

# SNS Activity Book

Wow!

Cool!

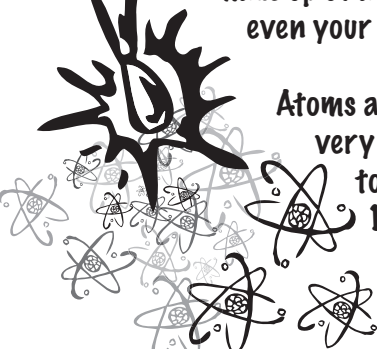
# What are Neutrons, and Why are They Important?



Before we can understand neutrons, we need to understand atoms. Everything in the world is

made up of atoms: the air, trees, cars—  
even your body is made up of atoms.

Atoms are so small that you need a very powerful magnifying glass to see them. There are 100,000,000,000,000,000,000 atoms in a single drop of water!

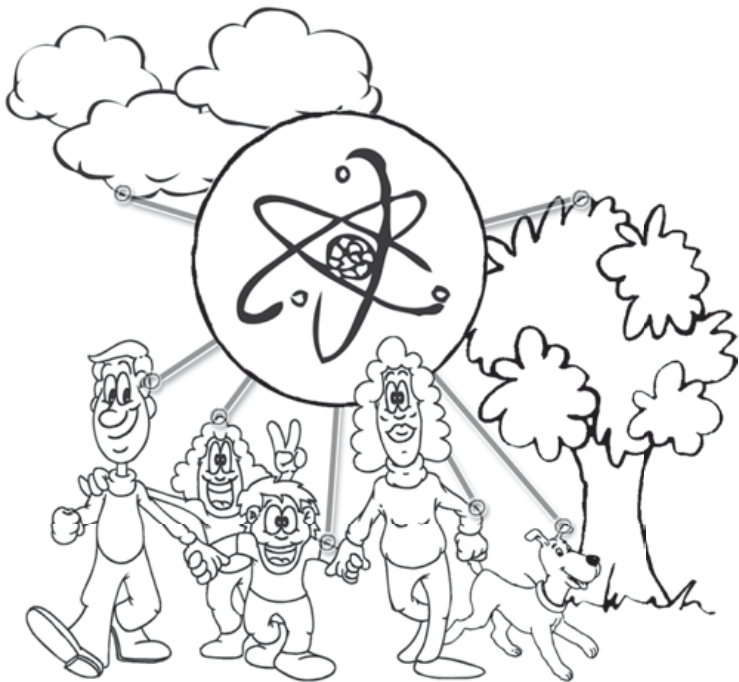


Even though atoms are very small, they are made up of even smaller particles. Every atom has a nucleus (or center) made up of even smaller particles called protons and neutrons. Other tiny particles, called electrons, orbit the nucleus, much like the planets in our solar system travel around the sun.



Neutrons are very useful to scientists at SNS because when they are released from the nucleus of an atom, they can travel inside other materials without damaging them. Once inside, the neutrons then act like a magnifying glass that allows scientists to see the internal structure of that material.

**Because everything in the world is made of atoms,  
which contain neutrons, neutron research can benefit  
every aspect of our lives—**



**the possibilities are endless!!**

# SEARCH-A-WORD

Q D W X L W V P Z A G J G H J W M T Q S X Z  
E L U C E L O M I D W W S S K V E T S I T D  
M Y S O K K H X T H K F N C D S R B O G J X  
K E L R I A S F M Y S W M C T B C N F E J M  
C P G A O X T Q W V S R Q N E G U S W C Z A  
T A J A B L D O C B V U E A H N R R K D G E  
B C V M W O I D M O N M M N C I Y T F C N R  
P C D N R A R N H S U L Z O T R S Q I D I E  
E E N N O H T A A R R H N S J R Y Y F P T H  
A L U E O A N T T C I T H P J T A B P U C C  
T E C X K R M S A O R D O E B G M P A L U R  
S R L T H W N V Z O R W Q E Z F S H R S D A  
T A E G A I P V L O Z Y R D Y A H D T E N E  
E T U E V J D R S P A L L A T I O N I V O S  
G O S N E E O Z W R K I N Z S E V U C N C E  
R R S E N O M E O O N L L U H S G W L O R R  
A B T R M E H P N T O Z B H Y O Q B E T E N  
T J R A T M T H E A R L T E N G A M P O P Z  
K A U T J D L Y G L T Z L A N L H Q I R U W  
G B C I Q S G S O U U F R O N T E N D P S I  
O V T O O R T I R M E Q J J M A E B O R N L  
F B U N E J S C D U N E L E C T R O N E S G  
Y P R N S E B I Y C D Y N J G E Z G I M Q I  
W A E L Q T T S H C W X G L P E C N E I C S  
T A B N A Y K T P A K S C A T T E R D N Q V

