Ising Model

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Ngày 20 tháng 11 năm 2021

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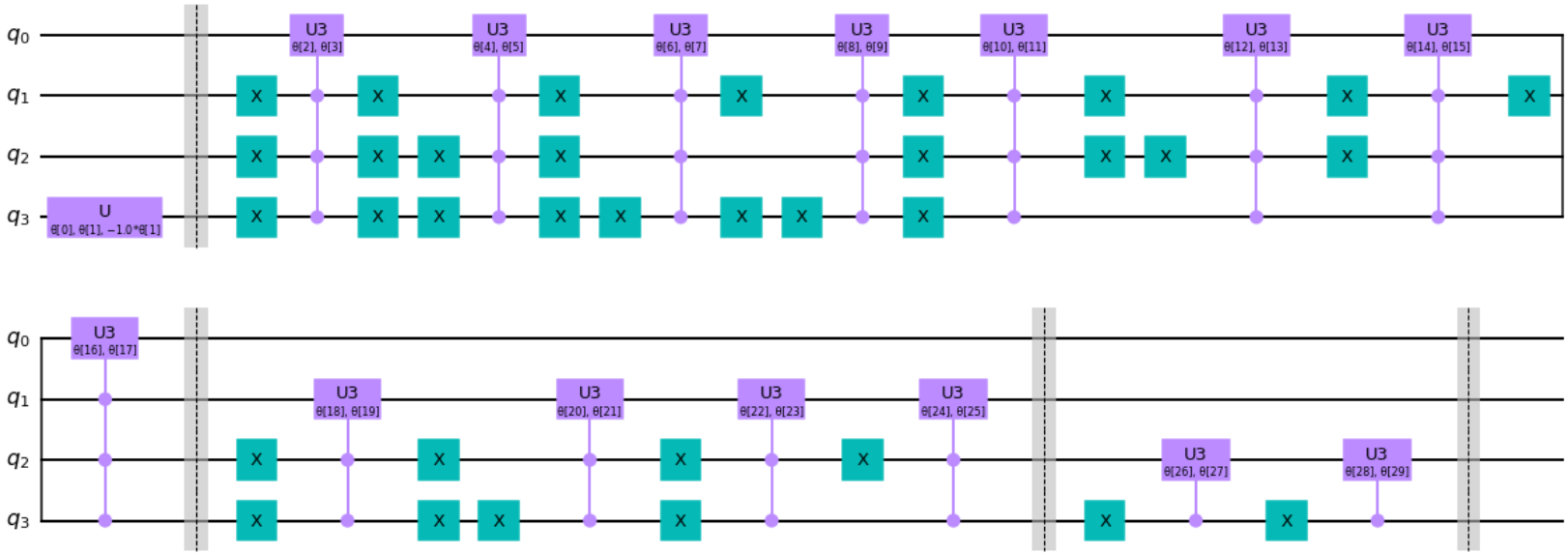
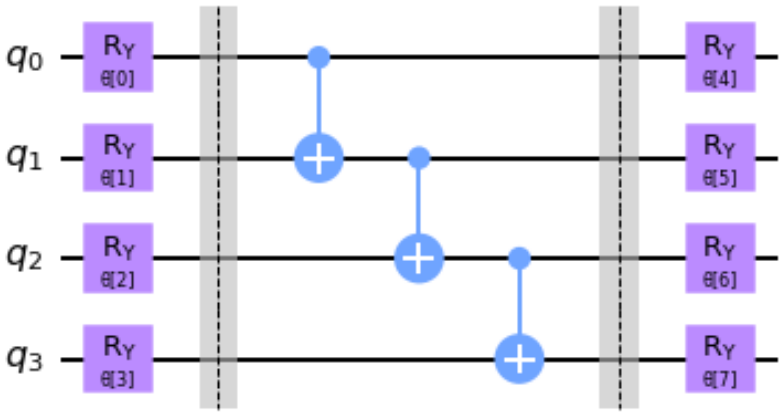
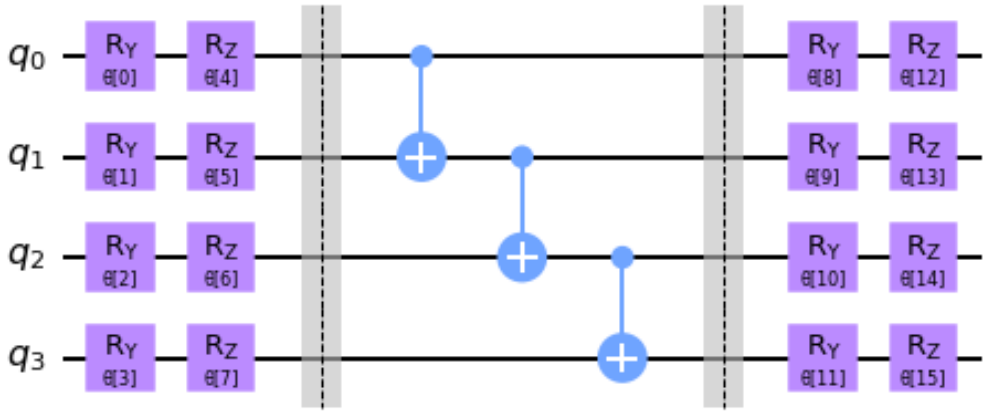
General 4 qubit ansatz



