Hubble Space Telescope

Cycle 15 GO Proposal

Decelerating and Dustfree: Efficient Dark Energy Studies with Supernovae and Clusters

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Scientific Category: COSMOLOGY

Scientific Keywords: COSMOLOGICAL PARAMETERS AND DISTANCE SCALE, CLUSTERS OF GALAXIES, SUPERNOVAE

Instruments: ACS, NICMOS

Proprietary Period: 12

Orbit Request	Prime	Parallel
Cycle 15	217	0

Abstract

We propose a proven and efficient approach to obtain a new sample of z>1 dust-free Type Ia supernovae. The resulting dark energy measurements from this sample of SNe do not share the major systematic uncertainty at these redshifts, that of the extinction correction with a prior. By targeting massive galaxy clusters at z > 1 we obtain a five-times higher efficiency in detection of Type Ia supernovae in ellipticals, providing a well-understood host galaxy environment. These same deep cluster images then also yield fundamental calibrations required for future weak lensing and Sunyaev-Zel'dovich measurements of dark energy, as well as an entire program of cluster studies. The data will make possible a factor of two improvement on supernova constraints on dark energy time variation, and much larger improvement in systematic uncertainty. They will provide both a cluster dataset and a SN Ia dataset that will be a longstanding scientific resource.

Investigators:

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Number of investigators: 47

* ESA investigators: 5

Target Summary:

Target	RA	Dec	Magnitude
WARPS1415+36	14 15 11.1000	+36 12 3.00	V = 25.0
1012.28	14 34 28.5200	+34 26 22.90	V = 25.0
1012.52	14 32 29.1800	+33 32 48.30	V = 25.0
1113.7.7	14 29 18.5100	+34 37 25.80	V = 25.0
1214.5.28	14 32 38.2800	+34 36 49.00	V = 25.0
1315.5.16	14 38 9.5400	+34 14 19.20	V = 25.0
1315.12	14 34 46.3300	+35 19 45.80	V = 25.0
1416.7.15	14 33 51.1300	+33 25 51.10	V = 25.0
IRAC0223-04	02 23 3.7000	-04 36 18.00	V = 25.0
RCS0220-03	02 20 55.7000	-03 33 19.00	V = 25.0
RCS0221-03	02 21 41.9500	-03 21 47.40	V = 25.0

Target	RA	Dec	Magnitude
RCS0337-28	03 37 50.4000	-28 44 28.70	V = 25.0
RCS0439-29	04 39 38.0400	-29 04 55.20	V = 25.0
RCS1511+09	15 11 3.8000	+09 03 15.00	V = 25.0
RCS2156-04	21 56 42.1500	-04 48 4.10	V = 25.0
RCS2319+00	23 19 53.3800	+00 38 13.90	V = 25.0
RCS2345-36	23 45 27.3000	-36 32 50.00	V = 25.0
RDCS0848+44	08 48 58.6400	+44 51 57.00	V = 25.0
RDCS0910+54	09 10 45.0700	+54 22 10.00	V = 25.0
RDCS1252-29	12 52 54.2800	-29 27 17.90	V = 25.0
XMMUJ2235	22 35 20.8300	-25 57 39.90	V = 25.0
XMMUJ1229+01	12 29 28.8000	+01 51 34.00	V = 25.0
CL1604+43	16 04 22.6000	+43 04 39.70	V = 25.0
TOO-SN-11ORB	14 16 30.0000	+32 30 0.00	V = 25.0
TOO-SN-2ORB	08 48 0.0000	+44 00 0.00	V = 25.0
TOO-SN-1ORB	12 52 0.0000	-29 00 0.00	V = 25.0

Observing Summary:

Target	Config Mode and Spectral Elements	Flags	Orbits
WARPS1415+36	ACS/WFC Imaging F850LP		9 (1x9)
1012.28	ACS/WFC Imaging F850LP		9 (1x9)
1012.52	ACS/WFC Imaging F850LP		9 (1x9)
1113.7.7	ACS/WFC Imaging F850LP		9 (1x9)
1214.5.28	ACS/WFC Imaging F850LP		9 (1x9)
1315.5.16	ACS/WFC Imaging F850LP		10 (1x10)
1315.12	ACS/WFC Imaging F850LP		10 (1x10)
1416.7.15	ACS/WFC Imaging F850LP		10 (1x10)
IRAC0223-04	ACS/WFC Imaging F850LP		6 (1x6)
RCS0220-03	ACS/WFC Imaging F850LP		6 (1x6)
RCS0221-03	ACS/WFC Imaging F850LP		6 (1x6)

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Target	Config Mode and Spectral Elements	Flags	Orbits
RCS0337-28	ACS/WFC Imaging F850LP		8 (1x8)
RCS0439-29	ACS/WFC Imaging F850LP		8 (1x8)
RCS1511+09	ACS/WFC Imaging F850LP		8 (1x8)
RCS2156-04	ACS/WFC Imaging F850LP		6 (1x6)
RCS2319+00	ACS/WFC Imaging F850LP		6 (1x6)
RCS2345-36	ACS/WFC Imaging F850LP		8 (1x8)
RDCS0848+44	ACS/WFC Imaging F850LP		7 (1x7)
RDCS0910+54	ACS/WFC Imaging F850LP		9 (1x9)
RDCS1252-29	ACS/WFC Imaging F850LP		6 (1x6)
XMMUJ2235	ACS/WFC Imaging F850LP		8 (1x8)
XMMUJ1229+01	ACS/WFC Imaging F850LP		7 (1x7)
CL1604+43	ACS/WFC Imaging F850LP		9 (1x9)
TOO-SN-11ORB	NIC2 Imaging F110W	TOO	22 (11x2)
TOO-SN-2ORB	NIC2 Imaging F110W	TOO	4 (2x2)
TOO-SN-1ORB	NIC2 Imaging F110W	TOO	8 (1x8)

Total prime orbits: 217