

# Mixed axion/axino dark matter in R-parity violating Supersymmetry and X-ray lines

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The axion is a well-known cold dark matter (CDM) candidate. Its fermionic partner in supersymmetry, the axino, can also be stable on cosmological times and if its mass is of order keV, if it is a warm dark matter (WDM) candidate. Assuming that the Peccei-Quinn (PQ) phase transition happens after the end of inflation, the mixed axion CDM / axino WDM scenario can only be realized for  $10^{10} < f_a/\text{GeV} < 10^{11}$ , with  $f_a$  the PQ scale. This combination is particularly interesting in the context of R-parity violating (RPV) supersymmetric models for two reasons: (a) they would otherwise lack a dark matter candidate, and (b) the keV axino can decay, with a lifetime much longer than the age of the universe, into a photon and a neutrino and produce an X-ray signal. In this work, we study a supersymmetric model with a baryon triality discrete symmetry, in which we introduce a DFSZ axion superfield. We embed the model in supergravity, parametrize supersymmetry breaking with soft terms, determine under which conditions the model is cosmologically acceptable and provide three benchmark points which would result in potentially detectable X-ray lines from axino decays.

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