Formula for QFT I

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1 Classical field theory

Euler-Lagrange-equation

$$\partial_\mu \left(\frac{\partial \mathcal{L}}{\partial(\partial_\mu \phi)} \right) - \frac{\partial \mathcal{L}}{\partial \phi} = 0 \tag{1}$$

momentum density

$$\pi(x) = \frac{\partial \mathcal{L}}{\partial \dot{\phi}(\underset{\sim}{x})} \tag{2}$$

Hamiltonian density

$$\mathcal{H}(\phi(\underset{\sim}{x}), \pi(\underset{\sim}{x})) = \pi(\underset{\sim}{x})\dot{\phi}(\underset{\sim}{x}) - \mathcal{L}(\phi, \partial_\mu \phi) \tag{3}$$