Neutrons escaping to a parallel world?

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In a paper recently published in *European Physical Journal C*, researchers hypothesised the existence of mirror particles to explain the anomalous loss of neutrons observed experimentally. The existence of such mirror matter had been suggested in various scientific contexts some time ago, including the search for suitable dark matter candidates.

Theoretical physicists Zurab Berezhiani and Fabrizio Nesti from the University of l'Aquila, Italy, reanalysed the experimental data obtained by the research group of Anatoly Serebrov at the Institut Laue-Langevin, France. It showed that the loss rate of very slow free neutrons appeared to depend on the direction and strength of the magnetic field applied. This anomaly could not be explained by known physics.

Berezhiani believes it could be interpreted in the light of a hypothetical parallel world consisting of mirror particles. Each neutron would have the ability to transition into its invisible mirror twin, and back, oscillating from one world to the other. The probability of such a transition happening was predicted to be sensitive to the presence of magnetic fields, and could therefore be detected experimentally.

This neutron-mirror-neutron oscillation could occur within a timescale of a few seconds, according to the paper. The possibility of such a fast disappearance of neutrons-much faster than the ten-minute long neutron decay-albeit surprising, could not be excluded by existing experimental and astrophysical limits.

This interpretation is subject to the condition that the earth possesses a mirror magnetic field on the order of 0.1 Gauss. Such a field could be induced by mirror particles floating around in the galaxy as dark matter. Hypothetically, the earth could capture the mirror matter via some feeble interactions between ordinary particles and those from parallel worlds.

More information: Z. Berezhiani, F. Nesti, Magnetic anomaly in UCN trapping: signal for neutron oscillations to parallel world? (2012), *European Physical Journal C* 72: 1974, DOI 10.1140/epjc/s10052-012-1974-5

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