Experimental perspective:

- Event generators for signal/luminosity
- Formfactor extraction

The European Physical Journal C **66**, 585–686 (2010)

Experimental requests:

1) Need progress from the theory [NNLO order with proper matching to the next orders resummation of logarithmically enhanced corrections. Also looks like the iterative generation of photons]:

- ππ,ππg (QED and effects beyond sQED)
- μμ(g) (QED)
- ee(g) (add the generation of events where one or both tracks are emitted at small angles)

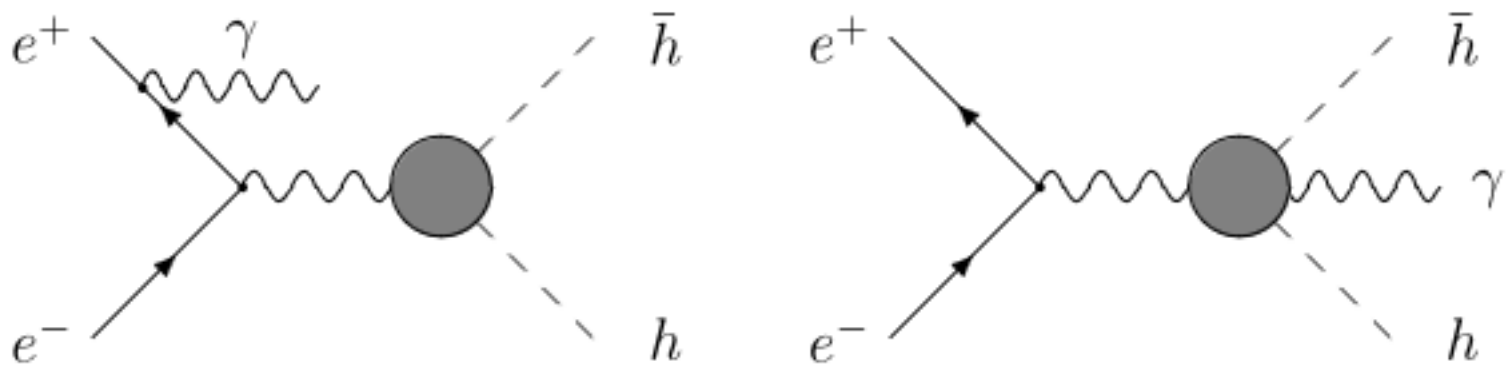
- 3π and 4π (FSR + new fit of FF to available data)

Effects to be included and tested:

- interference for ππ at NLO (2ISR with 1ISR+1FSR)
- radiative production and/or decay of hadrons

- Any new generator should come with the possibility to generate restricted phase space region,
- It would be useful to have the possibility to distinguish ISR and FSR photons (as in Phokhara OMEGA)

Elastic vector form factors



$\mathbf{h = \mu^+, \pi^+}$

$(\tau^+, K, D, p, n, \Lambda, \Sigma, \ldots)$?

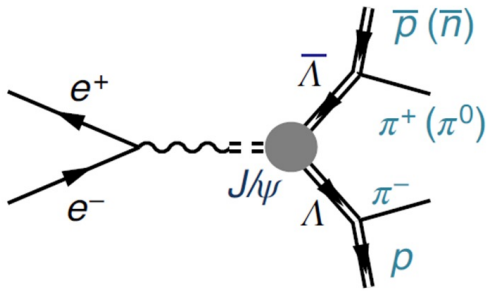
nature physics
LETTERS
https://doi.org/10.1038/s41567-019-0494-8

$$e^+e^- \to J/\psi \to \Lambda\bar{\Lambda}$$

Polarization and entanglement in baryon–antibaryon pair production in electron–positron annihilation

The BESIII Collaboration*

Nature Phys. 15 (2019) 631



Phys.Rev.Lett. 129 (2022) 131801

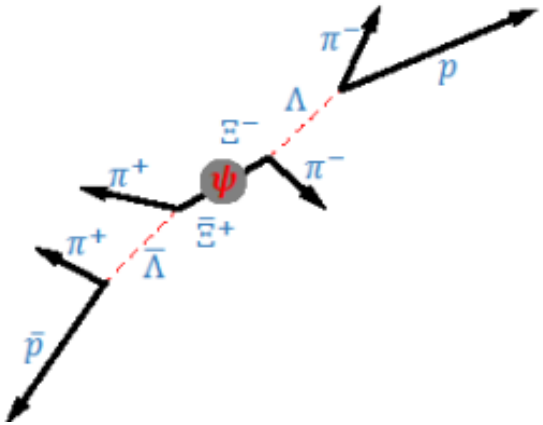
$$e^+e^- \to J/\psi \to \Xi^-\bar{\Xi}^+$$

Article | Open Access | Published: 01 June 2022

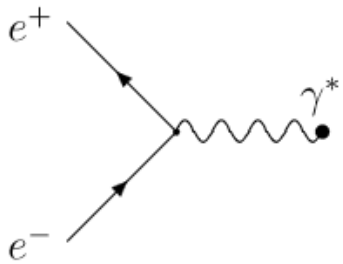
Probing CP symmetry and weak phases with entangled double-strange baryons

