

Search for new light vector boson

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using J/Ψ at BESIII and Belle II

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- Search for light vector boson at **BESIII**

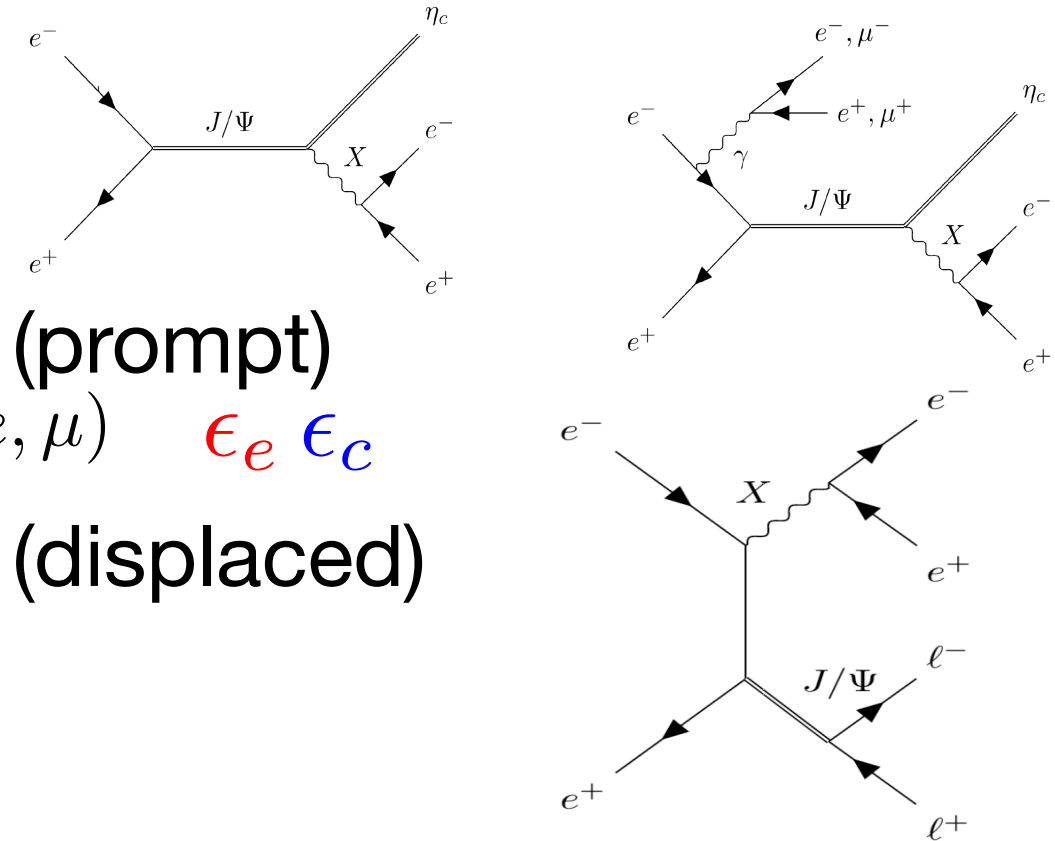
$$J/\psi \rightarrow \eta_c X \rightarrow \eta_c e^+ e^- \quad \epsilon_e \epsilon_c$$

- Search for light vector boson at **Belle II** (prompt)

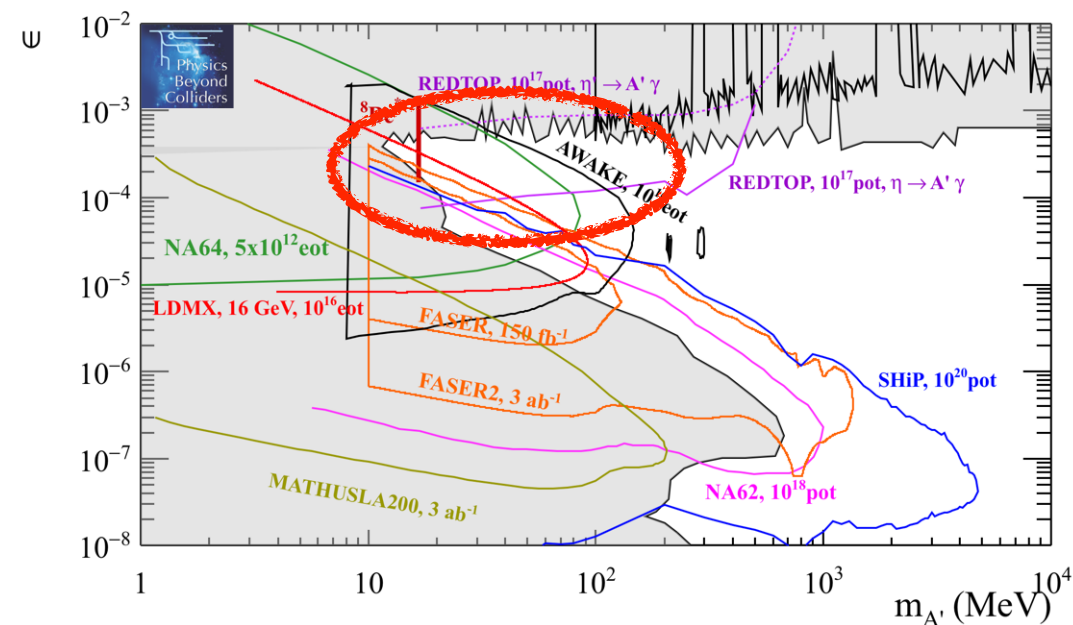
$$e^- e^+ \rightarrow \ell^+ \ell^- J/\psi (\rightarrow \eta_c X \rightarrow \eta_c e^+ e^-) \quad (\ell = e, \mu) \quad \epsilon_e \epsilon_c$$

