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Kelvin-Helmholtz Instabilities in Massive Collapsar Jets ENRIQUE GOMEZ, APRIL CRAWFORD, Western Carolina University — Collapsars are theoretical class of supernovae, which are the most widely held model for the sources of "long" gamma ray bursts (LGRB). They produce LGRB's through anisotropic, beamed jet emission close to the observer's line of sight. These jets must penetrate a radiation-dominated medium of their progenitor and break through its atmosphere in order to produce a LGRB. Recently a new class of ultra long GRB's have been identified with GRB 101225A as its prototype. It is postulated that the progenitors of ULGRBs are likely failed supernovae from massive stars. The issue is whether such jets are hydrodynamically stable as they penetrate the star. We present a study of collapsar jet simulations for this model. Here we invoke the linearized, relativistic fluid equations to find the Kelvin-Helmholtz modes that are triggered by recollimation shocks within the jet. These will then grow as they propagate with the jet. Perturbations that couple to the jet body modes, with a spread of bulk Lorentz factors, may evolve into internal shocks, which may give rise to the light-curve structure of ULGRB's.

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