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GRB220101A the most powerful GRB ever with seven BdHN Episodes observed

Wednesday, 14 June 2023 10:00 (30 minutes)

A long GRB that occurred at 2022-01- 01 05:11:13 (UT), was triggered by multiple satellites, including Swift (Tohuvavohu et al. 2022), Fermi (Arimoto et al. 2022), AGILE (Ursi et al. 2022), and Konus-Wind (Tsvetkova et al. 2022). The optical observation by Xinglong-2.16m telescope (Fu et al. 2022) revealed a broad absorption feature in the spectrum indicating the presence of Lyman alpha absorption, as well as from the absorption lines, the redshift was determined to be z = 4.61, which was confirmed by the Liverpool tele- scope (Perley 2022) and NOT (Fynbo et al. 2022). The burst exhibited a bright, complex multi-peaked time profile within the first ~ 150 s. An estimated isotropic equivalent energy is of $E_{iso} \sim 4 \times 10^{54}$ erg, and a peak luminosity is of $L_p \sim 9 \times 10^{53}$ erg s^{-1}, making GRB 220101A as one of the most luminous GRBs ever observed. The fact that it occurs at z = 4.6 gives a great opportunity to exploit new perspectives of observations as presented in Bianco et al. 2023. The discovery of a radio source with a mean frequency of 6.0 GHz was reported in Laskar (2022a). This finding aligns with the X-ray position noted in Osborne et al. (2022), as well as the optical positions reported by Tohuvavohu et al. (2022) and Hentunen et al. (2022), along with the mm-band position mentioned in Laskar (2022b). All seven episodes characterizing a BdHN I, as predicted in Ruffini et al. (2022a,b), have been identified, details are presented in Ruffini et al., (submitted). Our attention in this article is to identify the earliest XRT observations made possible by the use of the cosmological redshift of z = 4.61 and to obtain an unprecedented accurate description of the rising part and the power-law decay part of the X-ray emission evidencing the transition from a Jacobi ellipsoid into a Mac Laurin spheroid in the description of the newNS originating the afterglow.

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