



17988 - Galactic or extragalactic? Unravelling the extraordinary GRB 250702BDE

Cycle: 32, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

| <i>Name</i> | <i>Institution</i> |
|---|--|
| Prof. Andrew James Levan (PI) (ESA Member) (Contact) | Radboud University Nijmegen |
| Dr. Antonio Martin-Carrillo (CoI) (ESA Member) | University College Dublin |
| Prof. Peter G. Jonker (CoI) (ESA Member) | Radboud University Nijmegen |
| Prof. Lex Kaper (CoI) (ESA Member) | Universiteit van Amsterdam |
| Dr. Dong Xu (CoI) (ESA Member) | University of Copenhagen, Niels Bohr Institute |
| Dr. Patricia Schady (CoI) (ESA Member) | University of Bath |
| Dr. Paul Thomas O'Brien (CoI) (ESA Member) | University of Leicester |
| Dr. Robert Eyles-Ferris (CoI) (ESA Member) | University of Leicester |
| Dr. Giovanna Pugliese (CoI) (ESA Member) | Universiteit van Amsterdam |
| Dr. Benjamin Schneider (CoI) | Massachusetts Institute of Technology |
| Prof. Nial Rahil Tanvir (CoI) (ESA Member) | University of Leicester |
| Dr. Massimiliano De Pasquale (CoI) (ESA Member) | Universita degli Studi di Messina |
| Dr. Emeric Le Floc'h (CoI) | University of Arizona |
| Dr. Silvia Piranomonte (CoI) (ESA Member) | INAF - Osservatorio Astronomico di Roma |
| Dr. Valerio D'Elia (CoI) (ESA Member) | Agenzia Spaziale Italiana (ASI) Science Data Center (ASDC) |
| Dr. Susanna Vergani (CoI) (ESA Member) | Observatoire de Paris - Section de Meudon |
| Dr. Luca Izzo (CoI) (ESA Member) | INAF - Osservatorio Astronomico di Capodimonte |
| Dr. Dimple Dimple (CoI) (ESA Member) | University of Birmingham |
| Dr. Tanmoy Laskar (CoI) (AdminUSPI) | University of Utah |

VISITS

| <i>Visit</i> | <i>Targets used in Visit</i> | <i>Configurations used in Visit</i> | <i>Orbits Used</i> | <i>Last Orbit Planner Run</i> | <i>OP Current with Visit?</i> |
|--------------|------------------------------|-------------------------------------|--------------------|-------------------------------|-------------------------------|
| 01 | (1) GRB250702BDE | WFC3/IR | 1 | 09-Jul-2025 18:01:10.0 | yes |

1 Total Orbits Used

ABSTRACT

Gamma-ray bursts are extreme flashes of gamma-ray radiation typically lasting from a fraction of a second to tens of minutes. A critical feature is that they DO NOT repeat, nor, even in the extrema of ultra-long GRBs, do they last for more than a few hours. A very recent GRB has broken these paradigms. It triggered Fermi on no fewer than three occasions over several hours, and subsequent investigations show it was detected at high energies at least a day earlier. An infrared counterpart has been discovered that behaves temporally like a GRB afterglow but has colours unlike any transient seen before, with exceptionally reddening between H and K (a factor of ~ 30 in flux). Ground-based IR imaging in excellent ($\sim 0.4''$) seeing suggests that the transient is overlapping an extended source. If this is a galaxy, the probability of chance alignment is very small, but the field is also 5 degrees from the Galactic plane, and the extended nature could be due to source confusion in ground-based imaging. Here, we propose HST observations that can both track the late-time behaviour of the source beyond ground-based capabilities and also unambiguously distinguish between a background galaxy and several foreground stars by using exquisite HST resolution to resolve any foreground systems. These observations would ideally be taken within the current observing window, which runs until 17 July, but would still be of great value even if executed in a subsequent window.

OBSERVING DESCRIPTION

We propose to obtain a single orbit of F160W observations of GRB 250702BDE. The observations will consist of an initial short exposure (in which bright stars won't be saturated, and the STEP sequence will give excellent dynamic range). This will be of value for astrometry to ground based images if the counterpart is faint. We will then proceed with a 4-point dither pattern, again using the STEP sequences.

Proposal 17988 - Visit 01 - Galactic or extragalactic? Unravelling the extraordinary GRB 250702BDE

Wed Jul 09 22:01:10 GMT 2025

| Visit | Proposal 17988, Visit 01, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: SCHED 100%; TOO RESPONSE TIME 6.0D | | | | | | | | | | |
|---------------|--|------------------|--|---|-----------------------------------|----------------------------------|-------------------|-------------------------------------|--|-----------|-------|
| | Patterns | # | Primary Pattern | | | | Secondary Pattern | | | Exposures | |
| | | (1) | Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=2.860 Line Spacing=1.825 | Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false | | | | | | (2) | |
| Fixed Targets | # | Name | Target Coordinates | | Targ. Coord. Corrections | | Fluxes | | Miscellaneous | | |
| | (1) | GRB250702BDE | RA: 18 58 45.5700 (284.6898750d) Dec: -07 52 26.20 (-7.87394d) Equinox: J2000 | | | | V=25+/-2 | | Reference Frame: ICRS | | |
| | <i>Comments:</i> Category=EXT-STAR Description=[GAMMA RAY BURSTER, SUPERNOVA] | | | | | | | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | | Orbit |
| | 1 | | (1) GRB250702BDE | WFC3/IR, MULTIACCUM, IR | F160W | SAMP-SEQ=STEP2 5; NSAMP=12 | | | 199.233316 Secs (199.233 Secs) | | |
| | | | | | | | | | [==>] | | [1] |
| 2 | | (1) GRB250702BDE | WFC3/IR, MULTIACCUM, IR | F160W | NSAMP=11; SAMP-SEQ=STEP1 00 | | | Pattern 1, Exps 2-2 in Visit 01 (1) | 499.231969 Secs (1996.928 Secs) | | |
| | | | | | | | | | [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] | | [1] |

