Production of Short-lived Radionuclides in Asymmetric Supernovae

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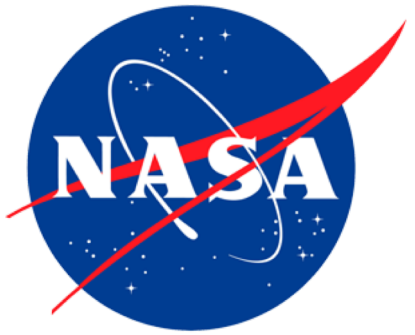

Purpose

- Computational models provide:
  - Guidance for observational data collection
  - A resource for interpreting observational data
  - Simulated information that cannot be recreated experimentally on Earth

- Provide insight into the history of our own solar system
  - Ratios of short-lived radionuclides (SLRs)
  - Heat source for differentiation

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Three supernova simulations

Model Name	Progenitor Mass	Explosion Asymmetry	Other Notes
50Am	15 $M_\odot$	none	—
jet3b	15 $M_\odot$	bipolar 2:1	$v_{\mathrm{polar}}/v_{\mathrm{equator}} = 2$
cco2	15 $M_\odot$	none	1.35 $M_\odot$ compact object

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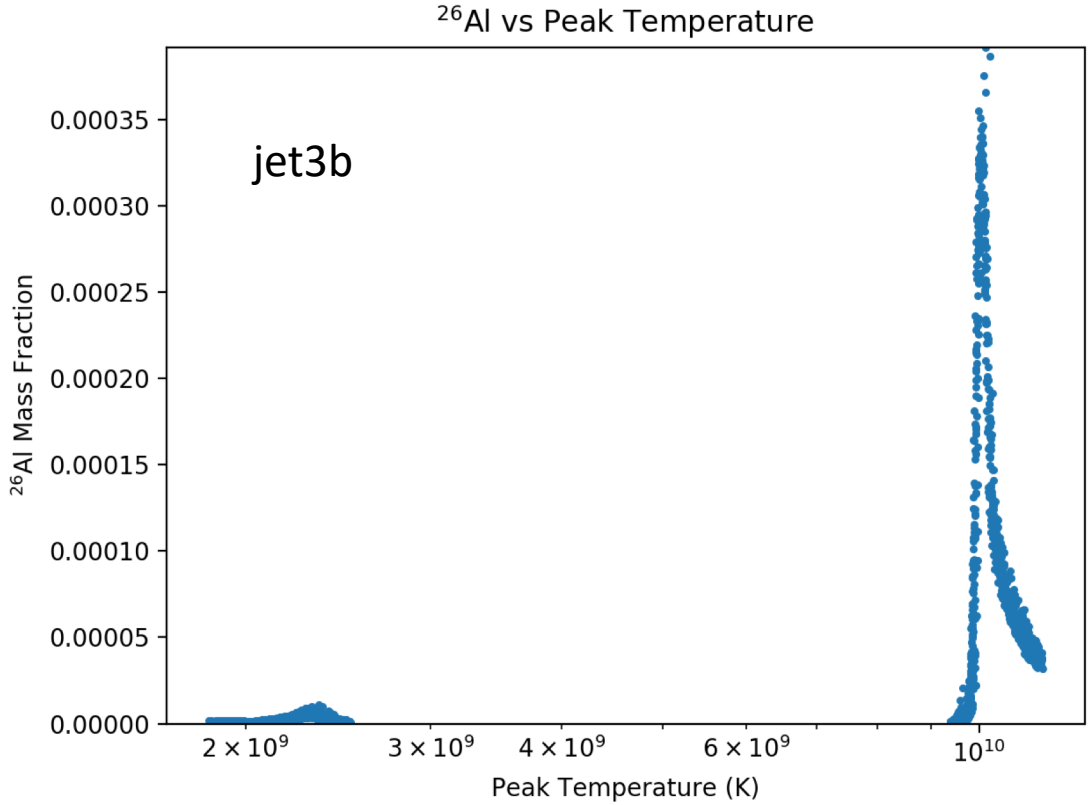
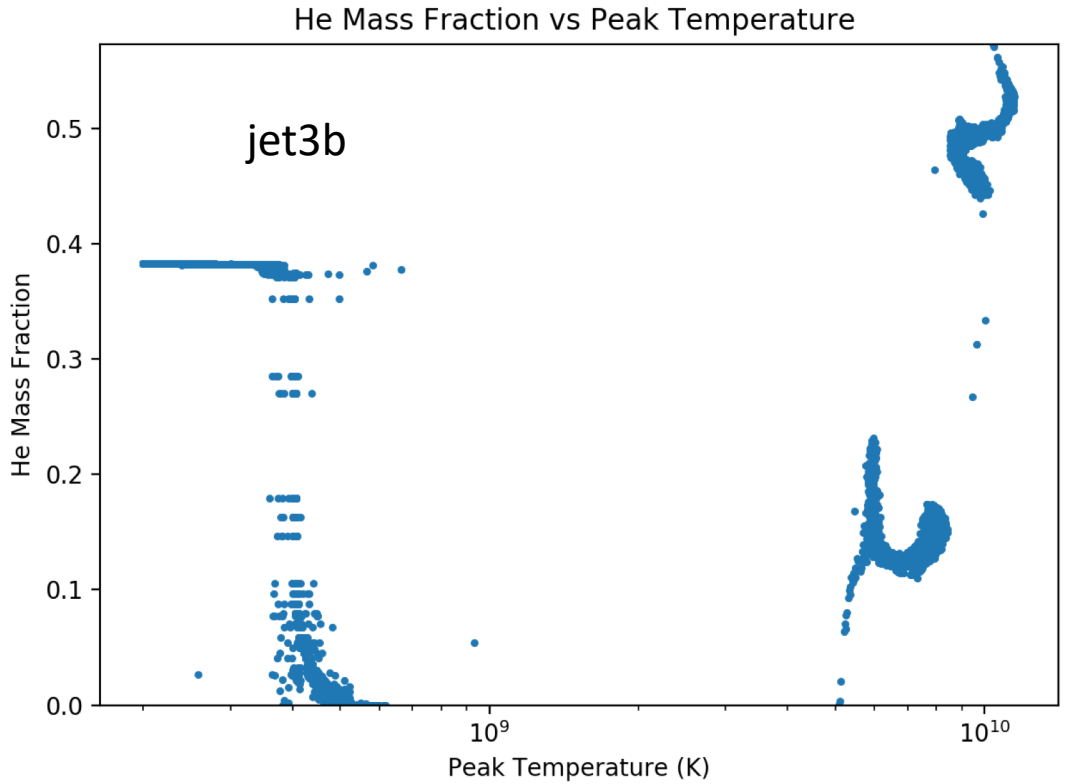
α-rich freezeout





