

# Massachusetts Institute of Technology

## Department of Physics

Course: 8.701 – Introduction to Nuclear and Particle Physics

Term: Fall 2020

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### Discussion Problems

from recitation on November 17th, 2020

#### Problem 1: Stable or not

Consider the isotope Curium-250 ( $^{250}_{96}\text{Cm}$ ), with mass 232.938 GeV. Given its A and Z numbers, do you expect this isotope to be stable?

#### Problem 2: Deuterium

If the nuclear force is charge independent and a neutron and a proton form a bound state, then why is there no bound state of two neutrons or two protons? What information does this provide for the nucleon-nucleon force?

#### Problem 3: Nuclear Shell Model

Discuss briefly the main experimental finding which led to the shell model description for nuclear states. Give examples of nuclei which correspond to closed shells and indicate which shells are closed.

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