Contribution ID: 80

Impact of the bounds on the direct search of bino-like Dark Matter on naturalness

Friday 25 September 2020 16:00 (15 minutes)

We postulate the WIMP neutralino Dark Matter's interaction with ordinary matter as scattering from the direct detection experiments' nucleon target. Recently, one of the most sensitive direct detection experiments XENON1T submitted an upper bound on the WIMP-Nucleon Spin-Independent elastic cross-section σ_{SI} at $4.1 \times 10^{-47} GeV^2$ for a mass of $30 \frac{GeV}{c^2}$. We imply the last XENON1T results and naturalness constraints to settle a lower bound on Higgsino mass parameter μ .

Results indicated that the lower bound on $|\mu|$ from direct WIMP

searches is only slightly above M_1 , especially for $\mu < 0$.

As e consequence, the bino approximation, especially for the negative sign of μ diverges for $|\mu| \rightarrow |M_1|$ where it occurs by increasing M_1 in the lower limit of μ formalism. Instead, we introduce a new approximation, a strong mixture, working in small $|\mu| - |M_1|$ that performs even better for the negative sign of μ .

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Session Classification: Particle Phenomenology session on Zoom and in Main Auditorium.

Track Classification: Particle Phenomenology