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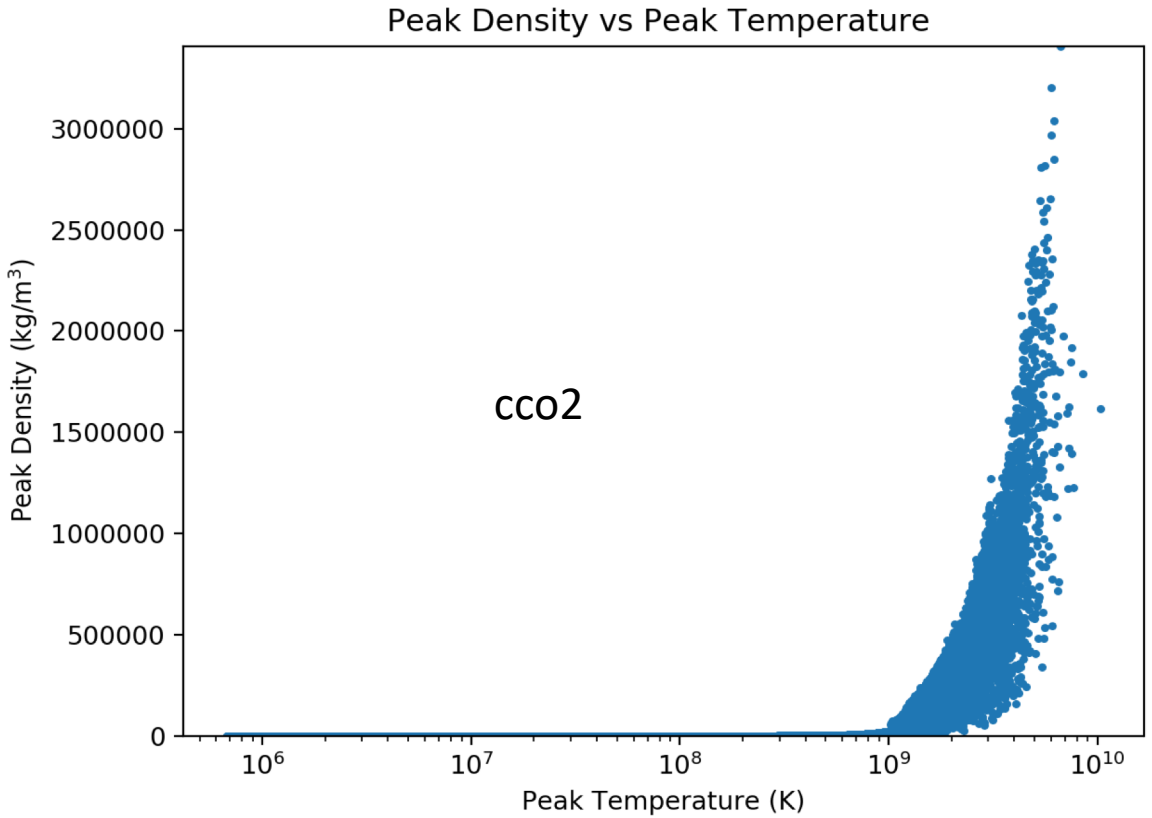
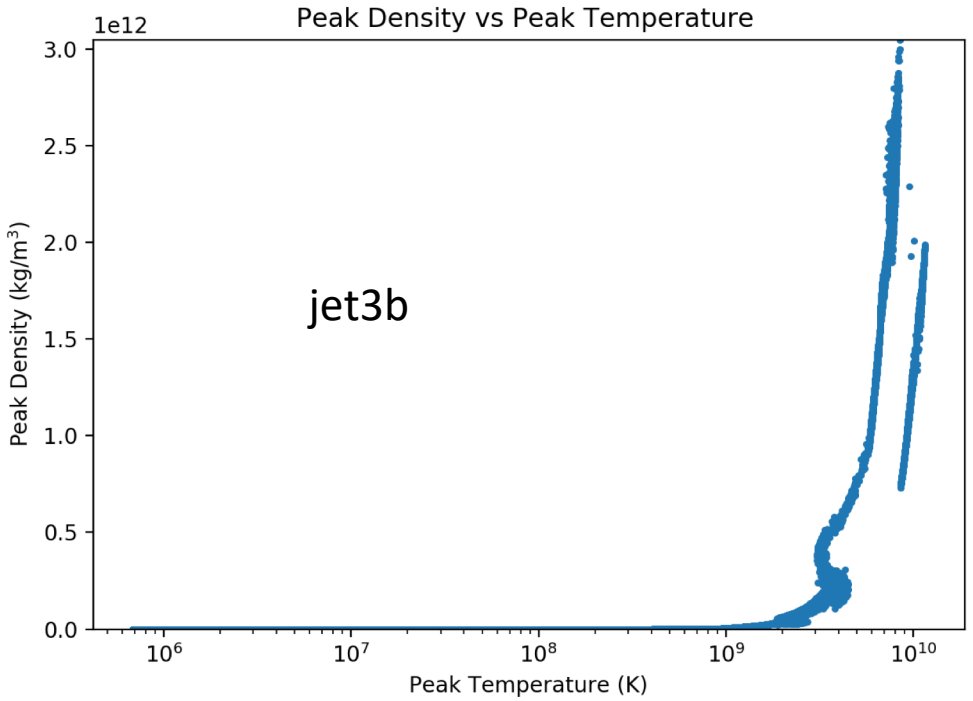