ACCELERATOR

ACCUMULATOR

ATOM

BEAM

CONTROL ROOM

ELECTRON

ENERGY

FRONT END

HYDROGEN

INSTRUMENT

ION

LABORATORY

LINAC

MAGNET

MEGAWATT

MERCURY

MOLECULE

NEUTRON

NEXT GENERATION

NUCLEUS

PARTICLE

PHYSICIST

PROTON

PULSE

RESEARCHER

RING

SCATTER

SCIENCE

SNS

SPALLATION

SPEED

STRUCTURE

SUPERCONDUCTING

TARGET

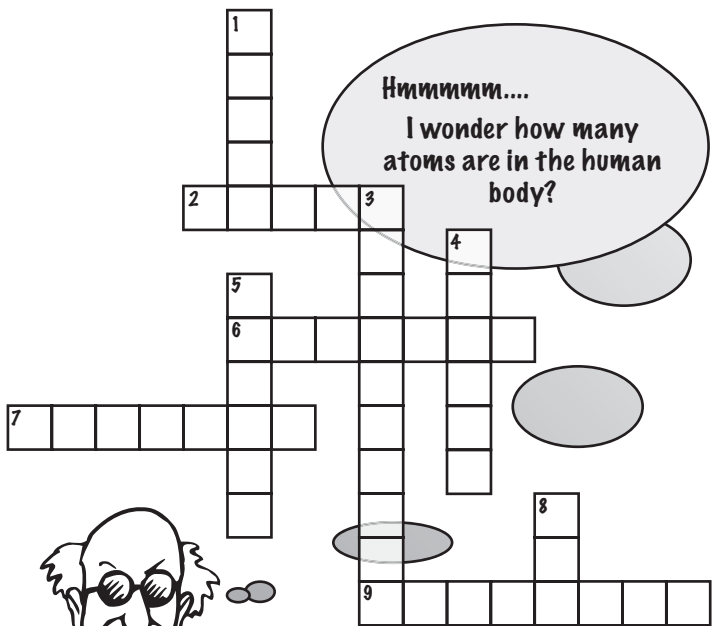


Two atoms are flying around the SNS ring. Suddenly the first atom said to the second, "Hey, I think I've just lost an electron!"

"Are you sure?" asked the second atom.

"Yeah," said the first, "I'm positive."

# CROSSWORD



HMMMMM....

I wonder how many atoms are in the human body?

An average adult (weighing 70 kg or 154 lb) would have approximately  $7 \times 10^{27}$  atoms. That is, 7 followed by 27 zeros:

7,000,000,000,000,000,000,000,000,000,000

## Across

2. Everything in the world is made up of \_\_\_\_\_.
6. This center part of an atom is where neutrons are.
7. The SNS target contains liquid \_\_\_\_\_.
9. These neutrally charged particles are the key to science at the SNS.

## Down

1. The SNS ion beam is accelerated to 90% the speed of \_\_\_\_\_.
3. \_\_\_\_\_ is another term for scattering, which is what happens to neutrons within the SNS target facility.
4. SNS stands for the Spallation Neutron \_\_\_\_\_.
5. A lot of \_\_\_\_\_ is needed to accelerate the tiny SNS ion beam.
8. Atoms are made up of tiny \_\_\_\_\_ such as neutrons, protons, and electrons.

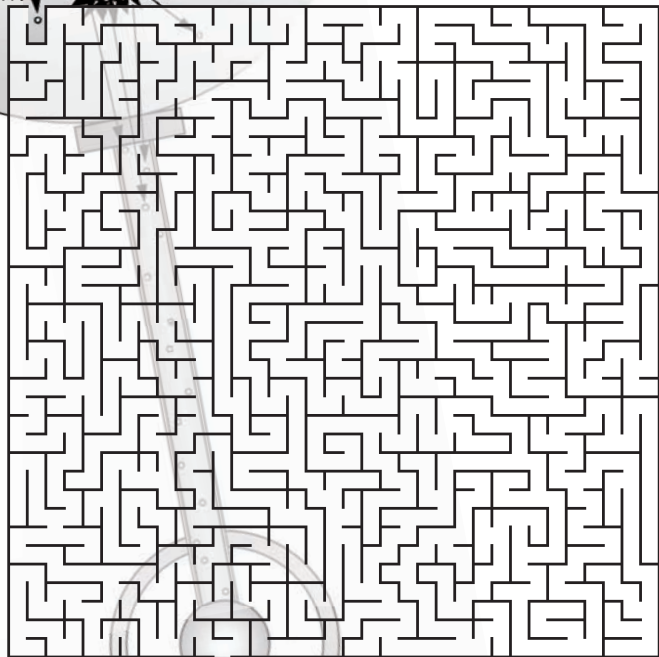


A neutron walks into a restaurant and orders a Coke. When the waiter hands him the drink, the neutron asks, "How much do I owe you?"  
The waiter replies, "For you...no charge."



# Get the neutron to the sample!

Start



Finish

Let the experiment  
begin!





[www.sns.gov](http://www.sns.gov)