Contribution ID: **132** Type: **Poster**

Two-component jet model for the TeV and multi-wavelength afterglows of GRB 221009A

Friday, December 15, 2023 3:44 PM (1 minute)

The Brightest of all time (BOAT) GRB 221009A hasn't been fully explained in multi-wavelength, especially including the TeV afterglows observed by LHAASO. The TeV afterglow has been interpreted as arising from a narrow jet, which could indicate the core of a structured jet. We here study a two-component jet model, including an inner narrow core and an outer wide wing with an angular structure, to explain both the early TeV afterglow and multi-wavelength afterglows that last to 100 days. We find that the radio afterglow and the TeV upper limit imposed by H.E.S.S. observations combine to constrain the circum-burst density to be low at larger radii. Thus, a decreasing density profile with radius is favored. Considering that the rising TeV light curve during the afterglow onset favors a constant-density medium, we invoke a stratified density profile, including a constant-density profile at small radii and a wind density profile at large radii. We find that the two-component jet model with such a stratified density profile can explain the TeV, X-ray and optical afterglows of GRB 221009A, although the radio fluxes exceed the observed ones by a factor of two at later epochs. The discrepancy in the radio afterglow could be explained by invoking some non-standard assumption about the microphysics of the afterglow shocks, such as a decreasing fraction of accelerated particles with time.

Primary authors: ZHENG, Jianhe (Nanjing University); LIU, Ruoyu (Nanjing University); WANG, Xiang-Yu Wang

Presenter: ZHENG, Jianhe (Nanjing University)

Session Classification: Poster