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Dirac dark matter, neutrino masses, and dark baryogenesis

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We present a gauged baryon number model as an example of models where all new fermions required to cancel out the anomalies help to solve phenomenological problems of the standard model (SM). Dark fermion doublets, along with the isosinglet charged fermions, in conjunction with a set of SM-singlet fermions, participate in the generation of small neutrino masses through the Dirac-dark Zee mechanism. The other SM-singlets explain the dark matter in the Universe, while their coupling to an inert singlet scalar is the source of the CP violation. In the presence of a strong first-order electroweak phase transition, this "dark"CP violation allows for a successful electroweak baryogenesis mechanism.

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