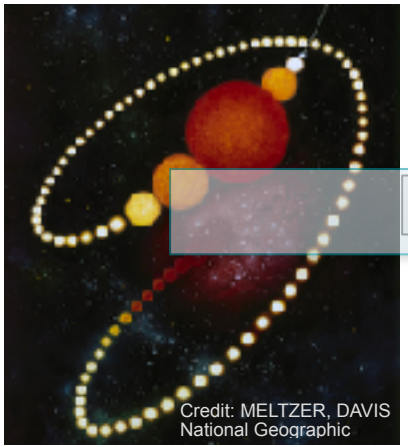
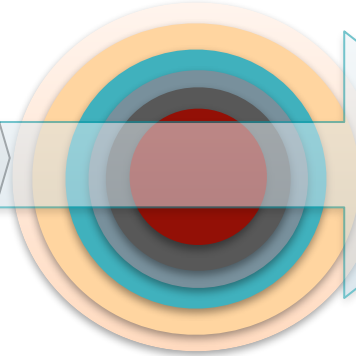
# Spectral Modeling Type Ic Supernovae




Progenitor

Supernova



Spectrum

Stellar Evolution

Hydrodynamical Simulation

Radiative Transfer

Sukhbold et al 2016:

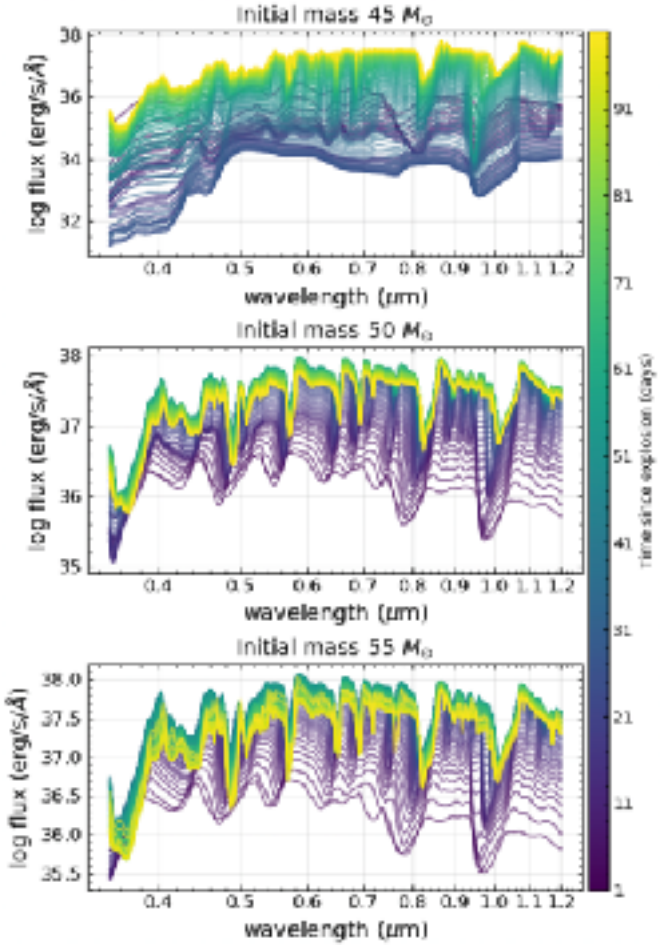
- Non-rotating single stars
- Solar metallicity
- 45 - 120 solar masses
- Using KEPLER

Barker et al. 2022:

