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Physics news on the Internet (based on electronic preprints)

Electron balls

Magnetism of electrons is usually measured with the aid of so-called atom traps. The precision of measurements is to a large extend limited by the interaction of the electron and its mirror image charge induced by the electron in the electrodes of the trap. It is difficult to account for this interaction. Hans Dehmelt and his colleagues at the University of Washington succeeded in imprisoning 1000 electrons in an atom trap, thus producing a single-component plasma consisting of negative charges only. The resulting droplet with spherical symmetry behaves like a point-like object with a charge and mass 1000 times those of a single electron. By studying such electron balls it is possible to account more accurately for the interaction of electrons with their mirror images. Electron balls may be useful in experimental plasma physics and many offer research areas.

Source: Physics News Update, Number 241, physnews@aip.org.

Change of the gravitational constant with time

By studying the evolution of low-mass stars in globular clusters Georg Raffelt derived the upper and lower limits for the possible change of the gravitational constant G with time. He calculated the evolution of stars on the assumptions that (i) G is constant and (ii) G varies linearly with time. If the age of the stars under consideration is taken as 8 to 20 billion years, then comparison of the results for the two conditions yields

$$-35 \times 10^{-12}\, y^{-1} < \dot{G}/G < 7 \times 10^{-12}\, y^{-1}$$

This is close to current estimates found from observations.

Source: raffelt@MPPMU.DE

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