Instructor: Carey-Anne DeVries *(2003 Science Teacher Workshop participant)*
School District: Saint Francis Cabrini, Piscataway,
Lesson Title: Astronomical Atoms!
Grade: 4
Subject: Science
Overview: This two-part activity allows students to examine 1) the parts of an atom and their functions, and 2) how atoms interact in the Sun and emit radiation using peer modeling and an interactive game.
Objectives:
The student will be able to:

- Identify the basic structure of an atom
- Construct the basic structure of an atom through student modeling
- Explain the role of hydrogen atoms in the Sun in the creation of helium
- Reconstruct the process by which the hydrogen in the Sun forms helium and emits radiation by using student modeling**.**
- NJ Science Core Curriculum Content Standard 5.7- (Physics) All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations.
- NJ Science Core Curriculum Content Standard 5.9- (Astronomy and Space Science) All students will gain an understanding of the origin, evolution, and structure of the universe.

Materials and Resources:

- 24 Post-It notes (8 Post-Its in each of three colors)
    - 8 labeled proton
    - 8 labeled neutron
    - 8 labeled electron
- 24 index cards labeled hydrogen
- 6 index cards labeled helium
- 30 18 inch lengths of yarn

Introduction:
This two-part activity allows students to examine 1) the parts of an atom and their functions, and 2) how atoms interact in the Sun and emit radiation.
Activity:

Part 1-Break the class into three groups. Give each student in one group the proton labels, give another group the neutron labels, and give the third group the electron labels. Model several atoms using the correct number of students to form the atom. For example, Hydrogen would require one proton and one neutron (students) forming the nucleus and an electron student orbiting them. Do this a few times to give them an idea of the structures of different atoms.

Part 2-When students are comfortable with the basic structure of an atom, introduce the concept of solar energy. When studying the solar system, fourth graders typically learn about the Sun. They learn that the Sun consists mainly of hydrogen atoms. They also learn that the hydrogen atoms heat up and combine to form helium. Explain that energy is released in this process. That energy is radiation. If necessary, give brief examples of radiation, such as nuclear materials, X-rays, and so on. Give each student an index card labeled hydrogen. Either you or the students punch two holes in the top of each card and run the string though them to create a necklace. Do the same for the helium cards. Next, model the basic process of fusion by combining four hydrogen atom students, having them remove their card labels, and having them put on a new helium label. If necessary, have them toss their old hydrogen labels behind them to represent the emission of part as energy, or solar radiation. Additionally, you can create a game if space permits by moving desks to the perimeter of the room and calling out either “hydrogen” or “helium.” When you call out “hydrogen,” the students must wear their hydrogen label. When you call out “helium,” the students must gather in groups of four and wear a helium label.