Twolocal 4 qubit ansatz

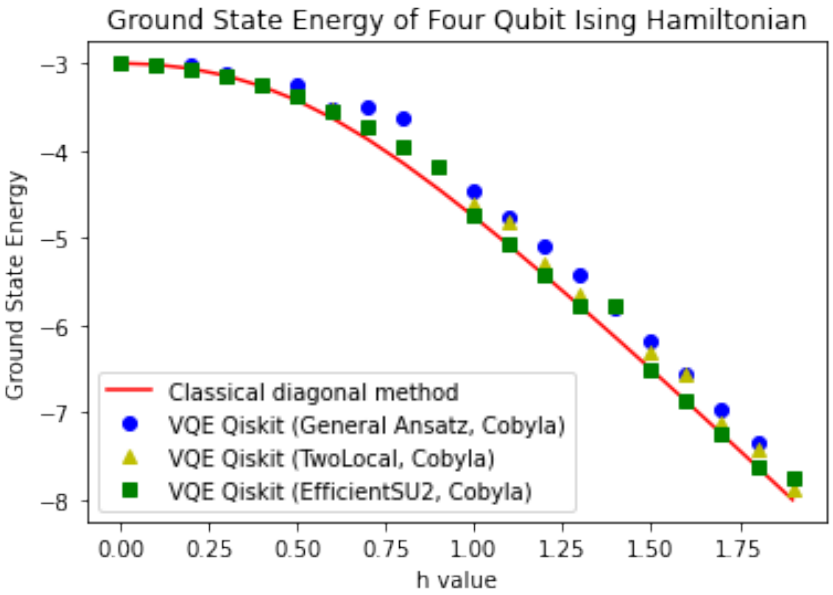


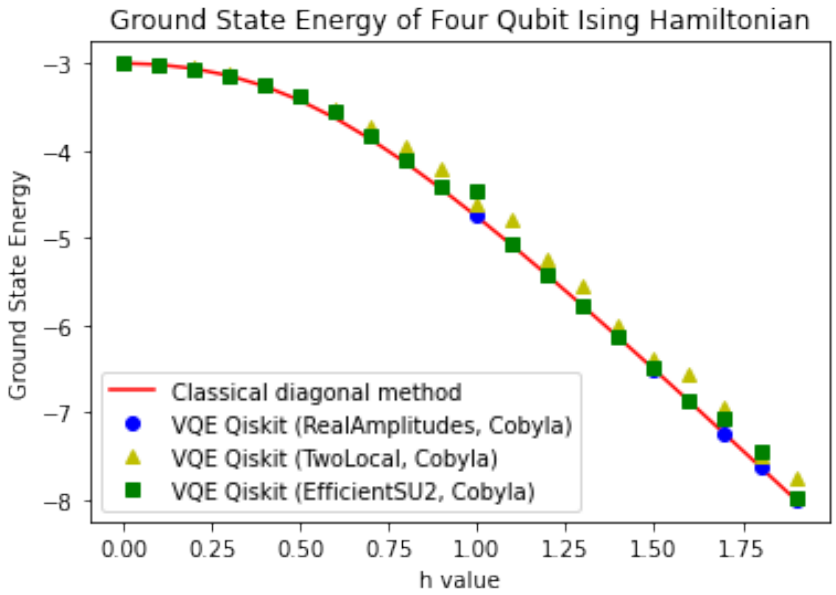
Hình 1: RealAmplitude ansatz

