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News & Comments

Distinctive Features of Charge Exchange

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The second flavour of hydrogen atoms (SFHA) is those types of hydrogen atoms that only exist in the discrete and continuous spectra in the zero-orbital angular momentum states (the S-states). They were first theorized, where analysis of atomic tests using the high-energy tail of the linear momentum distribution in the ground state of hydrogen atoms also served as evidence for their reality. Two solutions to the Dirac equation for hydrogen atoms exist, and they differ from one another by how they behave at relatively low values of the electron-to-proton distance r. Because it only possesses a weak singularity at tiny r, one solution is referred to as "regular. "This type of atom was given the moniker "second flavour of hydrogen atoms" for the following reason. The singular wave function describing the ground state of the other type of hydrogen atoms and the regular wave function describing the ground state of typical hydrogen atoms both have the same quantum numbers N = 0, k = 1, and j = 1/2 and correspond to the same energy. In addition to the insignificant double-degeneracy about the z-projection mj of the total angular momentum J, there is another double-degeneracy. Since two flavours differ by the eigenvalue of a third, new conserved quantity, hydrogen atoms have flavour symmetry. By drawing an analogy with the so-called flavour symmetry of quarks, it makes sense to have flavours: for instance, there are up and down quarks. The following recent astronomical observation also appears to provide further evidence for the SFHA's reality. The DES team's creation of the most accurate map of the distribution of dark matter in the universe revealed that this distribution is noticeably smoother than predictions made using Einstein's relativity. It was specifically examined in a system of several gravitational neutral particles, each with a mass equal to one hydrogen atom. The subsystem comprising these relatively isolated pairs of particles that lose energy through gravitational radiation was the area of focus. The spacing of the particles inside the pair is reduced because of this. The cross-sections of the resonant charge exchange for collisions of regular hydrogen atoms with incoming protons and collisions of Second Flavour Hydrogen Atoms (SFHA) with incoming protons were demonstrated to differ noticeably in the current work. The findings further support the status of the SFHA as the most likely candidate for dark matter, in addition to earlier evidence of the existence of the SFHA obtained from the analysis of other kinds of atomic experiments, as well as the evidence related to the two different kinds of astrophysical observations.

JOURNAL REFERENCE

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