

# 8.701

Introduction to Nuclear  
and Particle Physics

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2. Symmetries

2.4 Charge Conjugation



# Charge Conjugation

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Transformation that switches all particles to their corresponding antiparticles and vs.

$$C|p\rangle = |\bar{p}\rangle$$

Changes the sign of ALL internal quantum numbers - charge, baryon number, lepton number, strangeness, ..., leaving mass, energy, momentum and spin untouched

EM and strong interaction obey C-symmetry but the weak interaction violates C-symmetry

# Charge Conjugation

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Multiplicative quantum number (like parity)

$$C^2 = I$$

Only particles that are their own antiparticle can be eigenstates of C

$$C|p\rangle = \pm|p\rangle = |\bar{p}\rangle$$

That leave the **photon**

Limited use (by itself) in particle physics

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