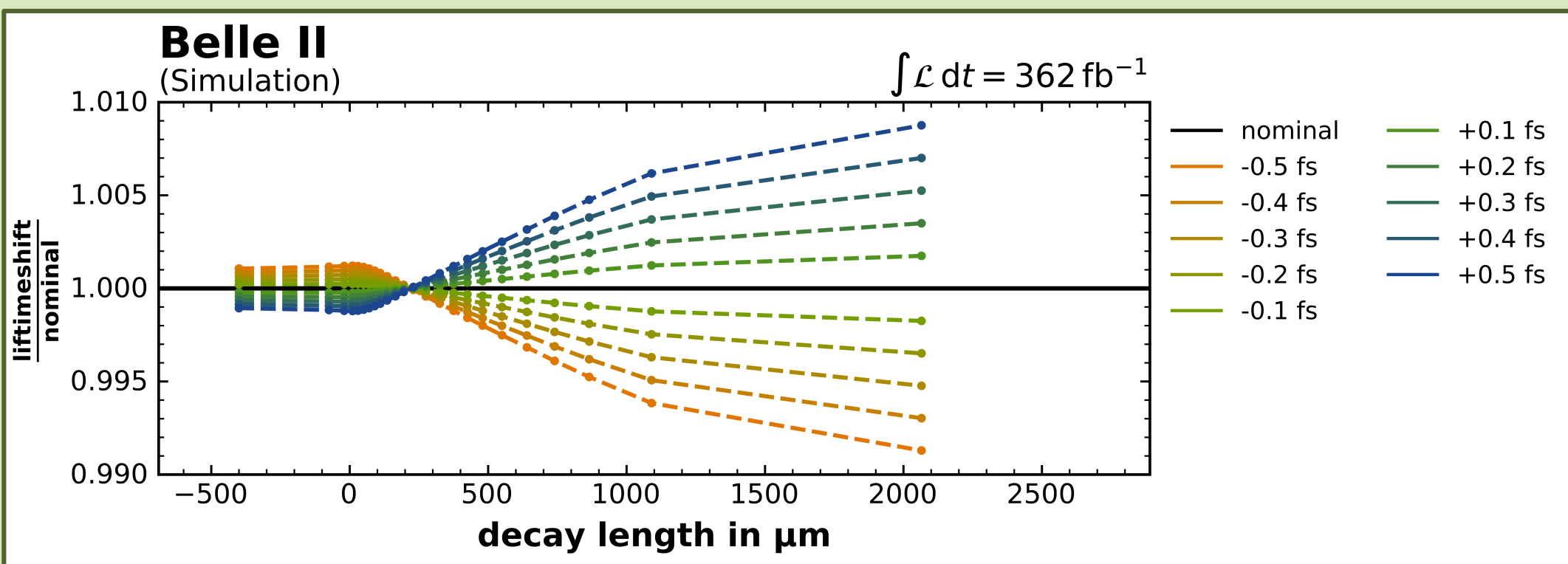
- PDG 2024: 290 ± 0.5 fs

New Method

- Likelihood model
- Template fit



Decay Length Templates:



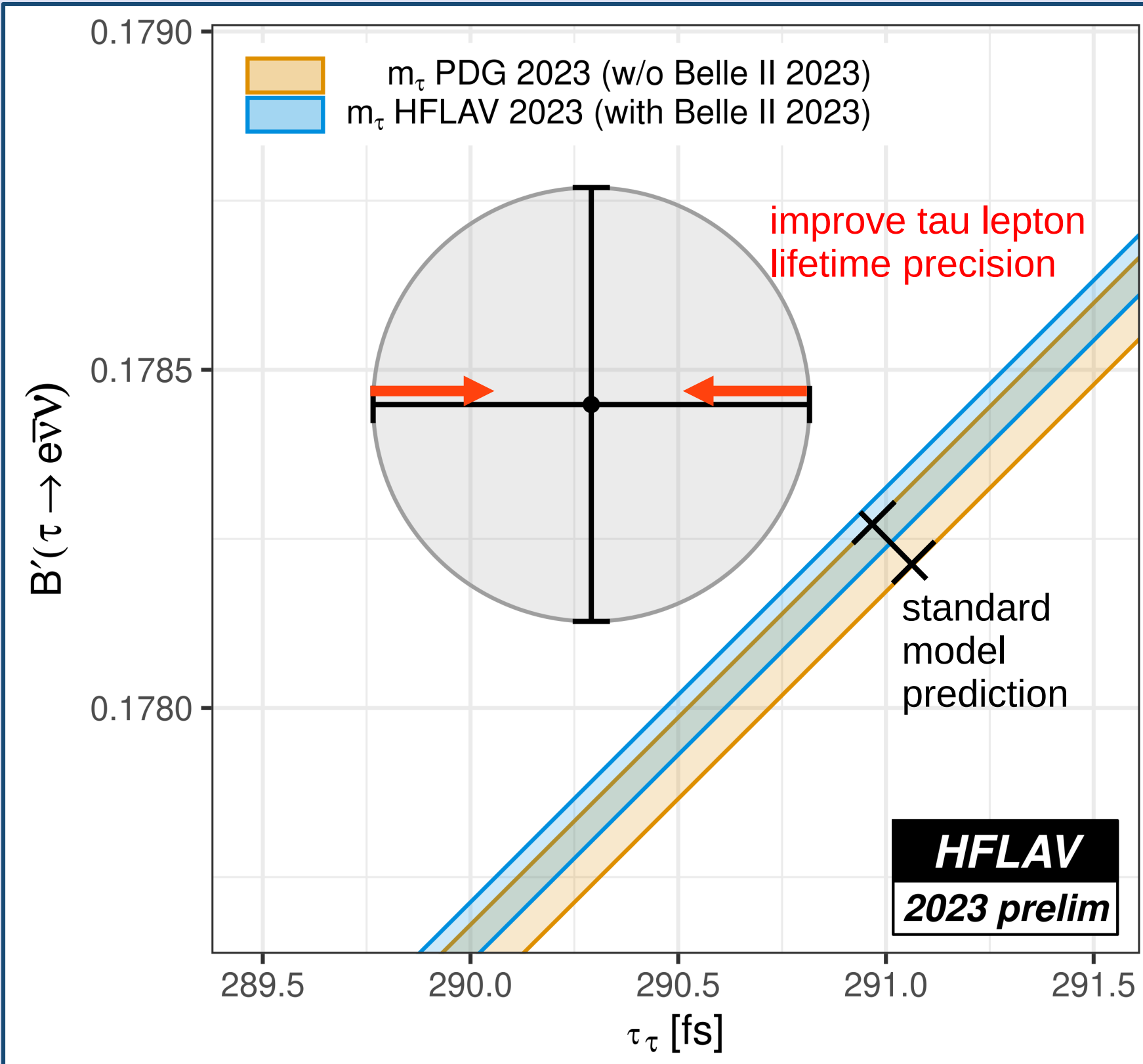
Do All Leptons Have the Same Coupling to the W Boson?

Standard Model

- Branching fraction:

$$B_{\tau e} \propto B_{\mu e} \frac{\tau_{\tau}}{\tau_{\mu}} \frac{m_{\tau}^5}{m_{\mu}^5}$$

- Proportionality factor



Anselm Baur

- 4th year PhD student
- Mechanical and working point optimization of PXD2
- Commissioning of PXD2
- New method for the tau lepton lifetime measurement

