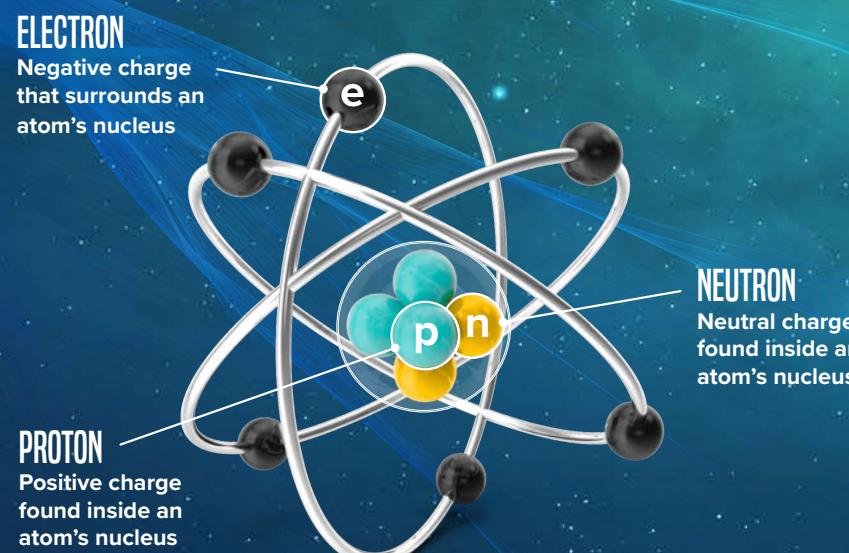


## WHAT IS RADIATION?

Radiation is the release of energy from the unstable nucleus of an atom that travels in waves or particles. The effect of radiation is defined by its ability to ionize — or remove electrons from atoms. Ionizing radiation produces charged ions that can pass through matter, unlike non-ionizing radiation which is commonly produced by everyday electronic devices.



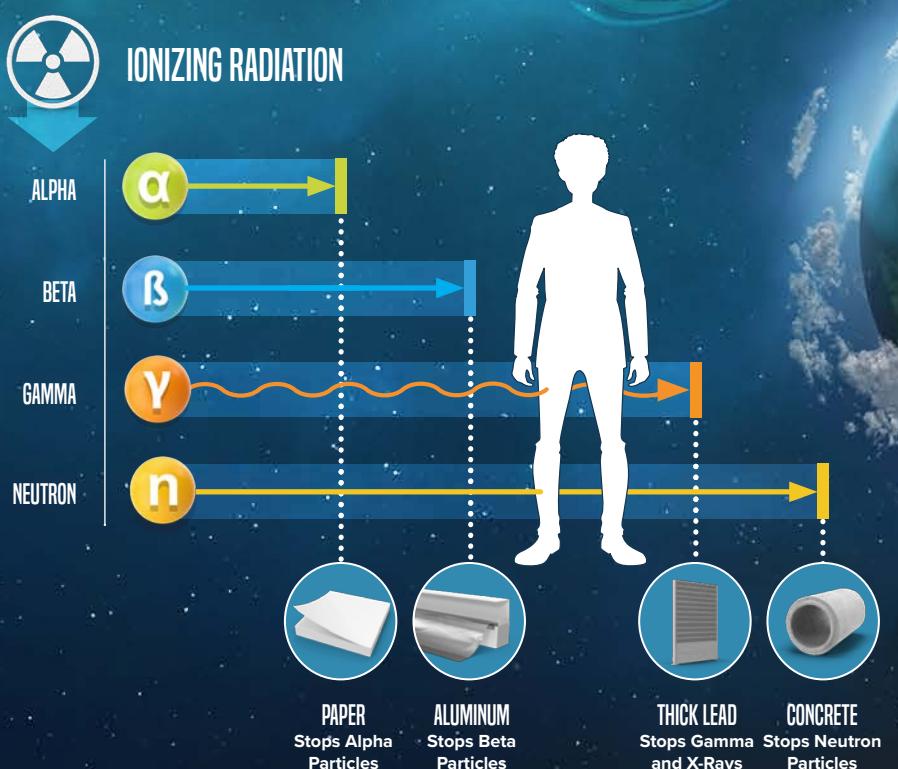
## WHERE DOES RADIATION COME FROM?

