

Observational study of transients

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Research Overview

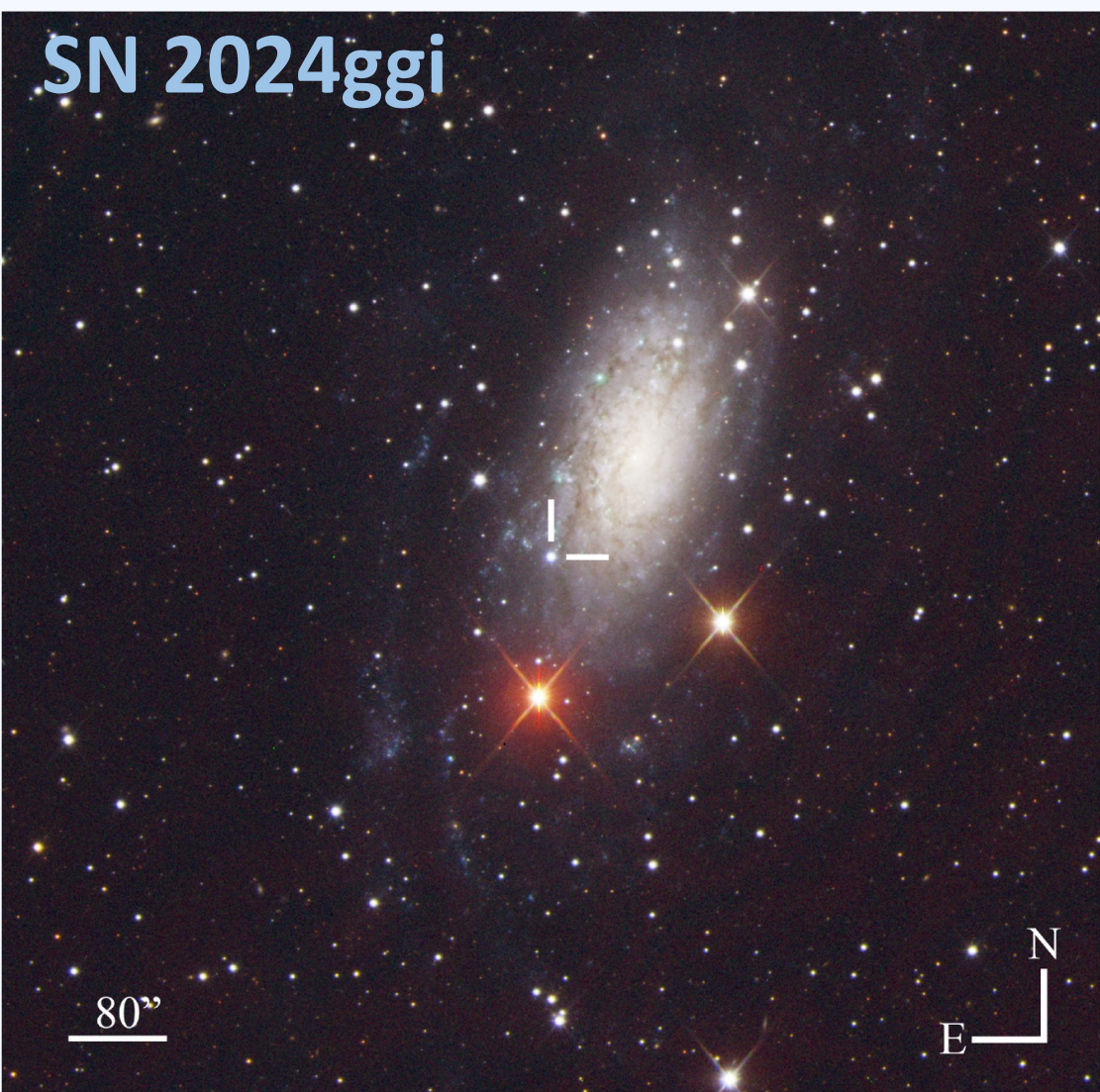
Studies stellar explosions, compact-object mergers, and multi-messenger astrophysics using multi-wavelength observations from facilities including MMT, Gemini, HST, JWST, etc.

