The Physics of Condensed Plasmoids (CP), Ball Lightning and Low-Energy Nuclear Reactions (LENR)

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Abstract

After decades of research on high-density charge clusters [1], ball lightning and LENR [2] it turns out, that Edward H. Lewis was right with his hypothesis: Atoms can enter a previously unknown state of matter, in which they behave like ball lightning, and which is an intermediate state of the LENR reaction [3], [4].

The quantum-mechanical understanding of this strange state of matter, which will in the following be called "condensed plasmoids (CP)", is a pivotal step towards "taming" LENR for commercial applications.

In contrast to the quantum-mechanical model of the atom, which is based on the spherically symmetric electrostatic potential of the nucleus, the quantum-mechanical model of CP is based on the cylindrical symmetry of a very thin plasma "wire".

In CP both, the nuclei and the electrons are moving rapidly in opposite directions along the plasma wire. This results in a strong electric current through the wire, pinching the "plasma" thin via its strong magnetic field. The word "plasma" is in quotes here, because the electrons are in their ground state, i.e. the entire object is stable against radiative decay.

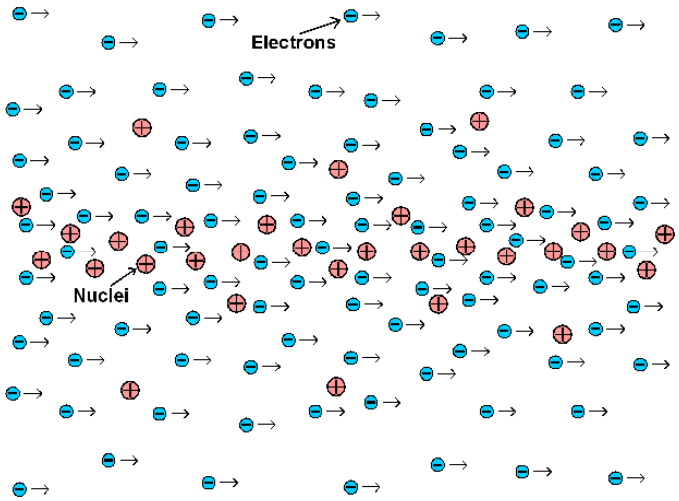

Figure 1 Basic cylindrical model of a CP. The CP similarly extends to the left and to the right of this picture

The assumption, that the nuclei of the atoms are fixed points in space (Born-Oppenheimer approximation), is not adequate for modeling CP, because the wave functions of all the electrons and all the nuclei are largely delocalized in one dimension.

The cylindrical model of CP is a simplified quantum mechanical approximation at a microscopic level. This model will be described and used in the following for computing the main properties of CP. Beyond this model however, the CP is also self-interacting via its strong magnetic field, which organizes the shape of CP at a mesoscopic level in complicated ways. For example CP are often coiling up in a manner shown here:

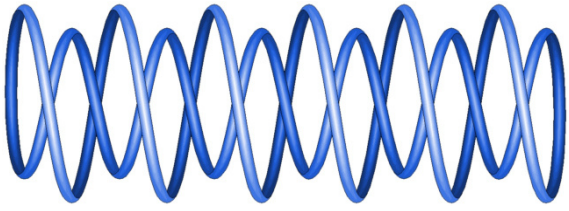

Figure 2 CP coiling up in a closed loop via magnetic self-interaction

CP enable nuclear reactions between the ions via its ultra-high density and the strong electronic screening of the Coulomb barrier.

The gamma and neutron radiation of nuclear reactions inside the plasma wire is suppressed, because the ultra-dense electron current in the plasma wire provides high dampening of the dipole oscillation of excited nuclei.