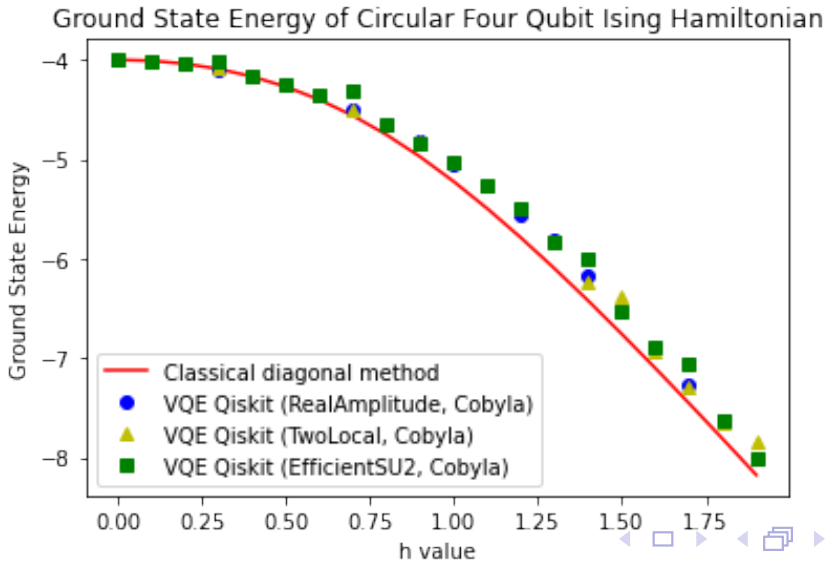


Hình 2: EfficientSU2 ansatz

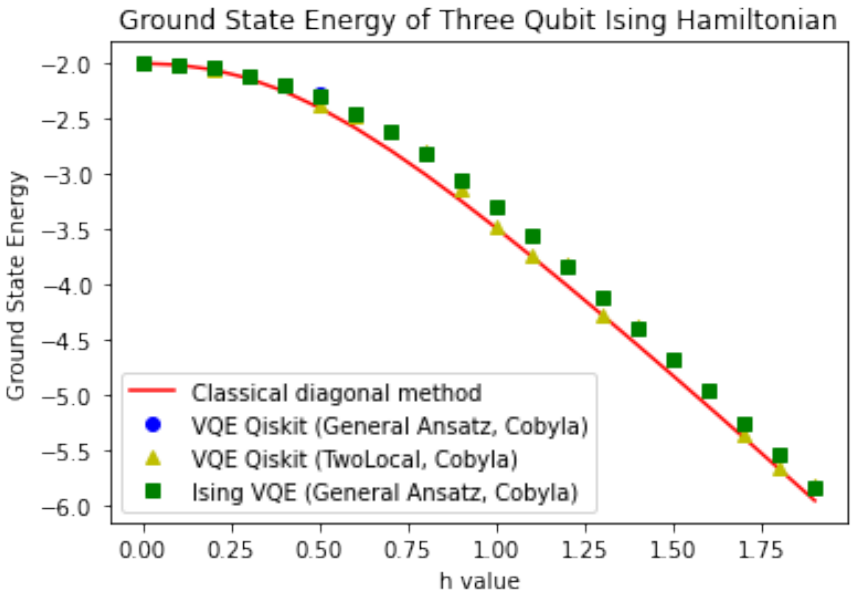
