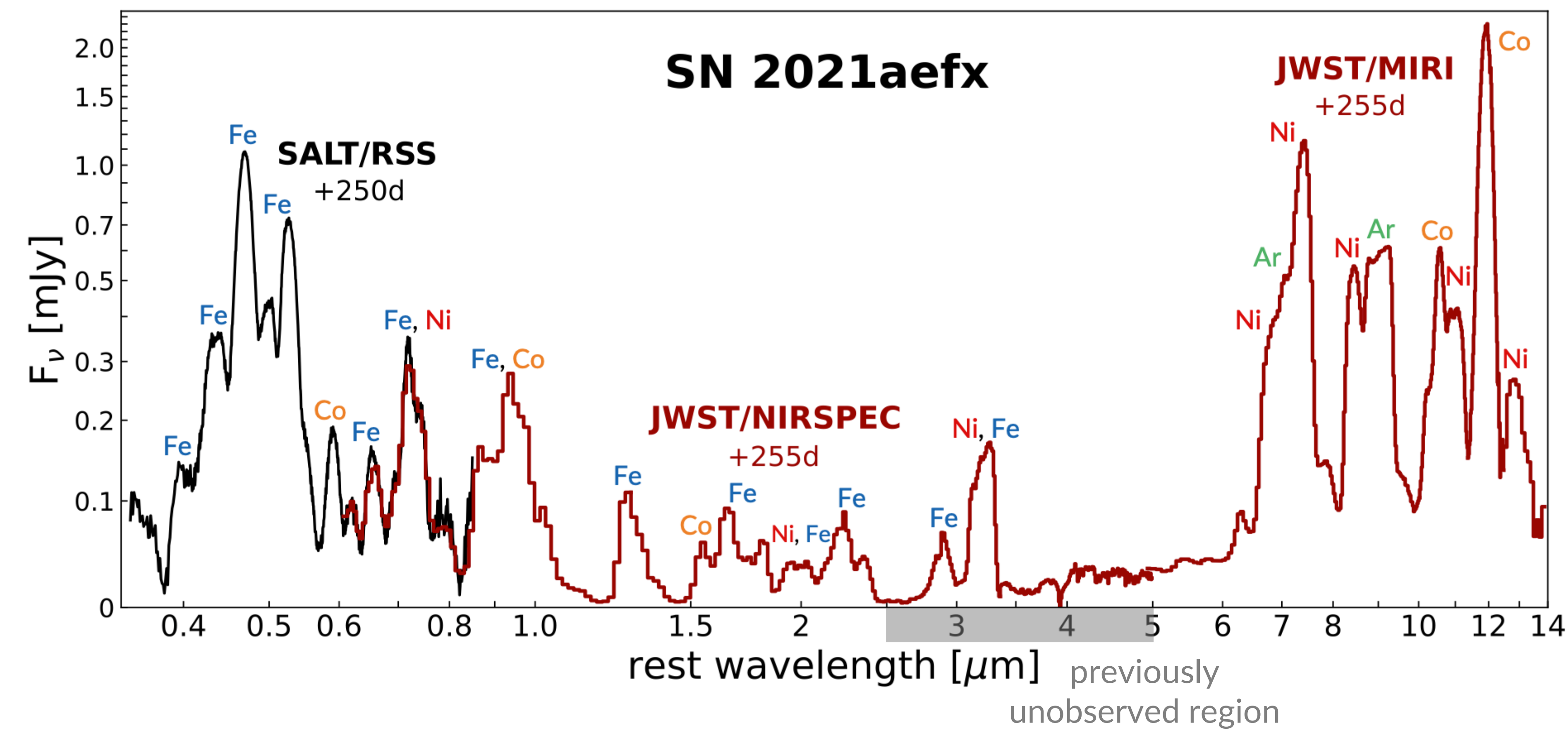




JWST/MIRI image of host galaxy NGC 1566

data via JWST GO 2107 (PI: Janice Lee), processing by Judy Schmidt



## Target: SN 2021aefx

Type Ia supernovae:

- thermonuclear explosion of a white dwarf
- used to measure cosmological distances
- progenitor system & explosion mechanism still not well understood

