

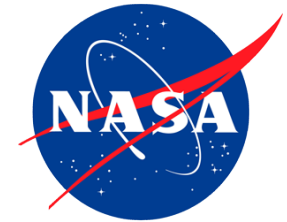
Examining Short-lived Radionuclide Creation in Supernovae Simulations

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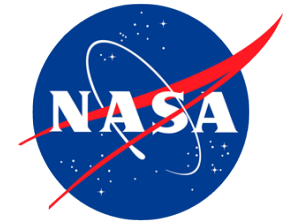
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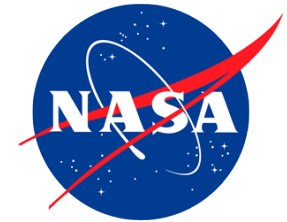
Purpose

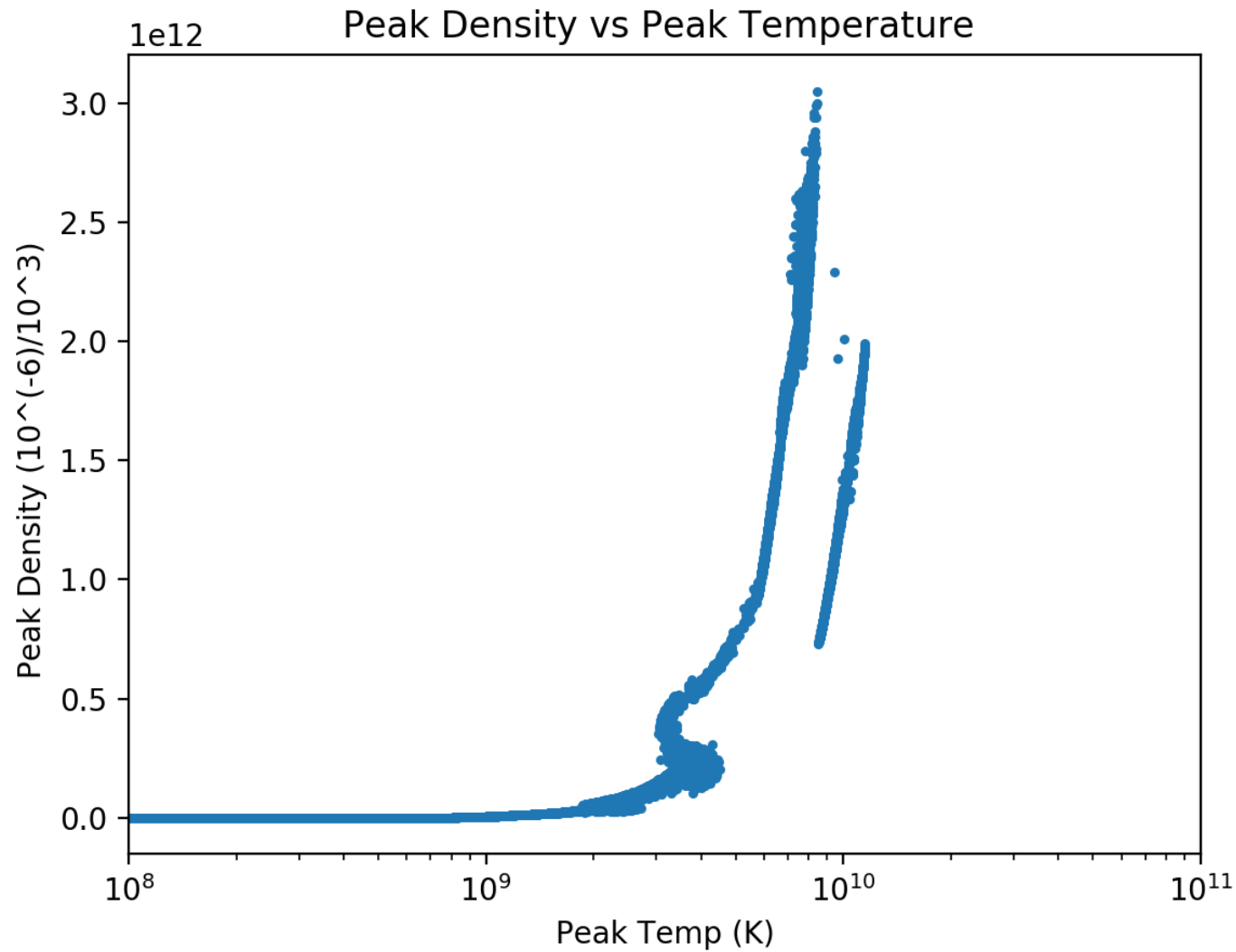
- Computational models provide:
 - Guidance for observational data collection
 - A resource for interpreting observational data
 - Simulated information that cannot be recreated experimentally on Earth
- Provide insight into the history of our own solar system
 - Ratios of short-lived radionuclides (SLRs)
 - Heat source for differentiation



