#### **Electromagnetic Radiation**

- What is <u>radiation</u>?
- Electomagnetic <u>spectrum</u>
  - Gamma and X <u>Rays</u>
  - UV-<u>radiation</u>
  - Visible light
  - Infrared radiation
  - Micro waves
  - Radio waves

In this list the frequency of the radiation decreases and the wavelength of the radiation increases when going down. At the same time the energy of the radiation is decreasing.

#### **Radioactivity**

- Elements, which are not stabile but decade to other elements, are said to be radioactive elements
  - The amount of neutrons vary in the kernel of an element. These are still the same element but they are called as **isotopes** to each other.
  - Radioactive isotopes of an element are called **radioisotopes**.
  - Radioisotopes in nature: Th 232, H 3 (tritium), K 40, U 238, C14
- The radioactivity of an isotope causes particle radiation and short wave gamma radiation.

#### Particle radiation

- α-radiation (α active radioisotope)
- β-radiation (β active radioisotope)
- Neutron radiation
- Electromagnetic Radiation
  - γ-radiation

Penetrating Distances of the Radiation









#### **Radiation properties**

Different radiations have different properties, as summarized below:

Radiatio n	Type of Radiation	Mass (AMU)	Charg e	Shielding material
Alpha	Particle	4	+2	Paper, skin, clothes
Beta	Particle	1/1836	±1	Plastic, glass, light metals
Gamma	Electromagnetic Wave	0	0	Dense metal, concrete, Earth
Neutron s	Particle	1	0	Water, concrete, polyethylene, oil

#### **Radioactivity**

- Half-Life
  - The half-life of an isotope is defined as the <u>time it takes</u> for <u>half the original</u> <u>mount</u> of isotope in given sample <u>to decay</u>.
  - <sub>6</sub>C<sup>14</sup> T<sub>1/2</sub>=5730y
- Activity
  - Bq (Beguerel)
  - Radioactive decays in second
- Radiation Dose
  - SV (Sievert)
  - The Biologigal strength of the radiation
  - <u>www.stuk.fi</u>
- Radioactive elements
  - C-14
  - Rn