SN 2021aefx: **normal & nearby** (18 Mpc)

- discovered by DLT40 (Hosseinzadeh et al. 2022; see also Ashall et al. 2022)

Observed extensively from the ground at early times



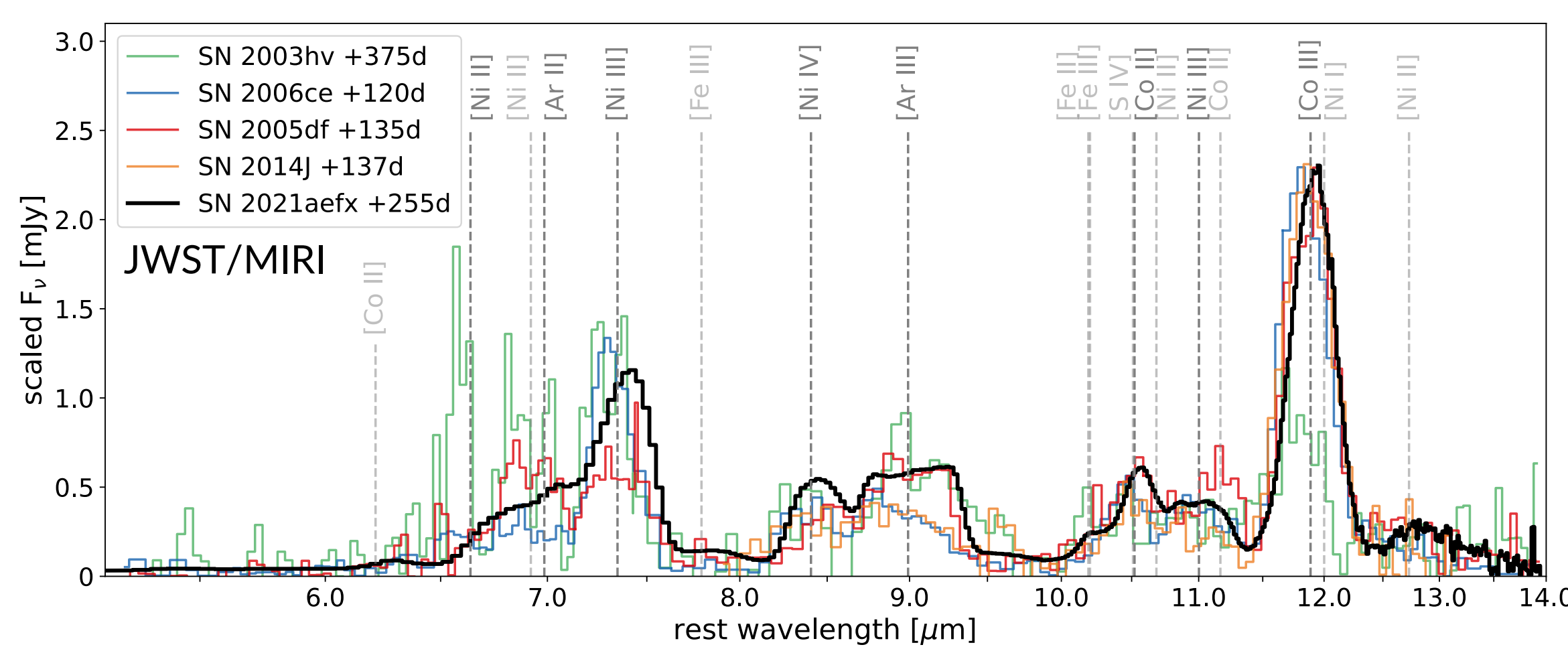
Optical image by Dan Crowson

## Seeing through the supernova

Nebular/late time spectroscopy:

- >100 days post-explosion
- supernova ejecta expands and dilutes
- emission from forbidden line transitions
- light escapes from all regions of ejecta

