

# 1 Are neutrinos Dirac or Majorana particles?

**Invent novel experimental approaches to determine whether neutrinos are Dirac or Majorana particles.**

**Focus: Neutrino physics**

**Requirements: Analytical calculation**

**Author: Boris Kayser**

Essentially the only approach being actively pursued to determine experimentally whether neutrinos are Dirac or Majorana particles is the search for neutrinoless double beta decay. Without consulting the literature (which would spoil the fun), can you think of other experimental approaches to making this determination? Analyze your proposed approaches quantitatively. Why are they sensitive to whether neutrinos are of Dirac or Majorana character? How sensitive is each of them? For each of them, what would it take, if anything, in the way of forces and/or particles beyond those that are presently known for this approach to work?