Young Core-Collapse Supernovae to constrain progenitor properties

- Mass loss rate of massive stars is not very well constrained
- Photometry + spectroscopy + polarimetry
- Comparison with models => physics of explosion

Example projects

- Create filters to identify SNe from Rubin Observatory
- Constraint mass-loss rate of progenitor using Observational data
- Several other projects possible

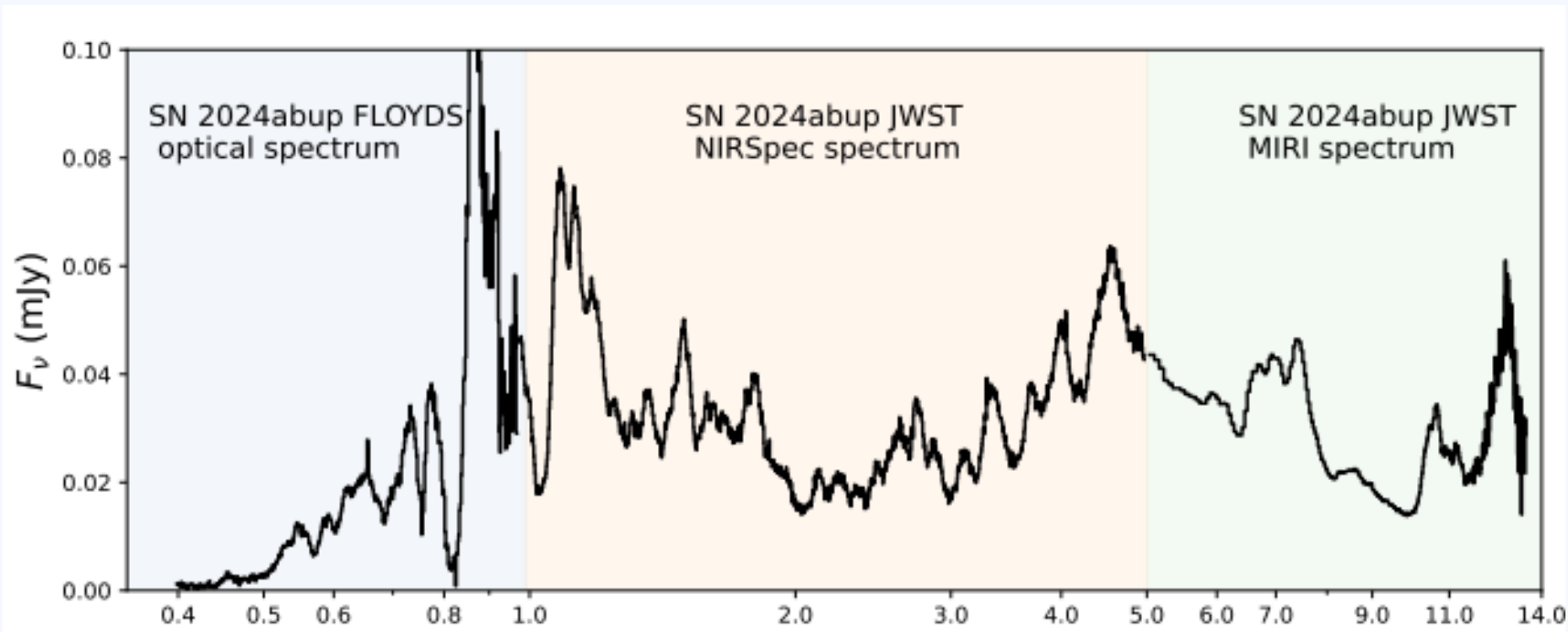


Heavy element production

- We do not know where elements like gold and platinum are formed in the Universe
- So far only been observed in binary neutron star merger
- Collapsars have been proposed as additional site

Example projects

- Analyze collapsars to search for r-process elements
- Develop filter to find new SN Ic-bl from Rubin observatory data



Gravitational-Wave Follow-up

- We are in exciting era of multi-messenger astrophysics
- For the same astronomical event, we can obtain gravitational wave and electromagnetic signal
- Developing infrastructure to find EM counterpart of GW event and understand its physics



Example projects

- Develop kilonovae vetting candidate
- Analyze short-gamma-ray burst population along with binary neutron star merger rate from GW to constrain their rate

