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Could the Cas A Explosion Have Produced a Gamma Ray Burst?
MARTIN LAMING, Naval Research Laboratory, UNA HWANG, Goddard Space Flight Center — We analyze the polar regions of the recently acquired very deep 1 Ms Chandra X-ray observation. We infer that the so-called "jet" regions are indeed due to jets emanating from the explosion center, and not due to polar cavities in the circumstellar medium at the time of explosion. We place limits on the equivalent isotropic explosion energy in the polar regions (around 1.5×10^{52} ergs), and the opening angle of the x-ray emitting ejecta (around 7-10 degrees), which give a total energy in the NE jet in the range $0.5 - 1 \times 10^{50}$ ergs; about an order of magnitude lower than inferred for "typical" GRBs. While the Cas A progenitor and explosion exhibit many of the features associated with GRB hosts, e.g. extensive presupernova mass loss, rotation and jets associated with the explosion, we speculate that the recoil of the compact central object, with velocity 330 km/s, may have rendered the jet unstable. In such cases the jet rapidly becomes baryon loaded, if not truncated altogether. Although unlikely to have produced a gamma ray burst, the jets in Cas A suggest that such outflows may be common features of core-collapse SNe. Work supported by Chandra GO Program and Basic Research Funds of the Office of Naval Research.

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