- Search for light vector boson at **Belle II** (displaced)

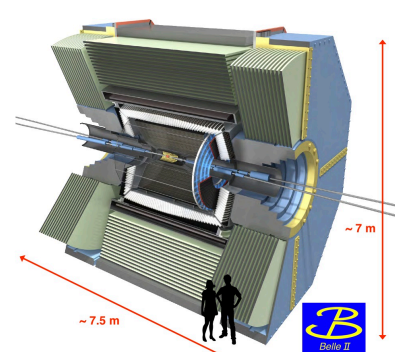
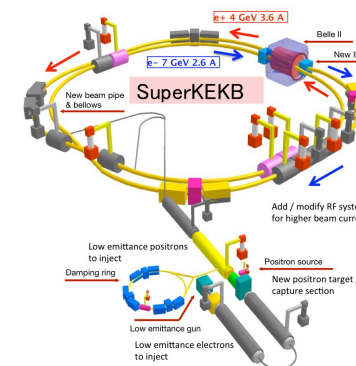
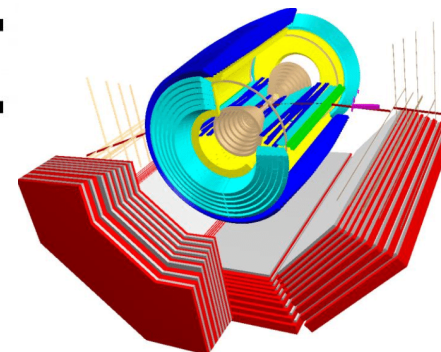
$$e^- e^+ \rightarrow J/\psi + X (\rightarrow e^+ e^-) \quad \epsilon_e$$



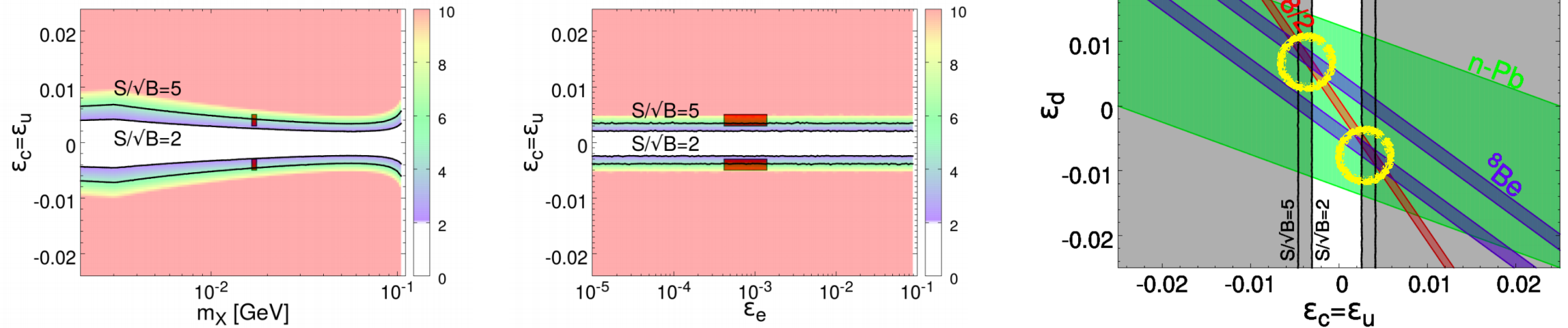
$$\mathcal{L} \supset \underbrace{f_{VP}(-2\sqrt{\pi\alpha_{\text{EM}}}\partial_\mu P \partial_\nu V_\rho \epsilon^{\mu\nu\rho\sigma} A_\sigma)}_{J/\psi \rightarrow \eta_c + \gamma/\gamma^*} - \underbrace{g_{Xc}\partial_\mu P \partial_\nu V_\rho \epsilon^{\mu\nu\rho\sigma} X_\sigma}_{e\epsilon_c} - \underbrace{g_{eV}\bar{e}\gamma^\mu e V_\mu}_{e^+e^- \rightarrow J/\psi} - \underbrace{g_{Xe}\bar{e}\gamma^\mu e X_\mu}_{X \rightarrow e^+e^-}$$



BESIII



- In BESIII, the expected data with the goal integrated luminosity can fully cover hadronic couplings suggested by X17 scenario.



- In Belle II, using the displaced vertex of the signal process, we expect the expected limit can cover a wide region of unexplored parameters, when we have a clear systematics in the 2-8mm of the transverse flight length of displaced vertex.