Directly reveals supernova composition, structure, & kinematics



Major improvement in SNR over Spitzer

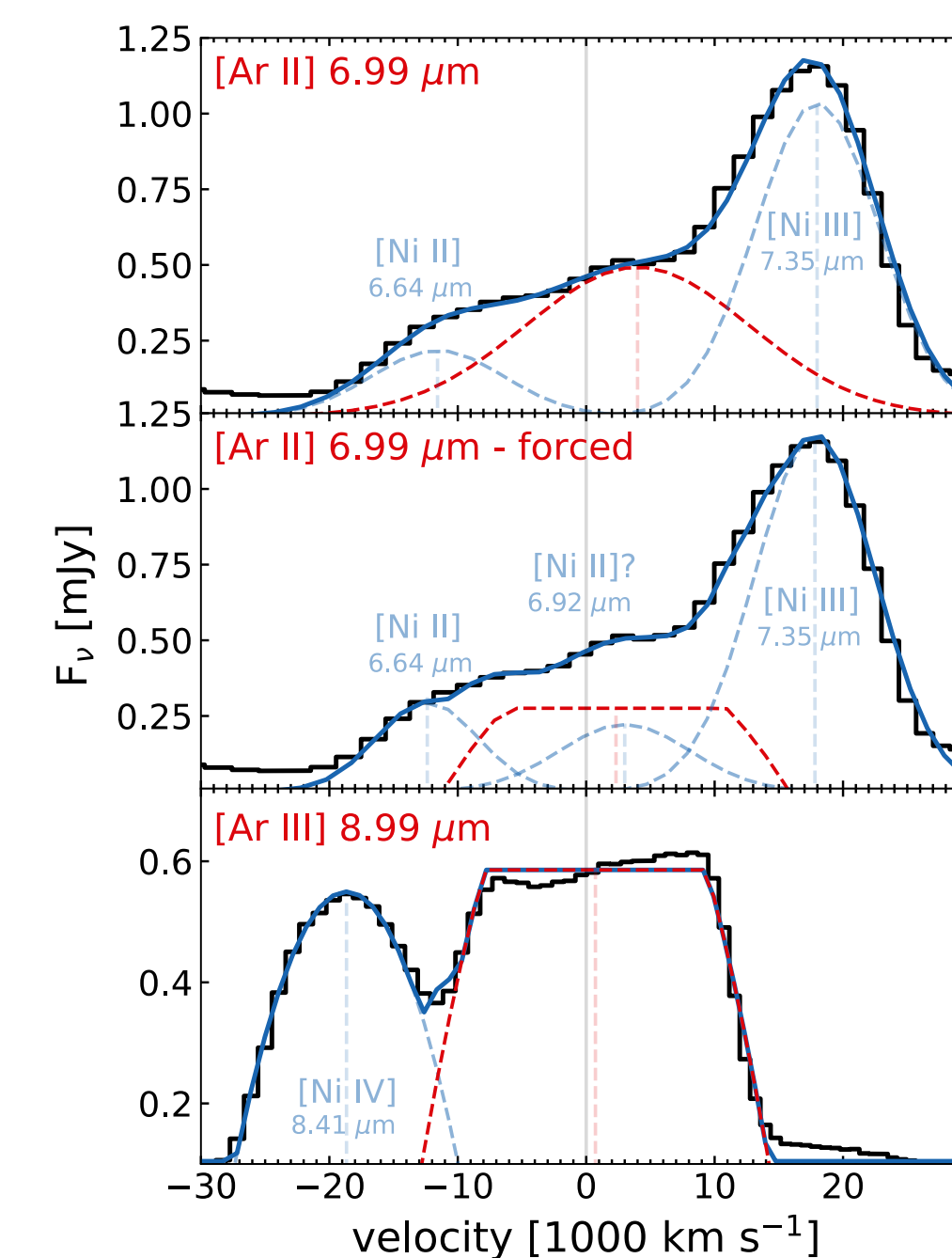
## Broad argon: signature of detonation

Flat-topped [Ar III] line profile

- thick shell of emission
- missing in the center

Ar lines broader than Fe, Co, Ni

- intermediate-mass elements extend to higher velocities than iron-group elements
- stratified ejecta
- signature of a **detonation**

