



## 6716 - Observing Molecule and Dust Formation in the Nearby SN 2024ggi

Cycle: 3, Proposal Category: DD

### INVESTIGATORS

<i>Name</i>	<i>Institution</i>
<b>Prof. Chris Ashall (PI)</b>	<b>University of Hawaii</b>
Dr. James M DerKacy (CoI) (CoPI)	Space Telescope Science Institute
Dr. Eddie Baron (CoI) (CoPI)	Planetary Science Institute
Dr. Melissa Shahbandeh (CoI) (CoPI)	Space Telescope Science Institute
Dr. Peter A. Hoeflich (CoI) (CoPI)	Florida State University
Dr. Kyle Medler (CoI)	University of Hawaii at Manoa
Dr. Armin Rest (CoI)	Space Telescope Science Institute
Dr. Maximillian Stritzinger (CoI) (ESA Member)	Aarhus University
Prof. Paolo A. Mazzali (CoI) (ESA Member)	Liverpool John Moores University
Jing Lu (CoI)	Florida State University
Sahana Kumar (CoI)	Florida State University
Prof. Eric Hsiao (CoI)	Florida State University
Dr. Ori Dosovitz Fox (CoI)	Space Telescope Science Institute
Mike Engesser (CoI)	Space Telescope Science Institute
Dr. Qinan Wang (CoI)	Massachusetts Institute of Technology
Dr. Lluís Galbany (CoI) (ESA Member)	Institute of Space Sciences (CSIC-IEEC)
Dr. Peter J. Brown (CoI)	Texas A & M University
Dr. Thomas de Jaeger (CoI) (ESA Member)	Laboratoire de Physique Nucleaire des Hautes Energies
Michael Tucker (CoI)	The Ohio State University
Dr. Mark M. Phillips (CoI)	Carnegie Institution of Washington
Dr. Nicholas B. Suntzeff (CoI)	Texas A & M University
Dr. Nidia Morrell (CoI)	Carnegie Institution of Washington
Mr. Tyco Brahe Mera Evans (CoI)	Florida State University

<i>Name</i>	<i>Institution</i>
Dr. Tea Temim (CoI)	Princeton University
Dr. Samaporn Tinyanont (CoI)	National Astronomical Research Institute of Thailand
Muryel Guolo (CoI)	The Johns Hopkins University
Dr. Louis-Gregory Strolger (CoI)	Space Telescope Science Institute
Christopher Burns (CoI)	Carnegie Institution of Washington
Dr. Lifan Wang (CoI)	Texas A & M University
Dr. Yi Yang (CoI)	Tsinghua University
Prof. Benjamin John Shappee (CoI)	University of Hawaii
Elham Fereidouni (CoI)	Florida State University
Dr. Katie Auchettl (CoI)	University of Melbourne
Willem Hoogendam (CoI)	University of Hawaii
Dr. David Coulter (CoI)	Space Telescope Science Institute

## OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
+250-300d				
	3	NIRspec	NIRSpec Fixed Slit Spectroscopy	(1) SN2024ggi
+380d				
	4	NIRspec	NIRSpec Fixed Slit Spectroscopy	(1) SN2024ggi

## ABSTRACT

On April 11, 2024, the Type II supernova (SN II) 2024ggi was discovered in NGC 3621 at only 7 Mpc from Earth; one of only a few SNe found within 7 Mpc in the last century. Discovered only hours after explosion, the  $>2$  mag rise over the following 8 hours triggered an intense, worldwide, multi-wavelength effort to provide a high-cadence view of SN 2024ggi's evolution. JWST observations will provide crucial insights as the only telescope capable of completing the wavelength coverage in the NIR+MIR. The proximity of 2024ggi provides a perfect opportunity to study details of dust formation and any asymmetries in SNe II. The production sites of dust are still debated. AGB stars are considered to be the primary dust producers, but the first dust likely formed before AGB stars had time to produce it. SNe II are expected to play an important role in dust production since their current rate dominates over all other types of SNe. We request 6.18 hr of DDT to obtain a NIR+MIR spectral time-series of 2024ggi at 3 epochs between  $\sim 30$ -400 d past explosion to detect and track the formation and evolution of molecules and dust in the ejecta. The observations will provide a legacy data set from which the community can understand dust formation in SNe II to a degree not previously possible. The data will also uniquely constrain the ejecta of a nearby SN II, adding to the handful of SNe II within 7 Mpc, but with the unparalleled insights that JWST provides.

Forgoing JWST observations at the proposed phases will hinder any future science (JWST or otherwise) of SN 2024ggi, and the community will be unable to measure reliably the evolution of dust growth of one of the nearest SN in the JWST era.