Ising 4 qubit results

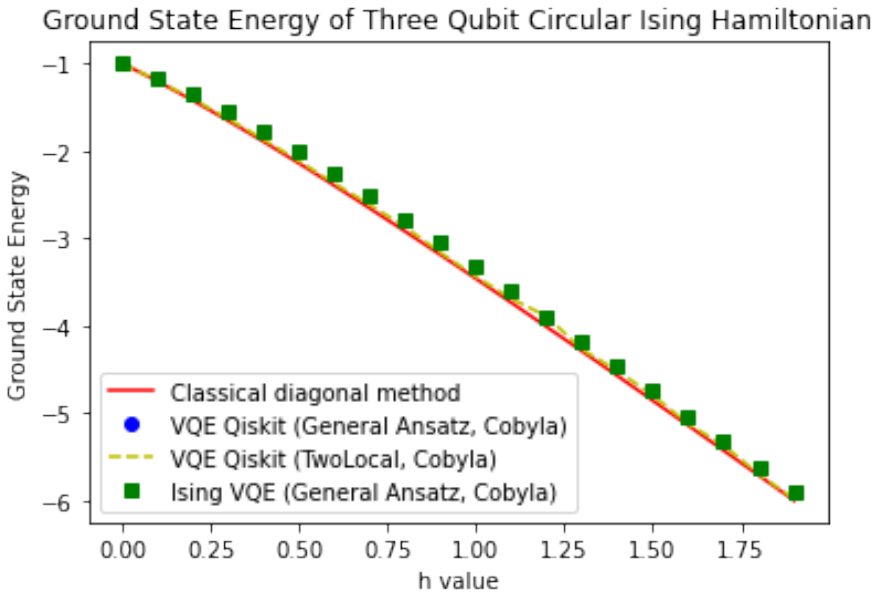






Review Ising 3 qubit results





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