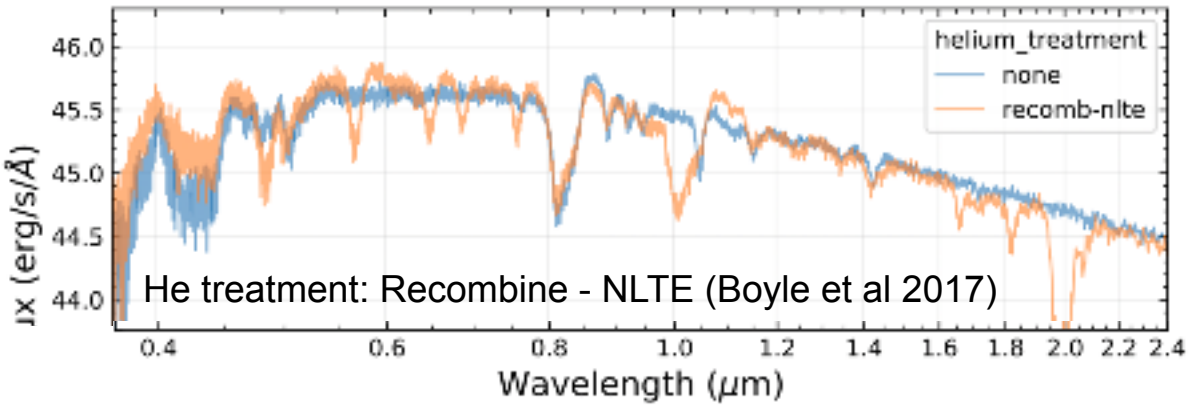
- Physics-driven explosions using FLASH + STIR (e.g., turbulence, neutrino-transport)
- Light curves using SNEC

TARDIS!

Exploring supernovae made easy




PRELIMINARY




showing spectral comparison with 1994I

showing composition comparison with 1994I

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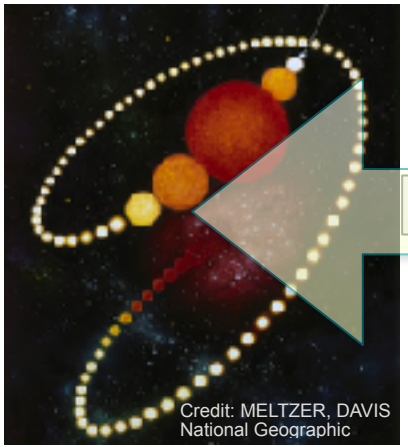


Progenitor

Supernova

TARDIS!

Spectrum

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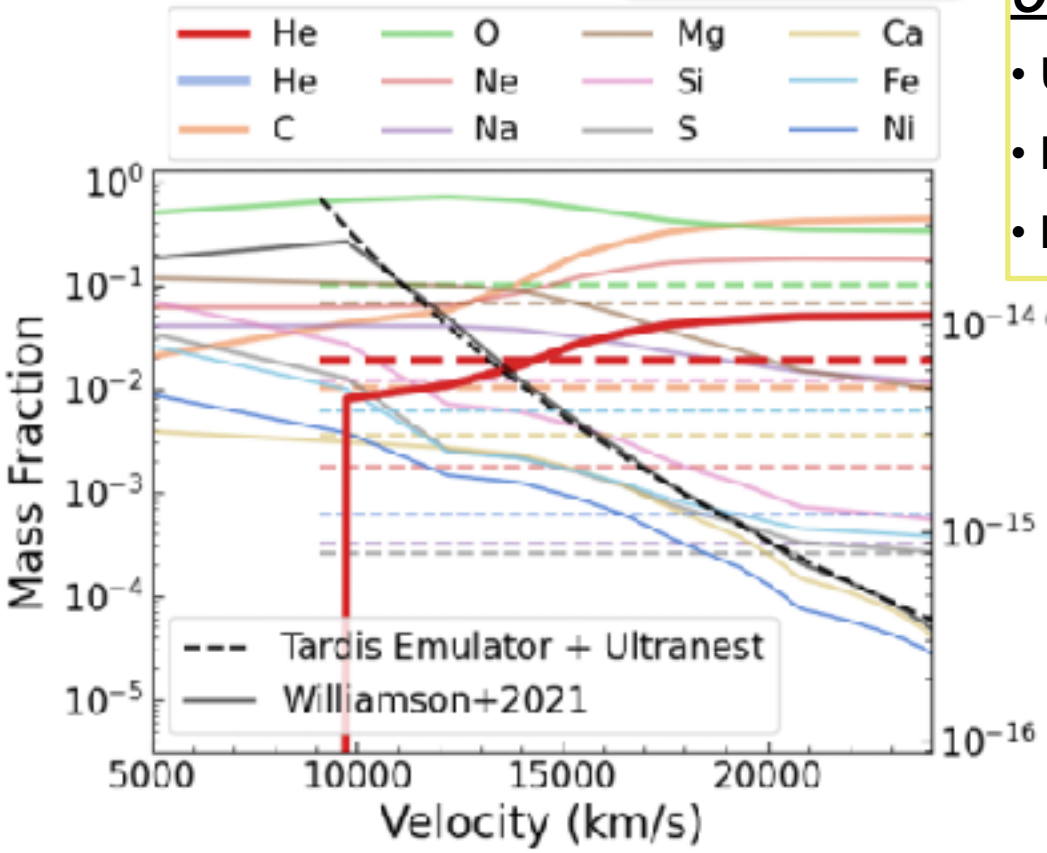
Emulator + Inference:

