

Light dark matter in the NMSSM: upper bounds on direct detection cross sections

Friday, August 27, 2010 2:34 PM (15 minutes)

In the Next-to-Minimal Supersymmetric Standard Model, a bino-like LSP can be as light as a few GeV and satisfy WMAP constraints on the dark matter relic density in the presence of a light CP-odd Higgs scalar. We study upper bounds on direct detection cross sections for such a light LSP in the mass range 2–20 GeV in the NMSSM, respecting all constraints from B-physics and LEP. The OPAL constraints on $e^+e^- \rightarrow \chi_1^0\chi_i^0$ ($i > 1$) play an important role and are discussed in some detail. The resulting upper bounds on the spin independent and spin dependent nucleon cross sections are $\sim 10^{-42} \text{ cm}^2$ and $\sim 4 \cdot 10^{-40} \text{ cm}^2$, respectively

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Session Classification: Astro 27-1 Chair: K. Cheung

Track Classification: Astro