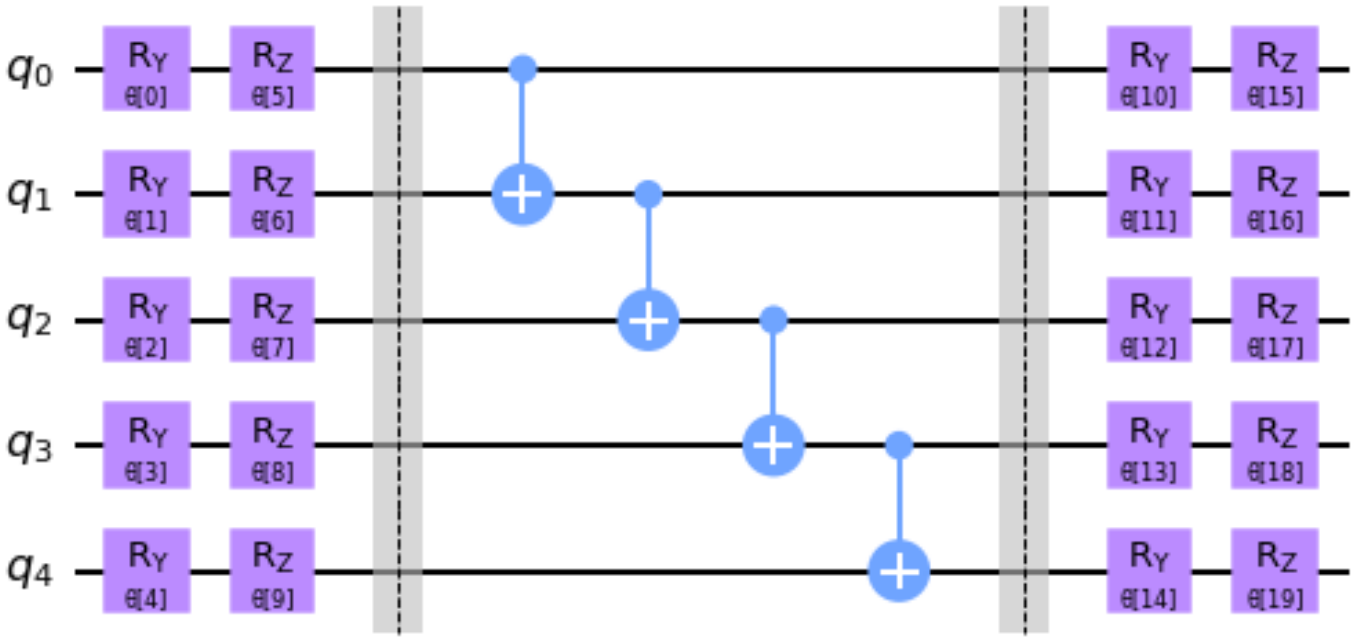
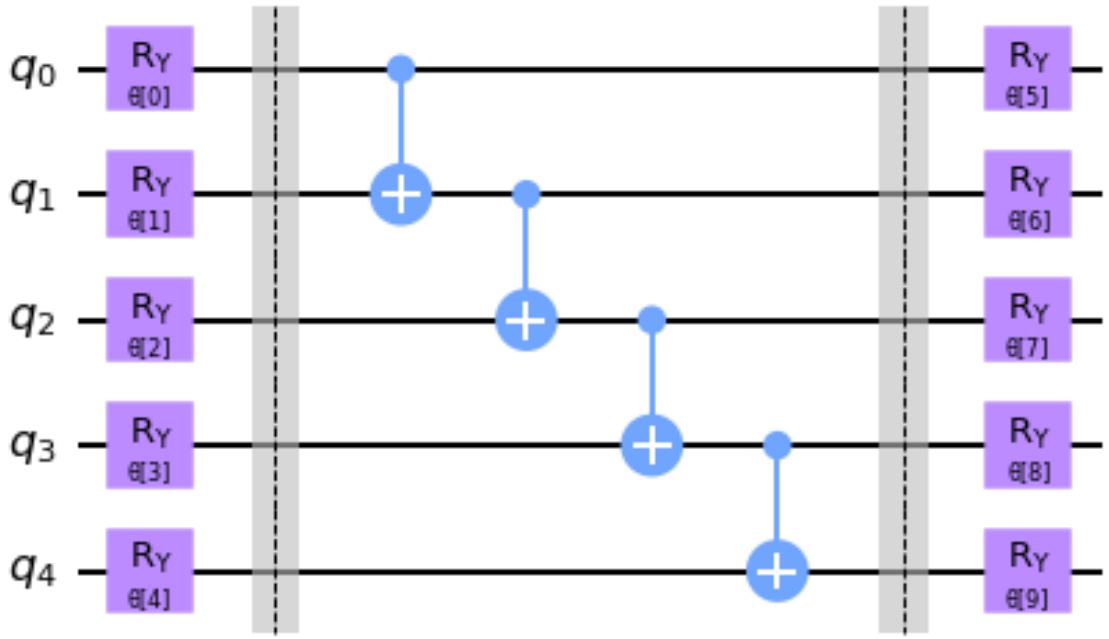
Twolocal 5 qubit ansatz