Ionizing radiation is released from an atom as either an alpha particle, beta particle, neutron particle, or gamma ray. **Alpha** radiation is created when an atom's nucleus releases two protons and two neutrons as a single particle. **Beta** radiation is created when a neutron changes to a proton in the atom's nucleus. **Neutron** radiation is created when an uranium or plutonium atom fissions, producing nuclear energy. **Gamma** radiation is a ray or wave of energy that is similar to the wavelength of X-rays.

## HOW TO REDUCE EXPOSURE

People are exposed to radiation every day from natural and human-made sources. The federal government works to reduce radiation doses by regulating the production, use, and disposal of hazardous materials.

Too much exposure to uncontrolled radiation can be harmful, so experts use time, distance, and shielding to help protect themselves. **Time** means limiting the amount of time spent near a source of radiation. **Distance** means increasing the physical space between a source of radiation and other objects. **Shielding** means using a material that protects other objects from ionizing radiation, as shown below.



TO REDUCE  
RADIATION EXPOSURE:

- REDUCE TIME
- INCREASE DISTANCE
- USE SHIELDING

# RADIATION & YOU

**RADIATION  
IS ENERGY  
IN MOTION!**

# NATURALLY OCCURRING RADIATION

Most radiation on Earth comes from natural sources found in the air, water, and soil. The human body contains some natural radioactive minerals, such as potassium-40. Over time, this radioactive material accumulates in our bodies, primarily through eating and drinking.

## THE SUN COSMIC RADIATION

Cosmic radiation is when high-energy particles travel through space to Earth. People living at higher elevations tend to be exposed to higher rates of cosmic radiation.



## HUMANS INTERNAL RADIATION

Humans give off radiation just like cosmic or terrestrial sources.

## ROCKS & SOILS TERRESTRIAL RADIATION

Uranium and thorium are sources of terrestrial radioactive material, found in the rocks and soils on Earth.

92  
**U**  
Uranium  
238.028



# HUMAN-MADE RADIATION

Though radiation mostly occurs naturally, half of a typical person's daily dose of radiation comes from artificial sources. Both natural and human-made radiation can be detected using special instruments.

## MEDICAL

The highest exposure to human-made radiation comes from medical procedures, like computerized tomography (CT) scans or X-rays.



## BUILDING MATERIALS

Some building materials contain naturally occurring radioactive elements, that decay into radon gas. Older homes and buildings are often tested for radon to protect human health and the environment.

## TOBACCO PRODUCTS

Tobacco products contain radioactive isotopes. Smokers receive a higher annual radiation dose.

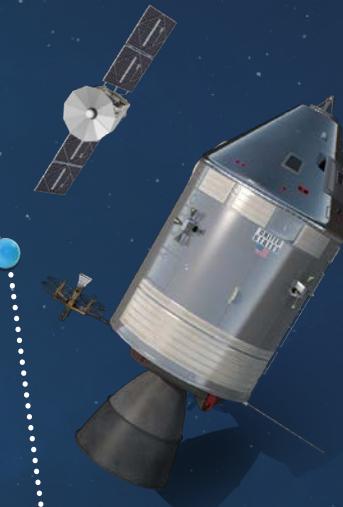


# USES FOR NUCLEAR TECHNOLOGY

Radiation supports life by advancing medicine, research, and technology.

## INDUSTRIAL AND SPACE EXPLORATION

Radiation is used in a variety of ways — from capturing harmful particles in power station emissions to manufacturing nonstick cookware. Radiation helps space exploration by powering spacecraft and satellites.



## STERILIZATION AND SANITATION

Radiation is used to disinfect medical supplies, like surgical tools, and kill harmful bacteria and germs. Food irradiation is a radiation-based method used to destroy microorganisms, improve food safety, and extend shelf life.



## EDUCATION

Teachers and scientists use radioactive materials to conduct research. For example, carbon dating can determine the age of mummies, fossils, and other artifacts.



## ENERGY

Nuclear power plants use fission — the process of splitting the nucleus of atoms — to produce heat that turns turbines and generators, which produces electricity for homes and businesses.