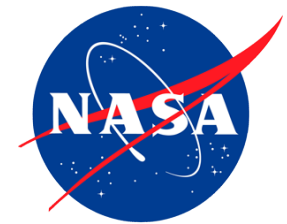
Progenitor Star and Supernova

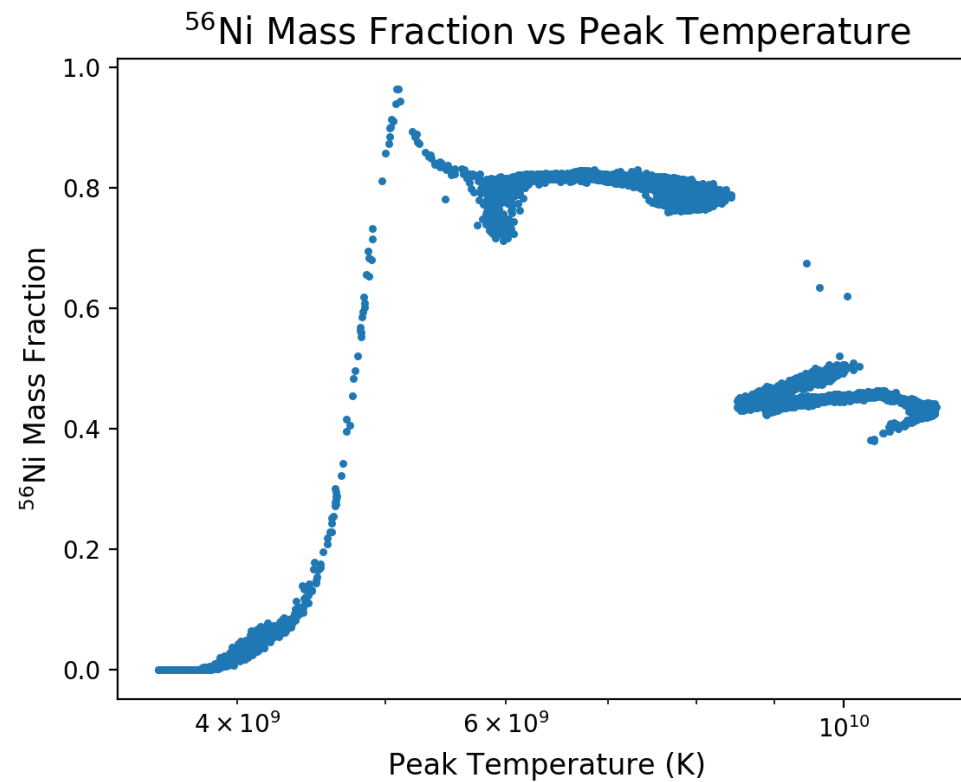
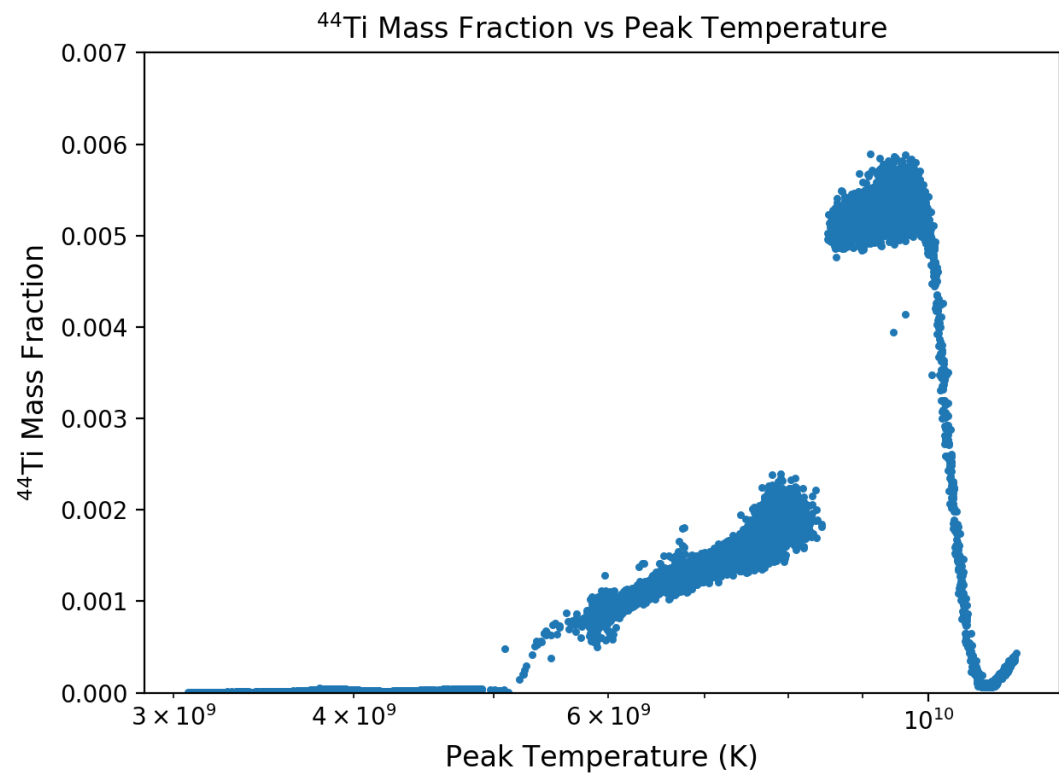
- $15 M_{\odot}$ Red supergiant star
- Asymmetric explosion
 - Velocity 1.5 times greater at the poles compared to the equator
 - Velocity decreases as a sine function from the poles to the equator
- TYCHO stellar evolution code





