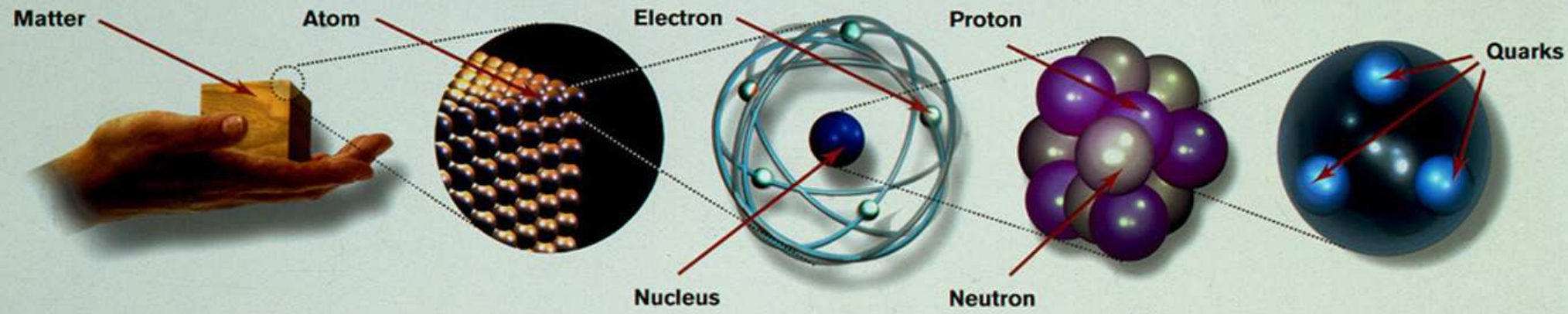

Matter particles
All ordinary particles belong to this group

These particles existed just after the Big Bang. Now they are found only in cosmic rays and accelerators

LEPTONS

FIRST FAMILY	**Electron** Responsible for electricity and chemical reactions; it has a charge of -1	**Electron neutrino** Particle with no electric charge, and possibly no mass; billions fly through your body every second
SECOND FAMILY	**Muon** A heavier relative of the electron; it lives for two-millionths of a second	**Muon neutrino** Created along with muons when some particles decay
THIRD FAMILY	**Tau** Heavier still; it is extremely unstable. It was discovered in 1975	**Tau neutrino** not yet discovered but believed to exist

QUARKS

Up Has an electric charge of plus two-thirds; protons contain two, neutrons contain one	**Down** Has an electric charge of minus one-third; protons contain one, neutrons contain two
Charm A heavier relative of the up; found in 1974	**Strange** A heavier relative of the down; found in 1964
Top Heavier still	**Bottom** Heavier still; measuring bottom quarks is an important test of electroweak theory

Force particles
These particles transmit the four fundamental forces of nature although gravitons have so far not been discovered

Gluons
Carriers of the strong force between quarks

Felt by: quarks

The explosive release of nuclear energy is the result of the strong force

Photons
Particles that make up light; they carry the electromagnetic force

Felt by: quarks and charged leptons

Electricity, magnetism and chemistry are all the results of electro-magnetic force

Intermediate vector bosons
Carriers of the weak force

Felt by: quarks and leptons

Some forms of radio-activity are the result of the weak force

Gravitons
Carriers of gravity

Felt by: all particles with mass

All the weight we experience is the result of the gravitational force

GRAPHICS: PETER CROWTHER