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Nucleosynthesis of Nickel-56 from Gamma-Ray Burst Accretion Disks[1] REBECCA SURMAN, NICOLE SABBATINO, Union College, GAIL MCLAUGHLIN, North Carolina State University — Observational evidence suggests that long-duration gamma-ray bursts (GRBs) are linked to the collapse of massive, rotating stars. One piece of this evidence is the observation of supernova light curves in the afterglow of a number of long-duration GRBs. Since the radioactive decay of Nickel-56 drives the light curves of ordinary core-collapse supernovae, long-duration GRBs must also copiously produce Nickel-56. This nickel may be produced in explosive burning, as in ordinary supernovae, or in outflows from the central object of the GRB—an accretion disk around a stellar-mass black hole. Here we examine the latter mechanism, by investigating outflows from a range of steady state accretion disk models. We find that significant amounts of Nickel-56 are produced over a wide range of disk and outflow parameter space. We discuss the influence of disk accretion rate, outflow entropy, outflow timescale, initial disk position, and neutrino-nucleon interactions on the mass fraction of Nickel-56 produced.

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