# 16505 - From a soft gamma-repeater to a fast radio burst

Cycle: 28, Proposal Category: GO

(Availability Mode: SUPPORTED)


**INVESTIGATORS**

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|---|---|---|
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**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) SGR1935+2154 | WFC3/IR | 1 | 15-Mar-2021 12:04:40.0 | yes |

1 Total Orbits Used


**ABSTRACT**

The origin of the Fast Radio Bursts (FRBs) has become one of the central questions in contemporary astrophysics. Several lines of evidence have pointed to their association with some form of magnetar flare, occurring in external galaxies. However, this is by no means a unique explanation, with other viable models also suggested. A significant step forward in this field occurred with the apparent detection of a millisecond radio burst (essentially an FRB) from the Galactic magnetar SGR 1935+2154. This magnetar is one of the most active known and continues to undergo an unprecedented period of activity with an intensive ongoing campaign. Fortuitously, HST has previously observed the magnetar, locating an IR counterpart. Here we request a single orbit observation that will detect it in its current active state. This observation will enable us to test how the optical/IR emission appears after the FRB providing vital insight to other searches for optical/IR counterparts of FRBs in external galaxies. Furthermore, as the source is currently active and sufficiently bright for detection, a proper motion measurement with a 6-year baseline will be

possible. The proper motion will enable the magnetar to be tracked back to its birth-site, testing its assocaition with a supernova remnant, as well as providing a route for comparing its velocity with that of the general pulsar population.

**OBSERVING DESCRIPTION**

The aim of this proposal is to obtain observations of SGR 1935+2154 to obtain a detection of its counterpart and a measurement (or limits) on its proper motion. Because the source is variable and active now the observations should be taken quickly. However, there is also a significant advantage to matching the orient of the observations with those taken previously. We will repeat the observational set-up previously used which is a simple 4-point dither pattern using the STEP reads for dynamic range.

## Visit

**Proposal 16505, Visit 01** Mon Mar 15 16:04:40 GMT 2021

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 205.218D TO 205.219 D; BEFORE 15-JUN-2021:00:00:00

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-IR-DITHER-BOX-MIN<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.572<br>Line Spacing=0.365 | Coordinate Frame=POS-TARG<br>Pattern Orientation=18.528<br>Angle Between Sides=74.653<br>Center Pattern=false | | (1) |

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | SGR1935+2154 | RA: 19 34 55.6800 (293.7320000d)<br>Dec: +21 53 48.20 (21.89672d)<br>Equinox: J2000 | | V=27+/-1 | Reference Frame: ICRS |

*Comments:*
*Category=EXT-STAR*
*Description=[NEUTRON STAR]*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) SGR1935+2154 | WFC3/IR, MULTIACCUM, IR | F140W | NSAMP=12;<br>SAMP-SEQ=STEP100 | | Pattern 1, Exps 1-1 in Visit 01 (1) | 599.232292 Secs (2396.929 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]*<br>*[==>(Pattern 4)]* | *[1]* |

## Orbit Structure