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Supersymmetric minimal B-L model at the TeV scale with right-handed Majorana neutrino dark matter. arXiv:1111.1789v2 [hep-ph][1] ZACHARY BURELL, University of Alabama — We propose a supersymmetric extension of the minimal B-L model where we consider a new Z_2-parity under which one RH neutrino is assigned odd parity. When the Majorana Yukawa coupling of a Z_2-even RH neutrino is large, radiative corrections will drive the mass squared of the corresponding RH sneutrino to negative values, breaking the B-L gauge symmetry at the TeV scale in a natural way. Additionally, R-parity is broken and thus the conventional supersymmetric dark matter candidate, the neutralino, is no longer viable. Thanks to the Z_2-parity, the Z_2-odd RH neutrino remains a stable dark matter candidate even in the presence of R-parity violation. We demonstrate that the dark matter relic abundance with an enhanced annihilation cross section by the B-L gauge boson (Z') resonance is in accord with the current observations. Therefore, it follows that the mass of this dark matter particle is close to half of the Z' boson mass. If the Z' boson is discovered at the Large Hadron Collider, it will give rise to novel probes of dark matter: The observed Z' boson mass will delineate a narrow range of allowed dark matter mass. If the Z' boson decays to a pair of dark matter particles, a precise measurement of the invisible decay width can reveal the existence of the dark matter particle.

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