

**AP 4010 Introduction to Nuclear Science  
Fall 2004**

**Homework Assignment 4: Due October 19, 2004**

1. Do problems 2.1, 2.2, and 2.3 at the end of Chapter 2 in Lilley's *Nuclear Physics*.
2. Consider a two-dimensional box (with infinitely high potential boundaries). What are the energy levels? Compare the energy levels of a two-dimensional box with the energy levels of a one-dimensional box and a three-dimensional box. (See Section 1.4.1 and Appendix B.)
3. Discuss the stability of Fermium ( $A = 257$ ,  $Z = 100$ , discovered in 1952) and Mendelevium ( $A = 258$ ,  $Z = 101$ , discovered in 1955). Consider  $\alpha$ ,  $\beta$ , and electron capture, and estimate the amount of energy released for both types of decay channels. Make use of the SEMF in your discussions. Which decay is most probable? Examine Appendix F. (If you would like, consider the a few of the more rapidly decaying isotopes and discuss their stability.)