

The two-component Dark Matter in the vectorlike hypercolor extension of the Standard Model.

At the moment, the Dark Matter existence is a firmly established fact, which is confirmed in many astrophysical observations. However, the nature of this phenomenon remains unknown, and it is one of the main problems of the Standard Model. The DM nature and properties can be interpreted as manifestation of weakly interacting massive particles (WIMPs) which have conserved additive or multiplicative quantum numbers.

Some astrophysical phenomena (in particular, monochromatic photon signals from the Galaxy center or positron excess in cosmic rays) can be explained on the assumption that the Dark Matter consists of several components. One of the two-component DM models will be discussed in this paper. In the minimal hyper-color model, a new fermion sector (H-quarks) in confinement with the gauge group $SU(2)_{TC}$ is introduced in addition to the SM particles. Interaction of H-quarks with the SM particles is provided by standard electroweak bosons

Thus, in the simplest vectorlike model there is a doublet of Dirac H-quarks with zero hypercharge and a triplet of pseudo-goldstones, H-pions, with lightest stable neutral component. In analogy with conventional QCD, H-quarks can form bound states - H-hadrons. The lowest neutral [scalar] state, B_0 -diquark, can also be a component of the DM together with the stable neutral H-pion. Mass splittings both for components of the H-pion triplet and for neutral H-pion and B have been calculated, it is shown that the splittings can be small. Relic abundance for this composition of the DM is considered and interaction of the DM particles with nucleons was also analyzed.

A feature of this scenario is that Dark Matter turns out to consist of particles, which are close in mass, but have different origin and interact differently with ordinary matter. So, the DM effects can be a consequence of two-component structure that naturally arises in the model. The possible effects of the interaction of the two-component DM with cosmic rays are also briefly discussed.

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