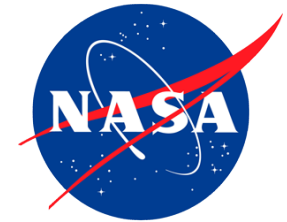
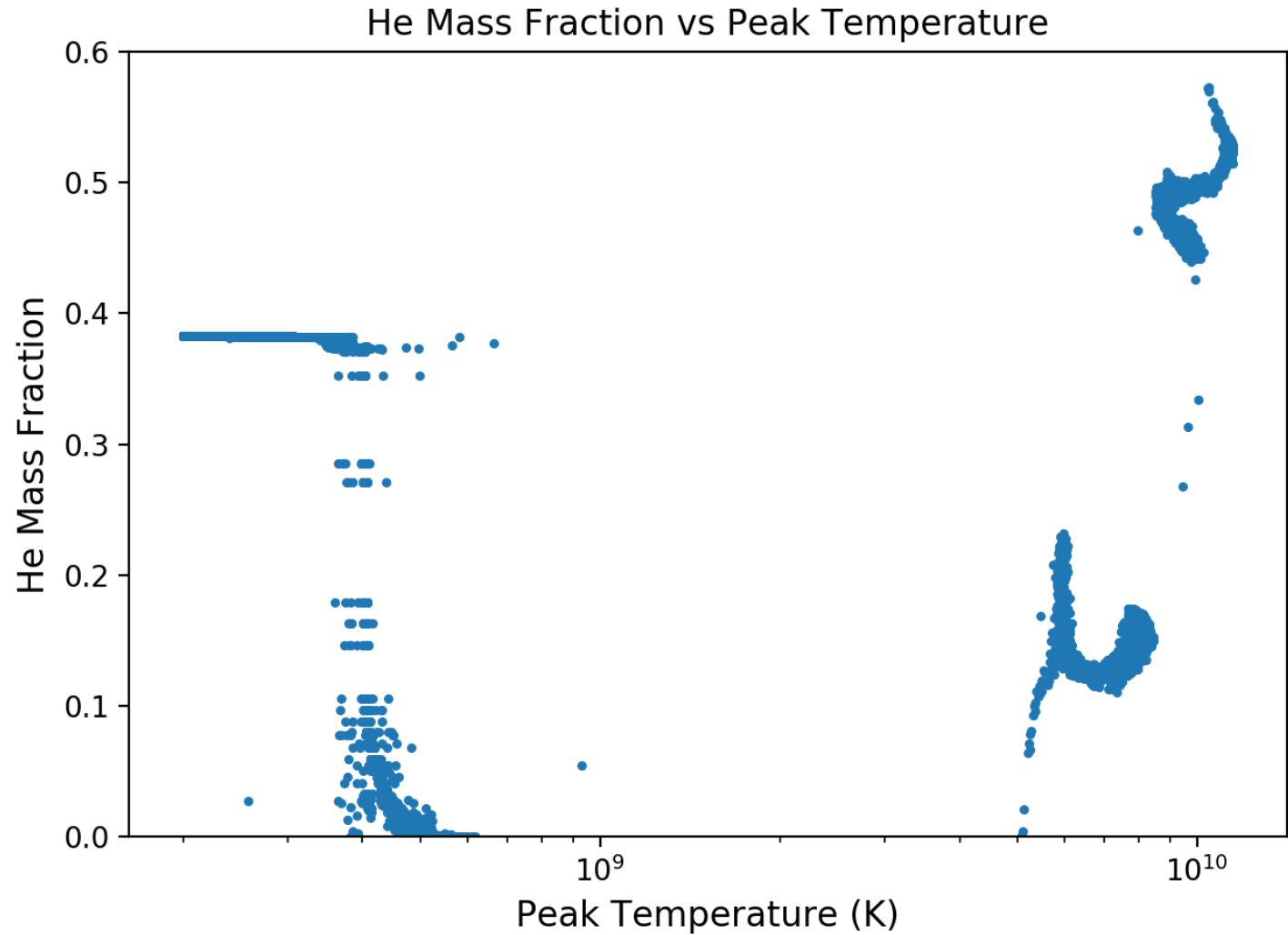
- Asymmetrical jet
- Temperature and density combination effect supernovae processes





