Nuclear Science Week

## Radioactive Decay

**OBJECTIVE:**
*To visualize and model what happens when a nucleus decays. Radioactive decay is accompanied by the emission of radiation (alpha, beta, or gamma).*

**Grade:** 6-12

**Intended Learning Outcome:**

- Make predictions
- Use a model to demonstrate understanding
- Understand science concepts and principles

**Subjects:** Physics, Science, Math, Statistics

**Materials:**

- Pennies (1 per student)
- Balloons (1 per student)

**Teaching Time:** Approximately 30 minutes

**Number of Players/Students:** Full class (20-30 students) – this activity will work better with a large group.

**Teacher Information:** The half-life of a substance is the time that it takes for one-half of a substance to react or change.

**Procedure:**

1) Start by having each student blow up the balloon (but not tie it) and hold it in one hand.
2) At 30-second intervals, have the students flip their coins.
3) Those students whose coins come up tails will have a radioactive decay. They can release their balloon any time within the 30-second interval.
4) Those students whose coins come up heads will repeat steps 2 and 3 at 30-second intervals.
5) Stop when all the radiation has been released, that is, when all the nuclei have “decayed.”

**Analysis and Results:** Record the number of students that

"decay" during each half life and then graph the results. Record where the "radiation" landed and whether it "hit" any of the students.

**Assessment:**

1) Have the students discuss the results shown in their graphs.
2) Could they predict exactly when they were going to decay? Why or why not?
3) What is the effect of the radiation (the balloon) from one atom "hitting" another atom?
4) Can they predict where the radiation will go?

**Lesson Extension:** You may identify one student and then have all the others try to guess in which interval that students 'nucleus' will decay. Do this a number of times with different students and record the flip number where the designated nucleus decayed. With many trials, a graph of these results should look the same as a graph of the half-life results.