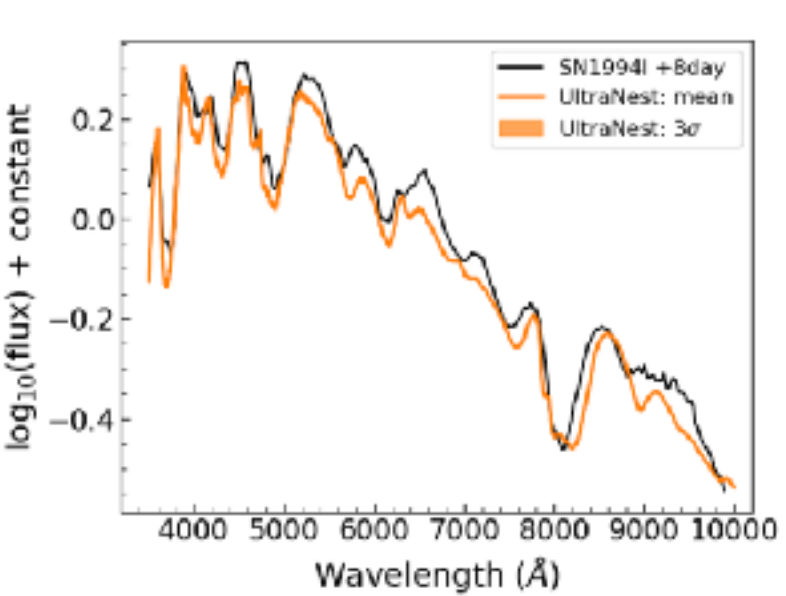
- Emulator: Deep learning neural networks **accelerate** TARDIS simulations **10^8** times
- Inference on observed spectra using emulator to generate simulated ones

PRELIMINARY



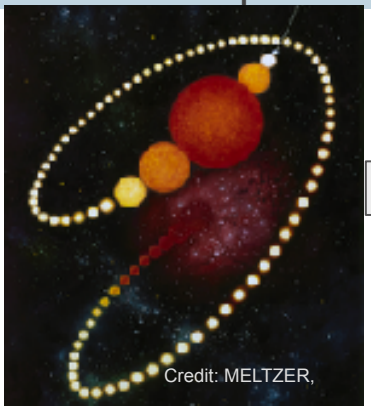

***Our first attempt of parametrization:***

- Uniform elemental mass fraction
- Power Law density profile
- Luminosity within observed Ic range



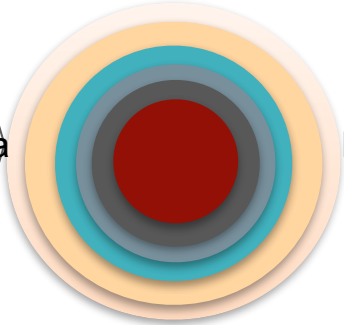
# Questions and Suggestions?

- **Forward Path**
  - Variations in each step (e.g., stellar mass, separation, rotation…)
  - Peak Luminosity, LC broadness??
  - Need community input: Ejecta models in homologous expansion stage with full isotope network are valuable
- **Backward Path**
  - Parametrizing ejecta models in a physical parameter space
  - What would be the a sensible parameterization to try? Correlations between parameter space)?




Progenitor

Supernova



Spectrum

Stellar Evolution | Hydrodynamical | Radiative Transfer