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Neutrino-Stimulated Pair-Creation in Supernovae[1] MALLORY YOUNG, Hendrix College — This research investigates the anisotropy of outgoing neutrino flux due to the production of electron-positron pairs as neutrinos interact with large magnetic fields typical of supernovae and other astrophysical phenomena. The deviation of the final neutrino from its original path is of interest since these stellar phenomena are especially sensitive to neutrino transport. Monte Carlo calculations of neutrino decay rates for varying energies and magnetic field strengths reveal a tendency for outgoing neutrinos to turn against the magnetic field upon decay. Data show that supernova-like conditions generate production rates on the order of 10^{-16} cm^{-1} with mean shifts in neutrino angle on the order of a few percent. Naturally, increased magnetic field strength amplifies these effects. These results demonstrate a mechanism by which a magnetic field can exert influence on a supernova's important, neutral energy-carrier: the neutrino.

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