



Contribution ID: 163

Type: not specified

## Blind Spots for neutralino Dark Matter in the MSSM with an intermediate $m_A$

Monday, 5 May 2014 16:30 (15 minutes)

We study the spin-independent neutralino Dark Matter scattering off heavy nuclei in the MSSM. We identify analytically the blind spots in direct detection for intermediate values of  $m_A$ . In the region where  $\mu$  and  $M_{1,2}$  have opposite signs, there is not only a reduction of the lightest CP-even Higgs coupling to neutralinos, but also a destructive interference between the neutralino scattering through the exchange of the lightest CP-even Higgs and that through the exchange of the heaviest CP-even Higgs. At critical values of  $m_A$ , the tree-level contribution from the light Higgs exchange cancels the contribution from the heavy Higgs, so the scattering cross section vanishes. We denote these configurations as blind spots, since they provide a generalization of the ones previously discussed in the literature, which occur at very large values of  $m_A$ . We show that the generalized blind spots may occur in regions of parameter space that are consistent with the obtention of the proper neutralino relic density, and therefore may be very relevant for the MSSM phenomenology.

### Summary

The MSSM, with squark masses of the order of 1 TeV and gaugino and Higgsino masses of the order of the weak scale is an attractive scenario, that is consistent with the observed Higgs mass and contains a Dark Matter candidate, namely the lightest neutralino. This scenario can be probed by precision measurement of the SM-like Higgs couplings, direct searches for sparticles and non-standard Higgs bosons at the LHC, as well as direct and indirect DM detection. Future SI DDMD experiments are going to probe in an efficient way the parameter space consistent with this model and therefore it is interesting to determine the parametric dependence of the neutralino-nucleon scattering signal.

It is well known that the SI DDMD cross section becomes smaller for negative values of  $\mu$ . Previous studies have also determine the presence of blind spots, where the SM-like Higgs DDMD amplitude vanishes. In this article, we have analyzed the condition of cancellation of the SI DDMD cross section including the contribution of the non-standard Higgs bosons in the MSSM. We have shown that quite generally, this condition requires negative values of  $\mu$  and we have presented analytical formulae to determine when a blind spot occurs in the MSSM. For moderate or large values of  $\tan \beta$ , and values of  $m_A$  not much larger than the current limits on this quantity coming from direct searches for non-standard Higgs bosons, the generalized blind spot scenario may occur at values of  $|\mu/M_{1,2}|$  of order one, which can lead to relic densities consistent with the observed ones. Therefore, the generalized blind spots may become very relevant for particle physics phenomenology.

**Authors:** WAGNER, Carlos (ANL/U. of Chicago); HUANG, Peisi (ANL/U. of Chicago)

**Presenter:** HUANG, Peisi (ANL/U. of Chicago)

**Session Classification:** Dark Matter II