Observed temporal variations of fireballs

Explanation: internal shocks

$\epsilon_\gamma \sim 1$ MeV; $\epsilon_p \sim 2 \times 10^6$ GeV

$\epsilon_\nu \sim 10^5$ GeV (spectrum calculated)

Time and direction: same as GRB

Flux: ~ 10 km^{-2}yr^{-1}

Flavor: ν_e (at GRB)