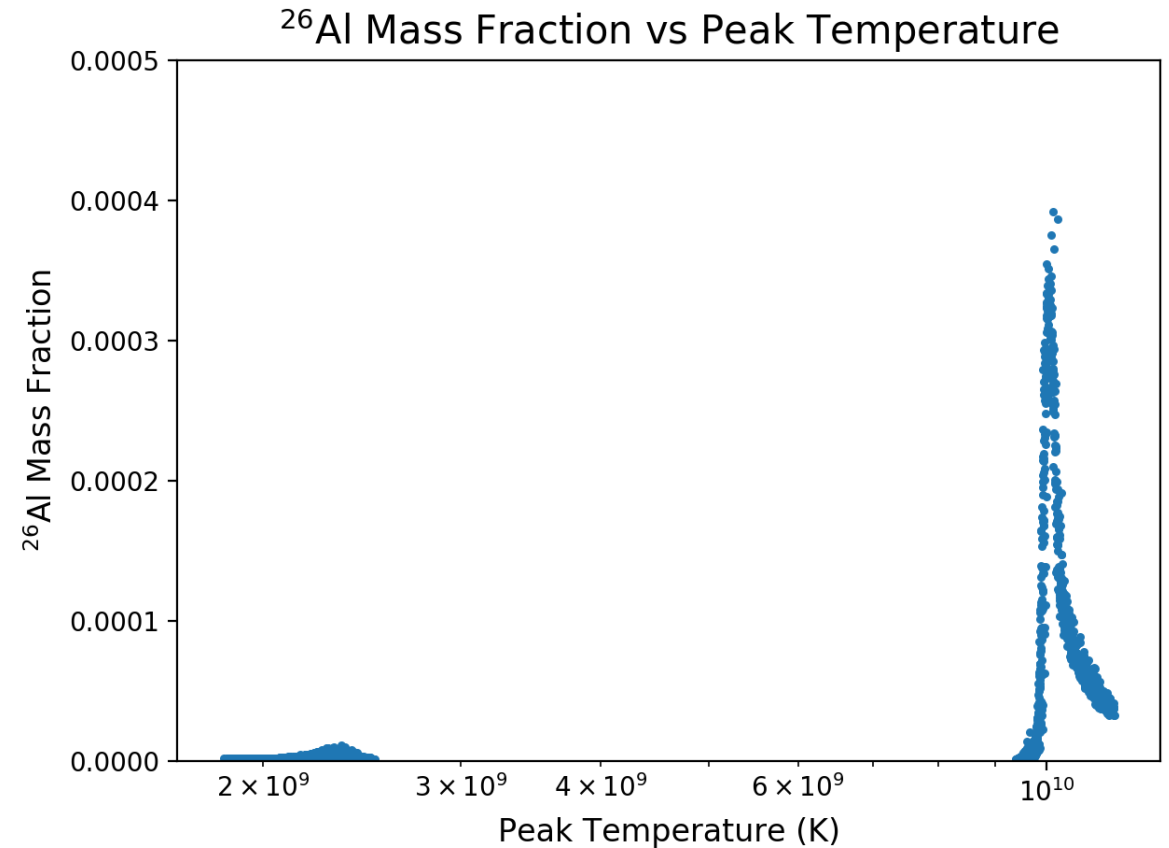
α -rich Freezeout

- High temperature ($\sim 10^{10}$ K) peaks of ^{44}Ti and ^{56}Ni
- He production peak at $\sim 10^{10}$ K



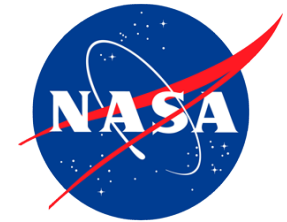
^{26}Al as a Heat Source

- Short half-life of 717,000 years
- Traces of ^{26}Mg found on Earth
- Differentiation of small-mass celestial planetary bodies
 - Vesta



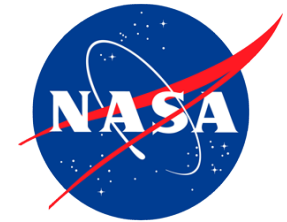
Future Work

- Further explore SLR ratios
- Explore additional supernovae geometry



Thank you!

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and Greg Vance



Questions?

