

## Nuclei in the Cosmos (NIC XVII)



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# Sensitivity Studies on Type Ia Supernova Observables

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Although there is broad agreement that Type Ia Supernovae (SNe Ia) originate from thermonuclear explosions of carbon-oxygen white dwarf stars (WD), the details of the path towards explosion remain uncertain: the degeneracy of the binary system, mass, and chemical composition of the WD, and the explosion mechanism of the SNe Ia. Using the reaction rates in STARLIB [1] we probe the sensitivities of nuclear reactions responsible for the abundance of potential observables in hopes to shed light on some of these uncertainties. This is done by employing a Monte Carlo reaction network method [2] by varying all reaction rates simultaneously according to their rate probability densities in each simulation. The hydrodynamical trajectories were derived from a near- $M_{Ch}$  WD shell model with a  $5 \times 10^{-4}$  M He layer surrounding its carbon oxygen core [3]. To take advantage of future early time observations, we focus on both early-time (e.g. gamma ray emitters) and late-time observables (e.g. elemental abundances in ejecta, supernova remnants). Results will be discussed.

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### References

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- [3] Hoeflich, P. et al. Nuclei in the Cosmos XV. Springer Proceedings in Physics, 219 (2019)

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