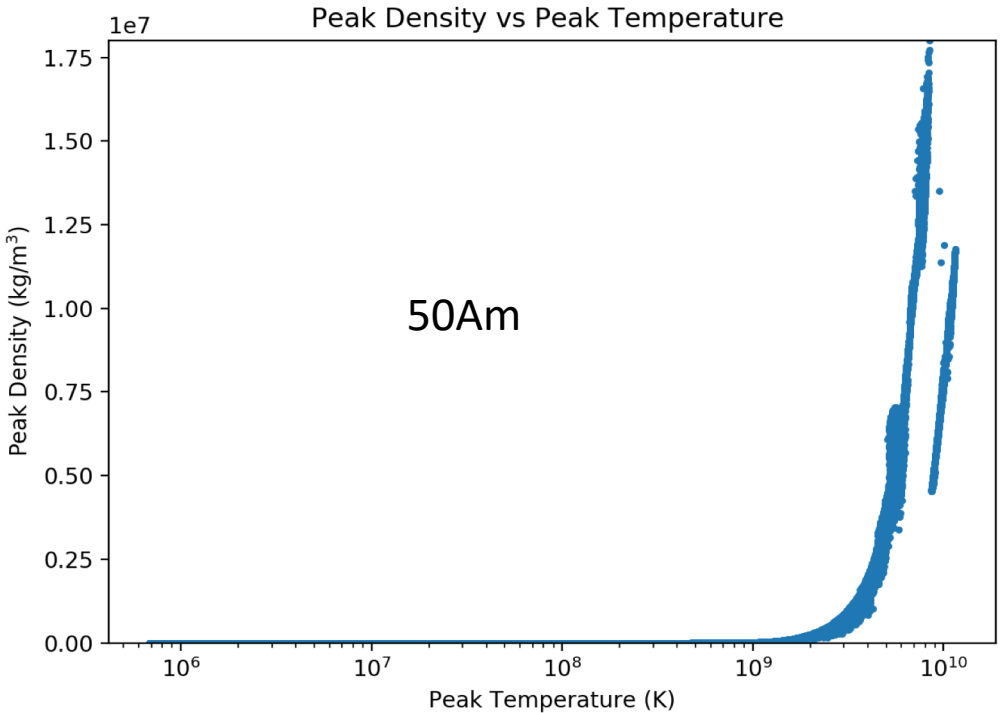
Comparison of peak densities against peak temperatures

