



# Snippets of Science from Fermilab

PS 2 (3-8) Explain

## CUTTING PAPER TO PROTONS

**Challenge:** Can you cut a piece of paper to the size of a proton?

**Goal:** Use scissors to methodically cut a piece of paper to as small a size as possible. It reinforces the idea that the smaller and object is, the harder it is to visualize and manipulate it.

**Fermilab Connection:** Fermilab scientists make measurements of incredibly small particles and distances. What is the smallest size “particle” you can create from a piece of paper?

### Preparation

Review the small things measured in the “measuring small” activity (PS 2 (3-8) Explore).

### Procedure

1. Take your piece of paper and fold it in half the short way (like a hamburger). Cut the paper in half. Keep both halves!
2. Continue folding the paper the short way (hamburger style) and cutting the paper in half. The goal is to safely cut the paper as small as possible.
3. Keep track of the number of cuts you make in the space below:

4. Ask how many cuts do you think it will take to make the paper the size of an atom?
5. How many cuts will it take to get the paper to the size of a proton?
6. Answers: Don’t reveal to your student!

Atom: Approximately 60 cuts

Proton: Approximately 30 additional cuts for a total of 90

### Discussion

1. How can scientists observe the really small?
2. How do we know if it’s there if we can’t see it?

**GRADE LEVEL**  
Grades 3–8 with modifications

### MATERIALS

- 8.5” x 11” paper
- Scissors

**Fermilab Resources:**  
Click on the linked resources!

[Nature’s Scale](#)

[What is the world made of?](#)

[Where do particle names come from?](#)