

1. **Bhabha Scattering**

Problem 5.2, Peskin and Schroeder

2. **Charged Scalar Field**

Consider a quantum field theory of a complex scalar field with a Lagrangian

$$\mathcal{L} = \partial\Phi^* \cdot \partial\Phi - M^2|\Phi|^2 - \frac{1}{4}\lambda|\Phi|^4. \quad (1)$$

- (a) Derive the Feynman rules for this theory.
- (b) Calculate to lowest non-trivial order in λ the elastic scattering cross-section for one particle and one anti-particle.