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Thermal emission in GRB 101219B

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In recent years there has been growing evidence that emission from the photosphere of the jet contributes to the prompt emission in many GRBs. The photospheric emission is usually seen to coexist with a dominant non-thermal component. In this talk I will present an analysis of GRB 101219B, the second burst observed by Fermi GBM that is well described by pure blackbody emission. This burst also has a previously reported detection of a blackbody component at soft X-ray energies in the early afterglow observed by Swift. There is no smooth connection between the two blackbody components, ruling out the scenario that the late emission is due to high-latitude effects. The observed properties of the blackbody emission, together with the known redshift and our estimate of the radiative efficiency, makes it possible to calculate the properties of the jet within the standard fireball model. This yields an initial Lorentz factor of ~ 140 and a nozzle radius of $\sim 3 \times 10^7$ cm. The latter value is close to the event horizon for a stellar-mass black hole and suggests that the jet has a relatively unobstructed path through the star.

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