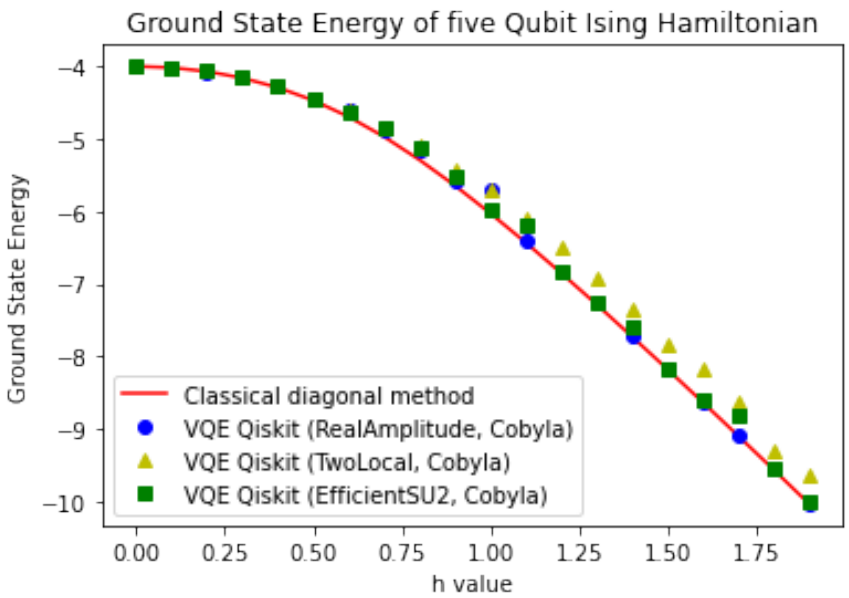
Hình 3: EfficientSU2 ansatz

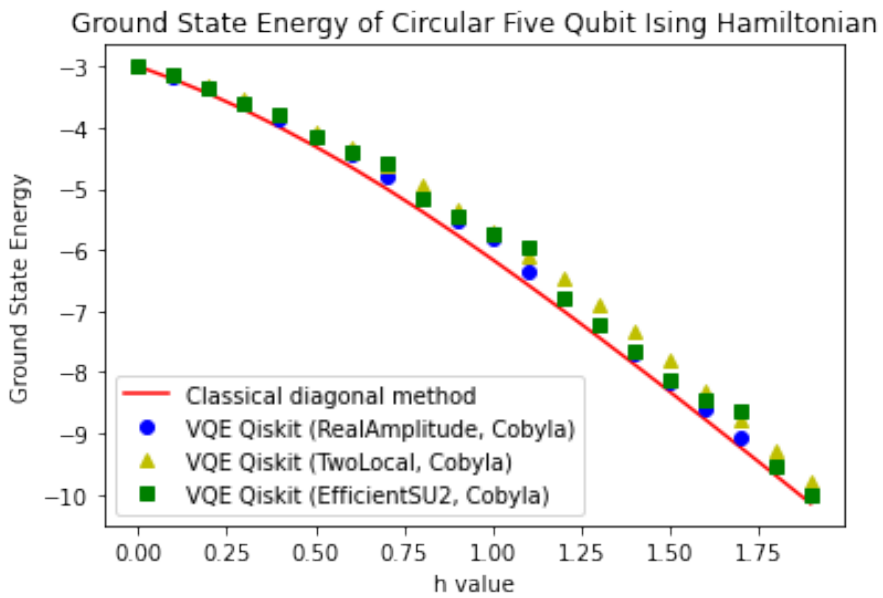
Twolocal 5 qubit ansatz



Hình 4: RealAmplitude ansatz

Ising 4 qubit results





Ising ansatz properties

Drawing some Ising ground state properties for designing the Ising ansatz

- Real
- Ground state energy under overall spin-flip (charge conjugation) symmetry $\mathcal{C} = \prod \sigma_x^i \rightarrow$ can reduce rotation space
- Neighbor interaction $\rightarrow$ can reduce entanglement map

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HEP Scattering Cross Section

Theoretical expression:

