

Feasibility of Weakly Interacting Massive Particles as Dark Matter Candidates: Exploratory Study on The Possible Reasons for Lack of WIMP Detection

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Abstract : Dark matter constitutes a majority of matter in the universe, yet very little is known about it due to its extreme lack of interaction with regular matter and the fundamental forces. Weakly Interacting Massive Particles, or WIMPs, have been contested to be one of the strongest candidates for dark matter due to their promising theoretical properties. However, various endeavors to detect these elusive particles have failed. This paper explores the various particles which may be WIMPs and the detection techniques being employed to detect WIMPs (such as underground detectors, LHC experiments, and so on). There is a special focus on the reasons for the lack of detection of WIMPs so far, and the possibility of limits in detection being a reason for the lack of physical evidence of the existence of WIMPs. This paper also explores possible inconsistencies within the WIMP particle theory as a reason for the lack of physical detection. There is a brief review on the possible solutions and alternatives to these inconsistencies. Additionally, this paper also reviews the supersymmetry theory and the possibility of the supersymmetric neutralino (A possible WIMP particle) being detectable. Lastly, a review on alternate candidates for dark matter such as axions and MACHOs has been conducted. The explorative study in this paper is conducted through a series of literature reviews.

Keywords : dark matter, particle detection, supersymmetry, weakly interacting massive particles

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