A multiwavelength view of two interacting SNe

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Multiwavelength observations of interacting supernovae reveal the full mass-loss histories and key insight into the progenitor

We used radio,optical and X-ray observations of a type IIn and Ibn to find the most likely progenitor system

SN 2020ywx

Radio +

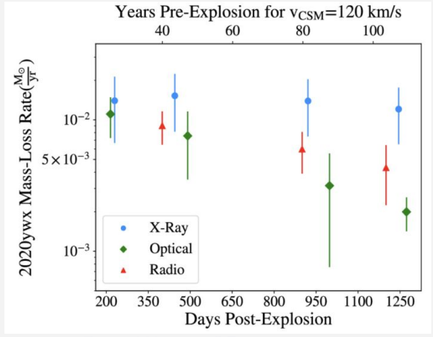
- Obtained 4 years of VLA+GMRT data from 0.4-30 GHz
- Found clear preference in data for **internal free-free absorption** of synchrotron emission from highly dense CSM

Optical +

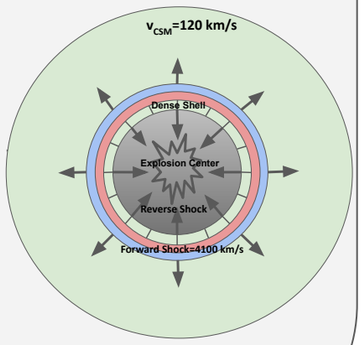
- Modeled **multi-component Halpha profiles** to find CSM speed and mass-loss rate
- Found slow-declining lightcurve suggestive of continuous mass-loss over 100 year period

X-ray

- Found emission from adiabatic forward shock-reverse shock absorbed by dense shell formed between shocks
- Used 0.2-10 keV spectra to **determine shock speed /mass-loss rate a 3rd independent way-differences across wavelengths suggest asymmetry**

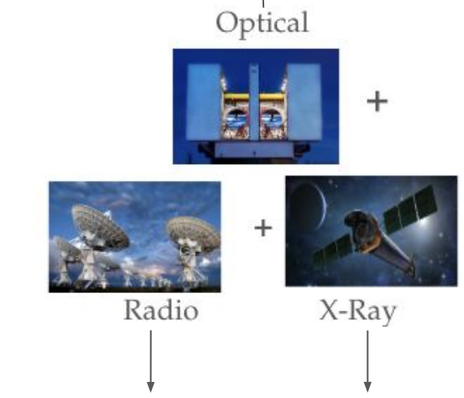


Baer-Way + 25a



Check out the paper here!

Get exact CSM/ejecta speed+composition of CSM



Get Density profile/independent mass-loss rate estimate/microphysics

Get Shock speed/ionization/density of CSM

Interacting Supernovae

- Interacting supernovae powered by ejecta-CSM interaction
- CSM lost at rates far greater than single-star limits and for years-decades
- Radio synchrotron emission generated by strong shocks+strong B field
- Thermal X-ray emission generated in thermal forward and reverse shocks
- **Exotic binary systems likely progenitors**

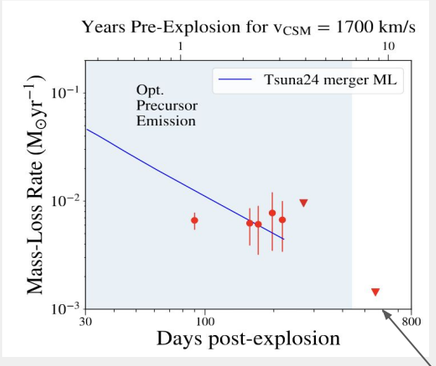
SN 2023fyq

Radio +

- **First radio detection of a type Ibn SN!**
- Fit synchrotron self-absorbed+ Free-Free absorbed model to dataset from ~40-600 days post-explosion
- Modeling reveals high mass-loss that **matches magnitude of mass-loss seen in merger models**
- Late-time non-detections reveal drop in mass-loss rate that also matches merger predictions

X-ray

- No detections in Swift-XRT data due to host contamination
- **Chandra non-detection aligns with radio turn-off**-gives upper limit on X-ray L<2e38 ergs/s at ~600 days post-explosion



Baer-Way+ in prep

Drop in mass-loss!