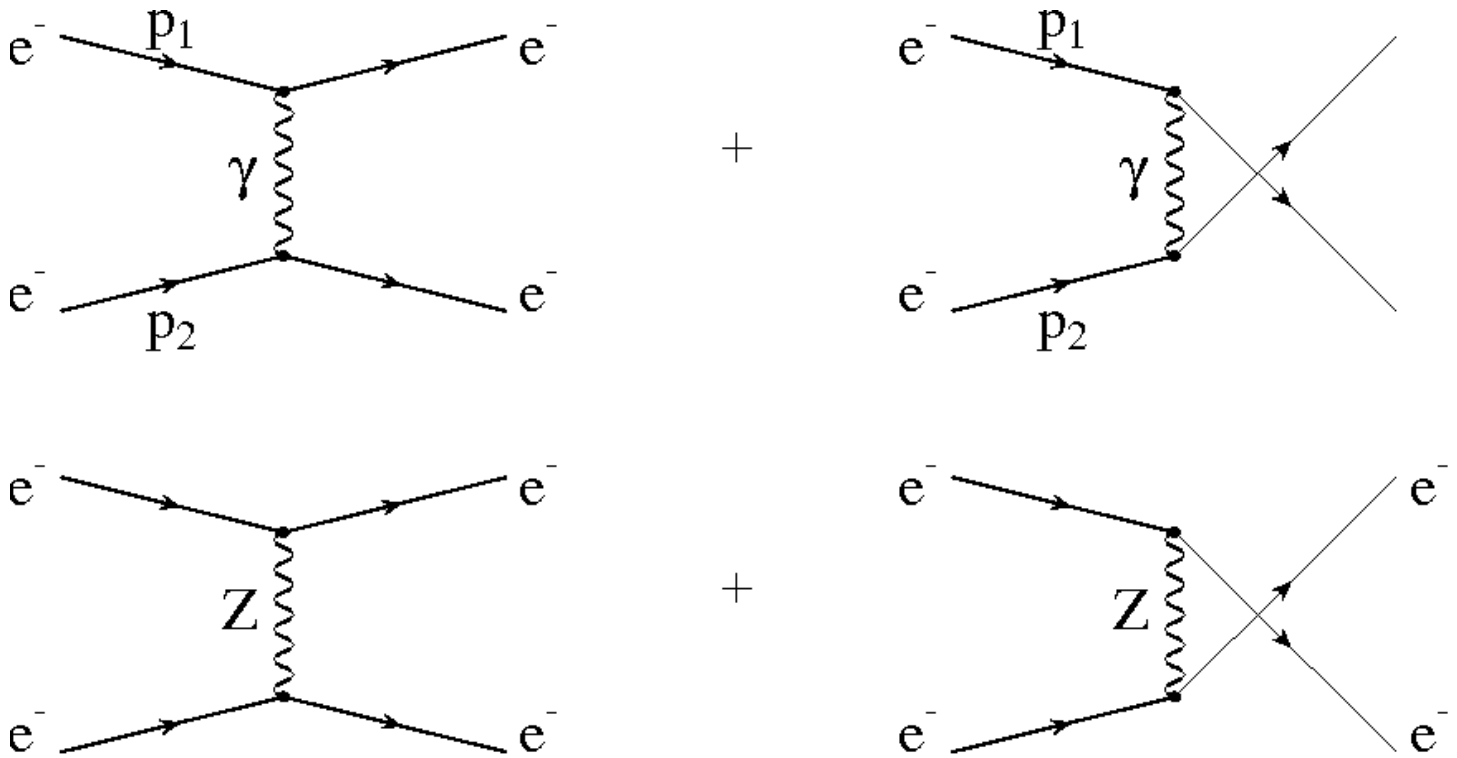
$$d\sigma = \frac{1}{2E_a 2E_b |v_a - v_b|} \left(\Pi_f \frac{d^3 p_f}{(2\pi)^3 2E_f} \right) |\mathcal{M}(p_a, p_b \to \{p_f\})|^2 (2\pi)^4 \delta \left(p_a + p_b - \sum_f p_f \right)$$

$|v_a - v_b|$: relative velocity (=longitudinal momentum/energy) of the beams viewed from the lab frame

p_a, p_b, E_a, E_b: initial state momenta and energies; p_f: final state momenta

$\mathcal{M}(p_a, p_b \to \{p_f\})$: scattering amplitude, $\{p_f\} = p_1, p_2, ..., p_n$

Scattering amplitude $\mathcal{M}(p_a, p_b \to \{p_f\})$



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