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Less-dimensions and the origin of Dark Matter

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The origin and the nature of Dark Matter cannot be addressed in the context of Standard Model. If the topology of the Universe is based on 2 flat +1 compact space dimension, constraints on the number of particles and on their quantum numbers occur from the requirement of gauge invariance in the 3-dimensional subspace. This scenario, called less-dimensions, suggests the GUT group of particle physics to be $SO(10)$ with the breaking pattern $SO(10) \rightarrow SU(5) \times U(1)$, where only $SU(5)$ is gauged. Interpreting the remaining $U(1)$ as the source of a discrete symmetry of Nature, the covering $SO(10)$ determines all matter fields either odd or even under the discrete symmetry. The minimal model based on Z_2 predicts only two possible Dark Matter candidates at low energy, the inert scalar doublet H_2 and the scalar singlet S . We work out Dark Matter phenomenology of that model and analyze PAMELA, ATIC and future FERMI data implications on it. At LHC, the SM Higgs sector is the portal to the Dark Matter world.

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