**OBSERVING DESCRIPTION**

We request 6.18 hrs of non-disruptive ToO time to obtain 3 NIR+MIR spectra of SN 2024ggi. We will use NIRSpec in the G395M/F290LP and G235M/F170LP gratings and the LRS mode on MIRI. This program will provide an unprecedented dataset on the evolution of CO, SiO and dust formation in the ejecta of one of the closest SN II in JWSTs lifetime, and enable a unique avenue to determine how SNe II explode to a degree that was not possible with previous facilities.

Proposal 6716 - Targets - Observing Molecule and Dust Formation in the Nearby SN 2024ggi

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)  <i>Comments:</i> <i>Category=Star</i> <i>Description=[Supernovae]</i>	SN2024ggi	RA: 11 18 22.0910 (169.5920458d) Dec: -32 50 15.29 (-32.83758d) Equinox: J2000		

Proposal 6716 - Observation 3 - Observing Molecule and Dust Formation in the Nearby SN 2024ggi

Mon Mar 24 17:00:51 GMT 2025

<b>Observation</b>	<p><b>Proposal 6716, Observation 3: NIRSpec</b>  <b>Diagnostic Status: Warning</b>                  Observing Template: NIRSpec Fixed Slit Spectroscopy</p>											
<b>Diagnostics</b>	(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
<b>Fixed Targets</b>	#	Name	Target Coordinates		Targ. Coord. Corrections			Miscellaneous				
	(1)	SN2024ggi	RA: 11 18 22.0910 (169.5920458d) Dec: -32 50 15.29 (-32.83758d) Equinox: J2000									
	<i>Comments:</i> Category=Star Description=[Supernovae]											
<b>Acquisition</b>	#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	
	1	SAME	WATA	SUB32	CLEAR	NRSRAPIDD6	3	1	1	0.26	156228	
<b>Template</b>	<b>HFF Readout Mode</b>			<b>Slit</b>			<b>Subarray</b>					
	false			S400A1			SUBS400A1					
<b>Dithers</b>	#	Primary Dither Positions					Sub-Pixel Pattern					
	1	3					NONE					
<b>Spectral Elements</b>	#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Ex #	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	
	1	G395M/F290LP	S400A1	NRSRAPID	40	1	1	NONE	3	3	191.695	156228
	2	G235M/F170LP	S400A1	NRSRAPID	40	1	2	NONE	3	3	191.695	156228

Proposal 6716 - Observation 3 - Observing Molecule and Dust Formation in the Nearby SN 2024ggi

Special Requirements

Between Dates 17-DEC-2024:00:00:00 and 05-FEB-2025:00:00:00

Proposal 6716 - Observation 4 - Observing Molecule and Dust Formation in the Nearby SN 2024ggi

Mon Mar 24 17:00:51 GMT 2025

<b>Observation</b>	<p><b>Proposal 6716, Observation 4: NIRSpec</b>  <b>Diagnostic Status: Warning</b>                  Observing Template: NIRSpec Fixed Slit Spectroscopy</p>											
<b>Diagnostics</b>	(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>		<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>				
	(1)	SN2024ggi	RA: 11 18 22.0910 (169.5920458d) Dec: -32 50 15.29 (-32.83758d) Equinox: J2000									
	<p><i>Comments:</i>                  Category=Star                  Description=[Supernovae]</p>											
<b>Acquisition</b>	<b>#</b>	<b>Target</b>	<b>TA Method</b>	<b>Subarray</b>	<b>Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>	
	1	SAME	WATA	SUB32	CLEAR	NRSRAPIDD6	3	1	1	0.26	156228	
<b>Template</b>	<b>HFF Readout Mode</b>			<b>Slit</b>			<b>Subarray</b>					
	false			S400A1			SUBS400A1					
<b>Dithers</b>	<b>#</b>	<b>Primary Dither Positions</b>					<b>Sub-Pixel Pattern</b>					
	1	3					NONE					
<b>Spectral Elements</b>	<b>#</b>	<b>Grating/Filter</b>	<b>Slit</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Ex #</b>	<b>Autocal</b>	<b>Total Dithers</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>	
	1	G395M/F290LP	S400A1	NRSRAPID	100	1	1	NONE	3	3	472.135	156228
	2	G235M/F170LP	S400A1	NRSRAPID	100	1	2	NONE	3	3	472.135	156228

Proposal 6716 - Observation 4 - Observing Molecule and Dust Formation in the Nearby SN 2024ggi

Special Requirements

Between Dates 26-APR-2025:00:00:00 and 16-MAY-2025:00:00:00