The BESIII Collaboration

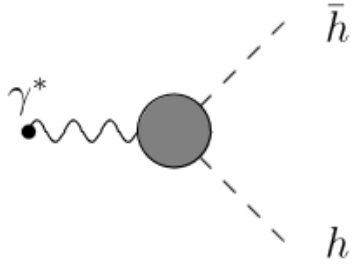
Nature **606**, 64–69 (2022) | Cite this article



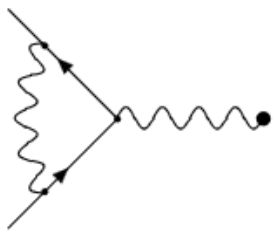
NNLO processes



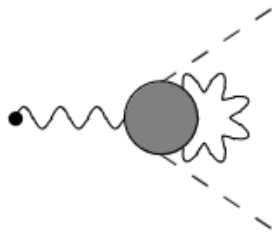
$M^{(0)}$



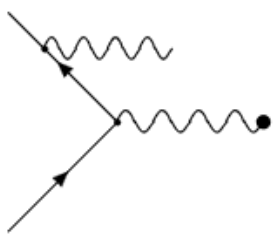
$J^{(0)}$



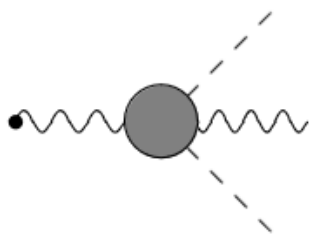
$M^{(1)}$



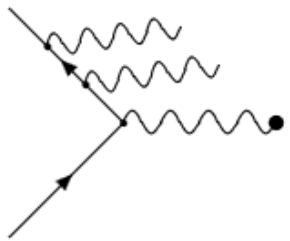
$J^{(1)}$



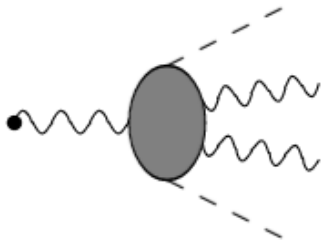
$M^{(0)}_{\mathrm{ISR}}$



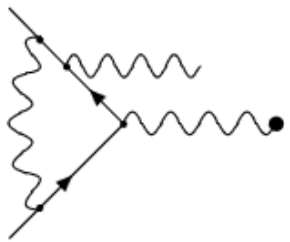
$J^{(0)}_{\mathrm{FSR}}$



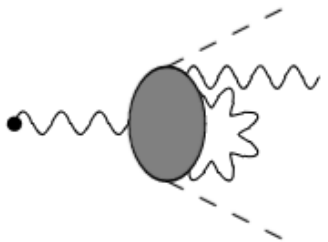
$M^{(0)}_{\mathrm{2ISR}}$



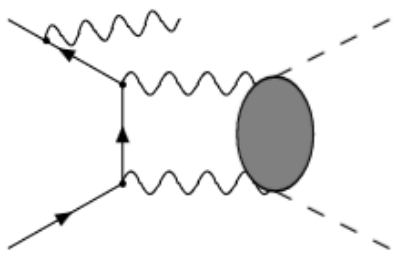
$J^{(0)}_{\mathrm{2FSR}}$



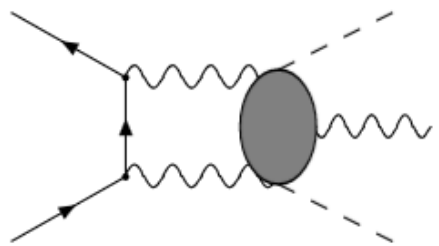
$M^{(1)}_{\mathrm{ISR}}$



$J^{(1)}_{\mathrm{FSR}}$



$\mathcal{A}^{2\gamma^*}_{\mathrm{ISR}}$

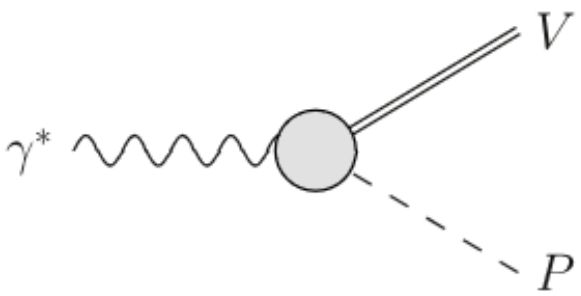


$\mathcal{A}^{2\gamma^*}_{\mathrm{FSR}}$

Transition form factors

$$e^+e^- \to \rho\pi(\pi^+\pi^-\pi^0), \rho\eta(\pi^+\pi^-\eta)$$

$$e^+e^- \to \pi^+\pi^-\pi^0\pi^0, \pi^+\pi^-\pi^+\pi^-$$



Experimental perspective:

- Modular program
- Reusable RC for other processes
- PHOKHARA

  -> dedicated PhD position