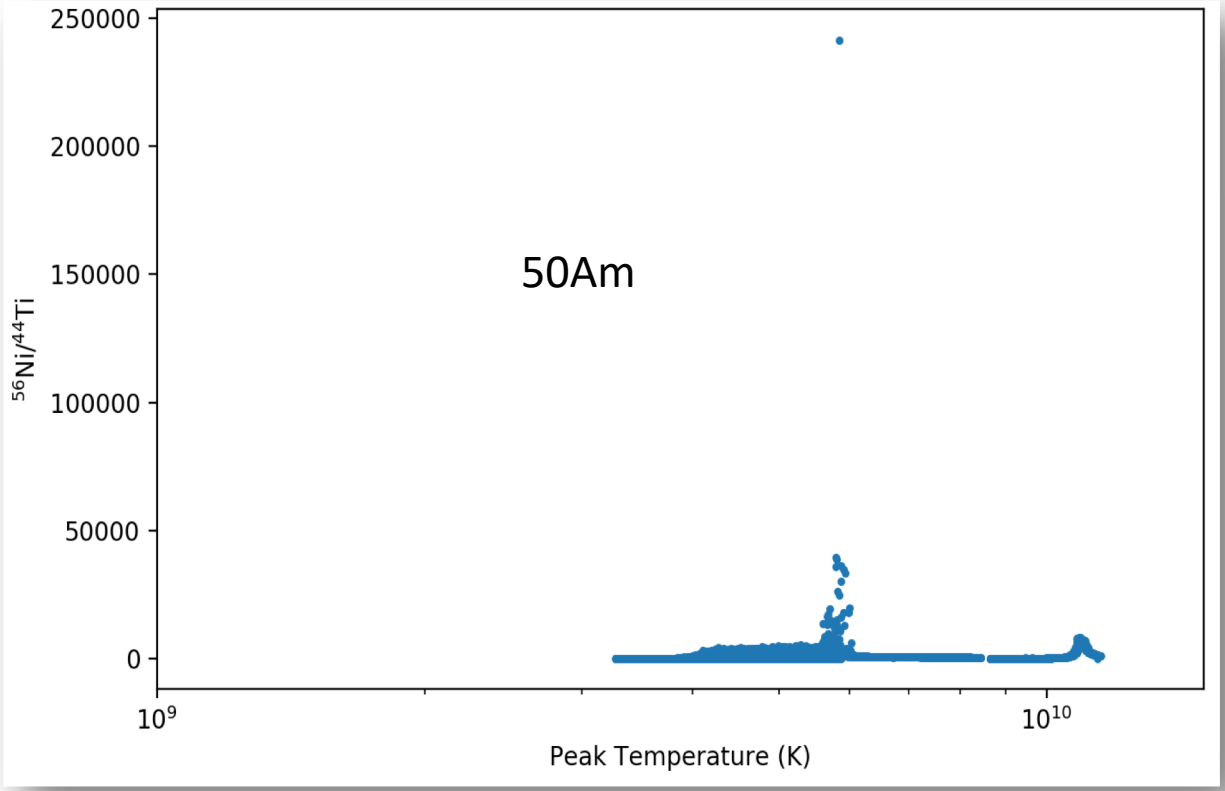


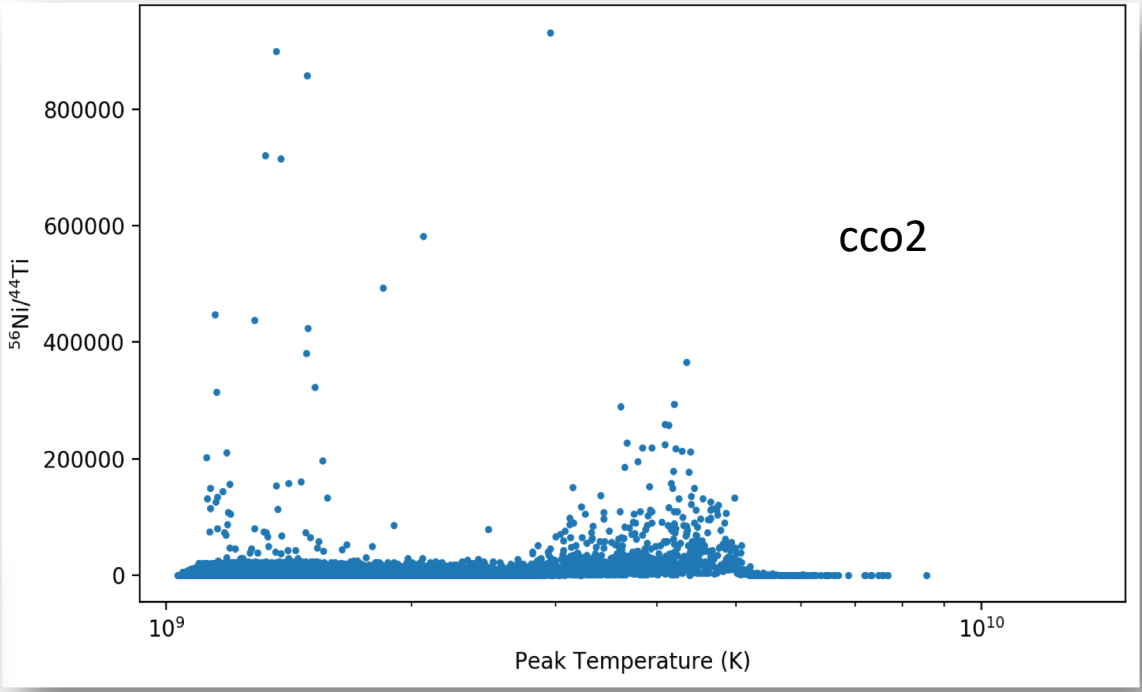


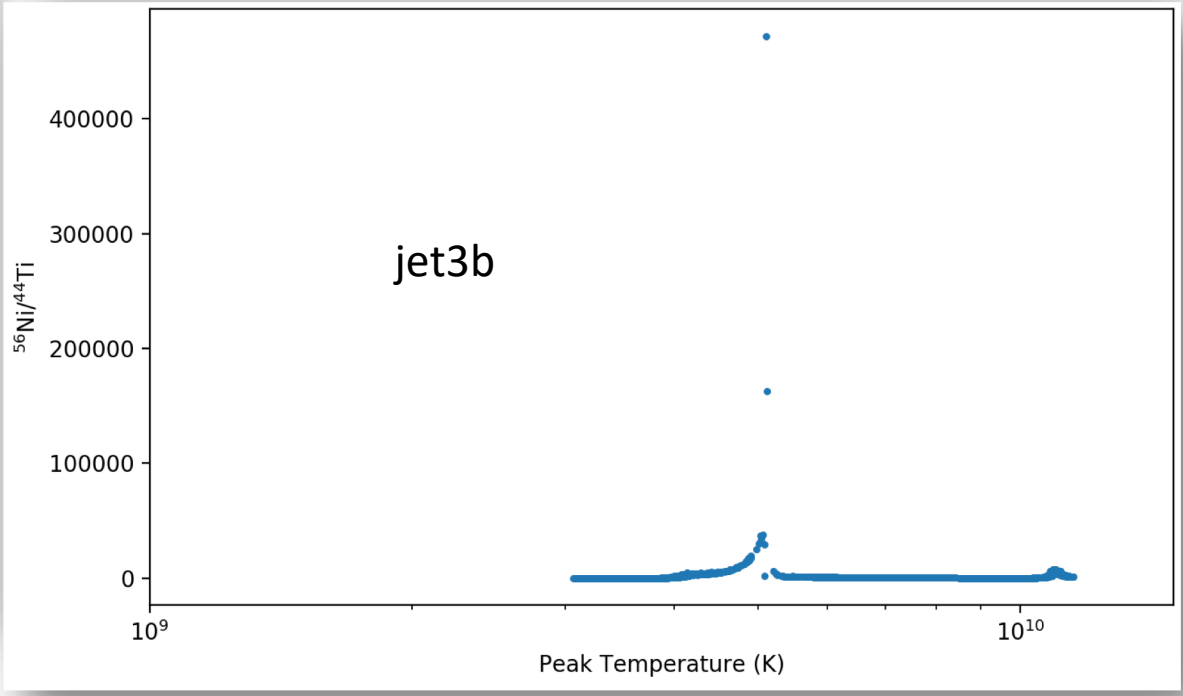


Ratio of ^{56}Ni to ^{44}Ti

- Particularly sensitive to changes in peak temperature and density
- Cassiopeia A emission lines







Future Work

- Comparison to observational data
- More models
- More SLR comparisons (^{41}Ca, ^{60}Fe, etc.)

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Thank you!

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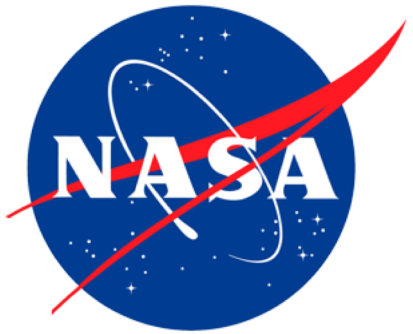

Questions?