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Potential Mirror Matter Effect on the Neutron Lifetime LOUIS VARRIANO, YURI KAMYSHKOV, Univ of Tennessee, Knoxville, ZURAB BEREZHIANI, Universita dell'Aquila — A precise measurement of the neutron lifetime is important for Big Bang nucleosynthesis calculations. The history of neutron lifetime measurements has demonstrated impressive continuous improvements of the experimental techniques and of the accuracy. However, two most precise recent measurements performed by different techniques differ by about 3 standard deviations. This difference of 9.2 seconds can possibly be resolved by future experiments, but it also can lead to an interpretation of a new effect. This research attempts to explain this difference by a mirror matter as dark matter effect present in these experiments. Both mirror matter and regular matter can have similar properties and self-interactions and can interact gravitationally with each other, thus providing evidence of the existence of dark matter. However mirror matter does not couple to the regular matter by our other Standard Model interactions. Additional interactions can exist, providing mixing of regular matter neutral states, like the neutron, with mirror components with small probability. This work first estimates the density of mirror matter particles needed to explain the difference between measurements of the neutron lifetime. Working under a model that describes an accumulation of mirror matter particles within the Earth, this resulting density is then evaluated for its reasonableness.

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