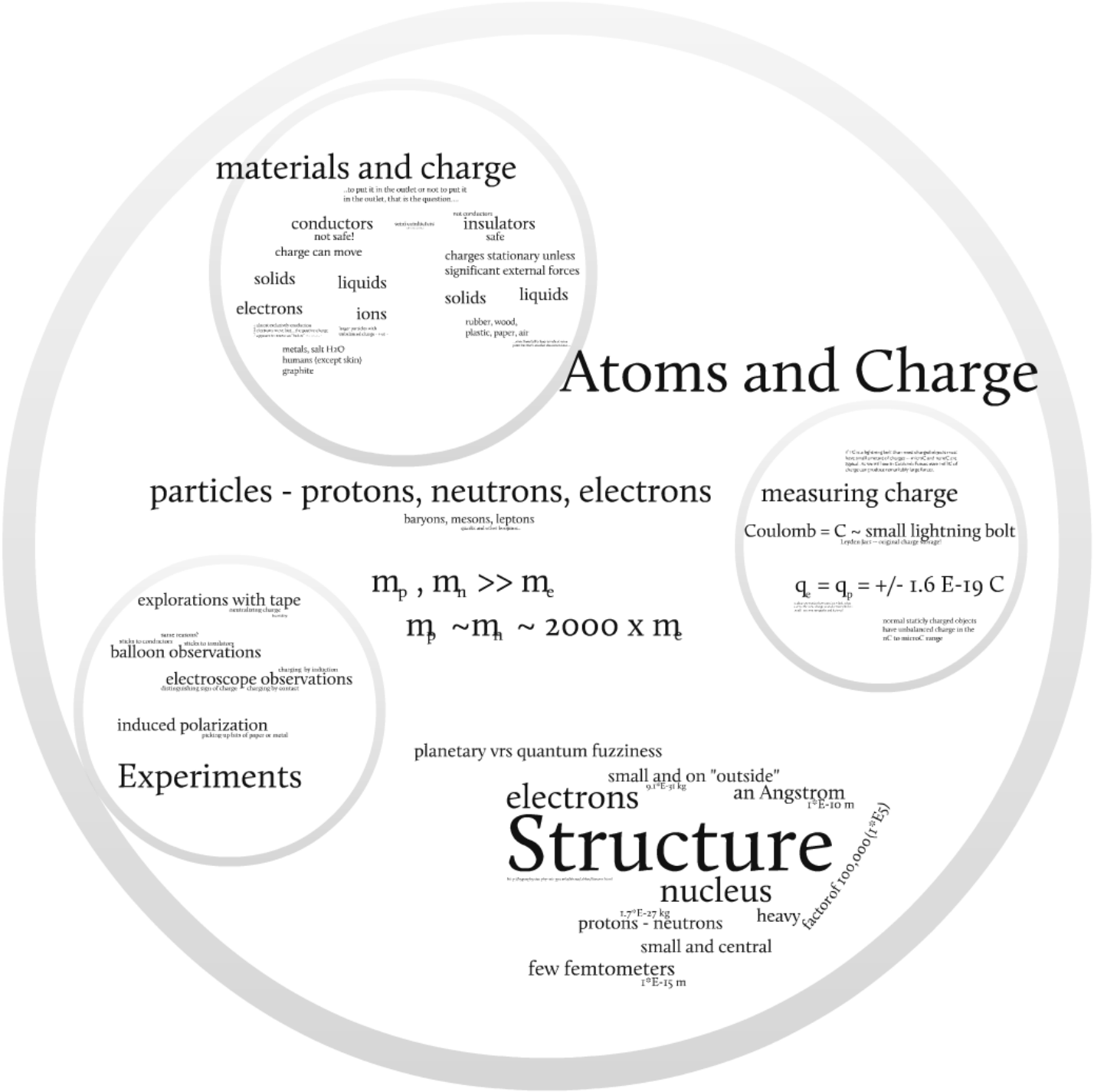
materials and charge
..to put it in the outlet or not to put it
in the outlet, that is the question...
conductors
not safe!
charge can move
solids
liquids
electrons
ions
metals, salt H2O
humans (except skin)
graphite
not conductors
insulators
safe
charges stationary unless
significant external forces
solids
liquids
rubber, wood,
plastic, paper, air
Atoms and Charge
particles - protons, neutrons, electrons
baryons, mesons, leptons
m_p , m_n >> m_e
m_p ~m_n ~ 2000 x m_e
measuring charge
Coulomb = C ~ small lightning bolt
Leyden Jars -- original charge storage!
$q_e = q_p$ = +/- 1.6 E-19 C
normal statically charged objects
have unbalanced charge in the
nC to microC range
explorations with tape
neutralizing charge
balloon observations
sticks to conductors
sticks to insulators
electroscope observations
charging by induction
distinguishing signs of charge
charging by contact
induced polarization
picking up bits of paper or metal
Experiments
planetary vrs quantum fuzziness
small and on "outside"
electrons
9.1*E-31 kg
an Angstrom
1*E-10 m
Structure
nucleus
1.7*E-27 kg
protons - neutrons
heavy
factor of 100,000 (1*E5)
small and central
few femtometers
1*E-15 m