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Dark Light Higgs

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We discovered a benchmark scenario in the NMSSM which possesses novel Higgs and dark matter (DM) properties. There naturally co-exist three light singlet-like particles in this scenario: a scalar, a pseudoscalar, and their superpartner, all with masses of order 0.1-10 GeV. New non-standard decay channel is opened for the Standard Model (SM)-like Higgs boson, while its pair-decays to the light scalars or pseudoscalars are generically suppressed. This will dramatically change our search strategies for the SM-like and light Higgs bosons at colliders. In addition, this scenario is characterized by a light singlino-like DM candidate ($\sim 1-10$ GeV). For a certain parameter window annihilation into the light pseudoscalar and exchange of the light scalar with nucleons allow the singlino to achieve the correct relic density and a (spin-independent) direct detection cross section as large as 10^{-40} cm² simultaneously, which is accessible to the current direct detections (e.g., CoGeNT and DAMA) or the ones in the near future.

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