

JWST

SUMMER SCHOOL

AUGUST 4-15, 2025
SPACE TELESCOPE SCIENCE INSTITUTE
BALTIMORE, MD

High Redshift Transients with JWST

Week 1 Agenda: *This week will provide the theoretical background needed to understand transients at high-z, and the unique contributions the James Webb Space Telescope brings to the field. Beginning with general overview lectures, the school participants will learn about supernovae, tidal disruption events, active galactic nuclei, and gravitationally lensed stars in galaxies. We plan to offer a combination of flipped-style and traditional lectures with time for discussion and checkpoints. There will also be opportunities to visit the JWST Mission Operations Center, interactive quizzes and game, and several other social events.*

Monday August 4 th : Welcome and General Overview Lectures
"Ice Breaker" and Welcome to the JWST Summer School
General Overview Lectures: <ul style="list-style-type: none"> - Transients: what are they and their different types - What can JWST provide for the transient field that is not possible with other observatories - Photometry/Spectroscopy basics - Differences between low and high-z transients (e.g. time dilation) and the impact of contamination
Tuesday August 5 th : Supernovae (SN)
What are supernovae? General physics background, types of SN and their light curves
What have we learned so far with JWST?
SN in the distant universe
Local vs. high-z SN properties
Star formation and metallicity as a function of redshift
Wednesday August 6 th : Tidal Disruption Events (TDEs)
What are TDEs? general physics background, spectral classes
What have we learned so far with JWST?
High-z universe: <ul style="list-style-type: none"> - TDE rate, black holes, PopIII stars - Models of intrinsic SED and luminosity, metallicity studies.
Thursday August 7 th : Active Galactic Nuclei (AGN)
What are AGNs? General physics background, transient nature of AGNs
High-z universe: AGN rates, variability rates and scales
What have we learned so far with JWST?
Black Hole mass growth and seeds
Techniques and models
Friday August 8 th : Gravitationally lensed, individual stars in galaxies
Gravitational magnification and micro-lensing, general physics background, models
JWST's contributions to the field
Microlensing event occurrence, application of magnification and microlensing to transients in the high-z universe
Probing dark matter with highly magnified stars
Understanding contamination

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Week 2 Agenda: *This week will provide an end-to-end data experience for participants. We will cover proposal preparation, data reduction and analysis for both imaging and spectroscopy. This week will have a heavy emphasis on hands-on exercises, allowing participants to work with real JWST data. Participants will work individually and in groups. There will also be opportunities to visit the JWST Mission Operations Center, interactive quizzes and game, and several other social events.*

Monday August 11 th : Proposal Preparation
Welcome to Week 2
How to write a successful proposal
Available Proposal Tools and Resources
Hands-on exercises: <ul style="list-style-type: none"> - Using the JWST Exposure Time Calculator - Using the Astronomer's Proposal Tool
Tuesday August 12 th : Data Reduction
Introduction to Data Products
Introduction to the JWST Calibration Pipeline
Hands-on Exercises: <ul style="list-style-type: none"> - Downloading data from MAST - Installing and Running the Pipeline - NIRCcam Imaging example
Astrometric alignment using various methods
Wednesday August 13 th : Difference Imaging to Detect Supernovae
Hands-on Exercises: <ul style="list-style-type: none"> - Data Organization - Image Stacking - Selecting a template - Photometry
Forced Photometry
Host Galaxy Photometric Redshifts (photo-z)
Thursday August 14 th : Supernova Light Curve Analysis
Imaging Hands-on Exercises: <ul style="list-style-type: none"> - Light curve fitting - Classification
Spectroscopy Hands-on Exercises: <ul style="list-style-type: none"> - 1D extracted spectra - Complex extraction - Tips and Tricks
Friday August 15 th : Cross Telescope Discussion & Conclusion
Cross-telescope Light Curves: current and future
School wrap-up and goodbye