4/7/16 Lecture 4 outline / summary

- Klein Gordon theory, SHO, and charged Klein Gordon theory.
- Euler Lagrangian equations for field theory. Klein Gordon example.
- Quantization: quantum field in terms of creation and annihilation operators.
- Covariant derivatives $D^\mu = \partial^\mu - (q/i\hbar c)A^\mu$ and minimal substitution, for charged Klein-Gorgon field. Will be useful for Higgs field.
- Spin 1: they are gauge fields. Example: $S = \int d^4x(-1/4)F_{\mu\nu}F^{\mu\nu} - j^\mu A_\mu/c$.
- Quantize spin 1, photon creation and annihilation operators.