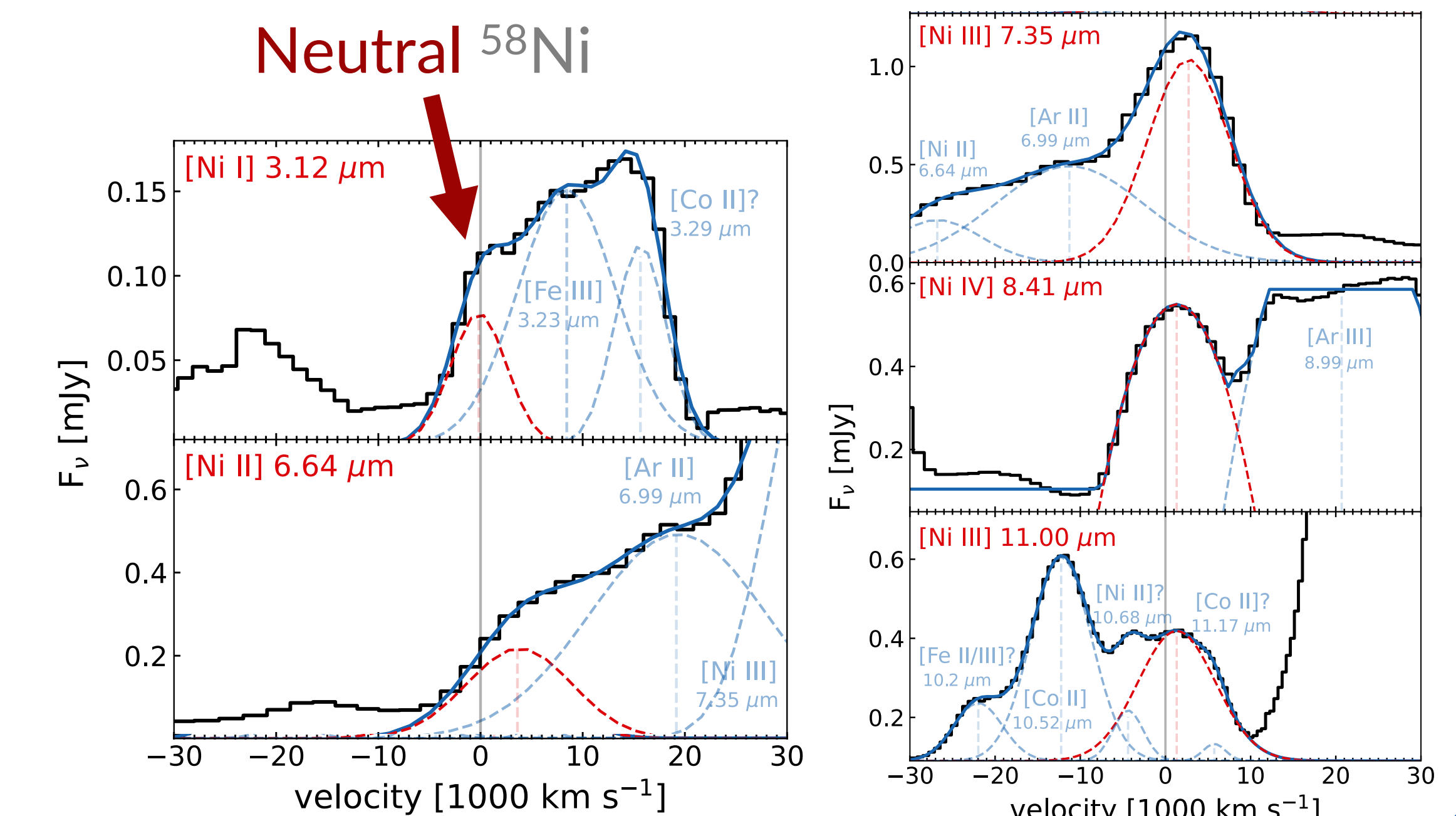


## Strong nickel: suggests high-mass progenitor

Strong stable <sup>58</sup>Ni lines

- high-density burning
- **high-mass** white dwarf progenitor

Stable <sup>58</sup>Ni lines slightly **redshifted** compared to Fe and Co, which come from radioactive <sup>56</sup>Ni.



JWST NIR & MIR spectrum suggests **detonation** in a **high-mass white dwarf** for SN 2021aefx.

## Check out the Paper!

A JWST Near- and Mid-Infrared Nebular Spectrum of the Type Ia Supernova 2021aefx

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