# First radiative α-capture on $^{7}$Be using DRAGON for neutrino-driven wind nucleosynthesis

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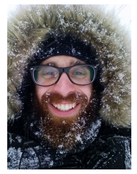
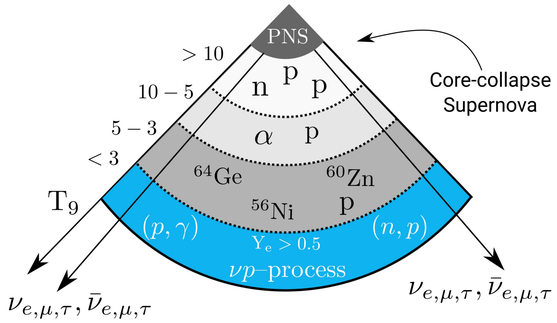


## Introduction

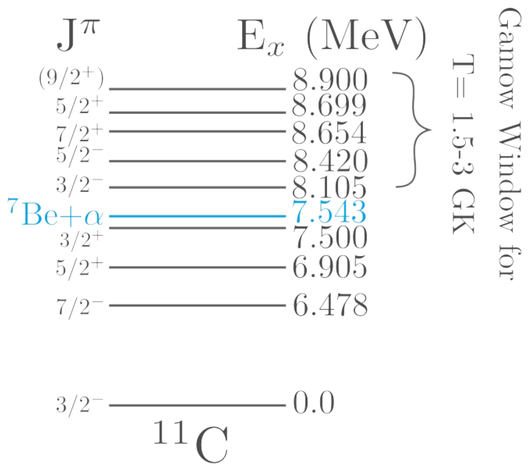
A possible mechanism to explain the origin of the light p-nuclei in the Galaxy is the nucleosynthesis in the proton-rich neutrino-driven wind ejecta of core-collapse supernovae via the νp-process. However this production scenario is very sensitive to the underlying supernova dynamics and the nuclear physics input.




Simplified schematic of the nucleosynthesis in proton-rich neutrino–driven wind ejecta (νp-process).

## Why the $^{7}$Be(α,γ)$^{11}$C?

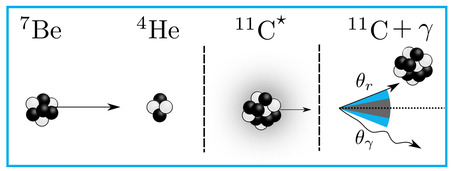
- The breakout from *pp*-chains through $^{7}$Be(α,γ)$^{11}$C which occurs prior to the νp-process, is suggested to influence the reaction flow and the production of heavy nuclei.
- There are **5** known resonances in the Gamow window for T= 1.5-3 GK, however the current reaction rate is base only on **2** of them.



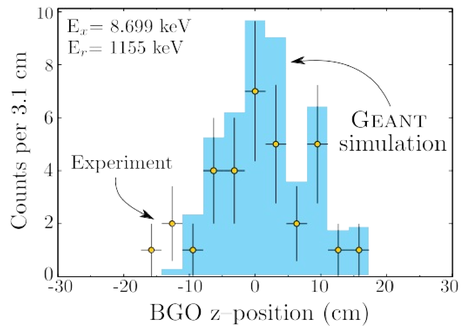

Partial level scheme of 11C. The α separation energy is shown.

**Constrain the reaction rate for $^{7}$Be(α,γ)$^{11}$C at νp-process temperatures**

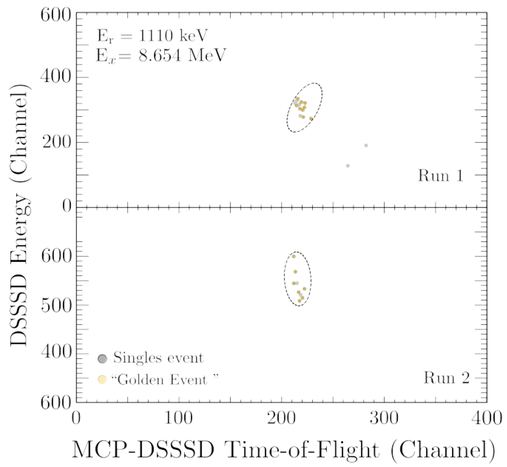
## Reaction kinematics



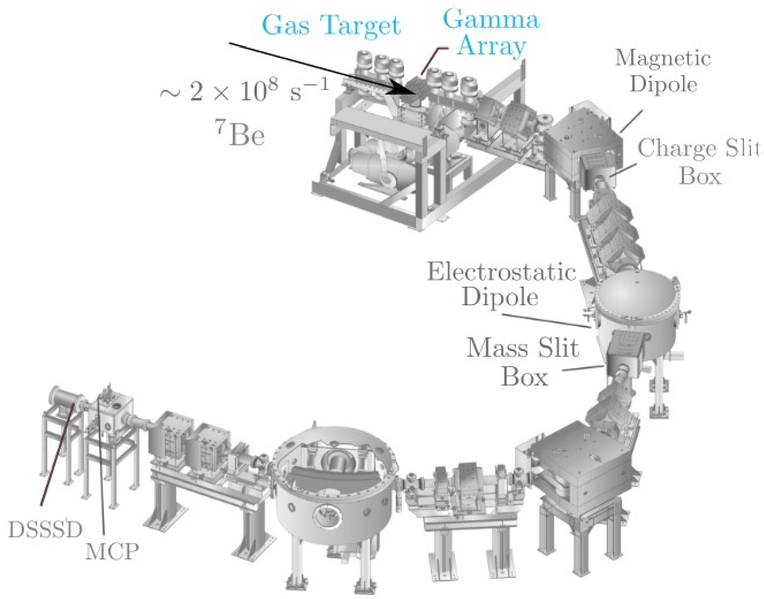

## Data Analysis



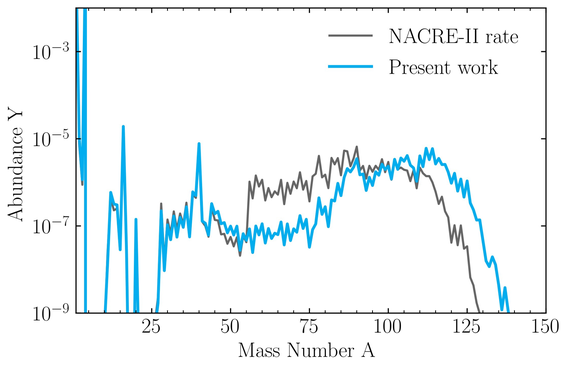

BGO position profile spectrum for the $E_r$=1155 keV resonance.




MCP/DSSSD versus Searator Time–Of–Flight for the $E_r$= 1110 keV resonance for two independent runs.




## Nucleosynthesis calculation using the new reaction rate




**The new $^{7}$Be(α,γ)$^{11}$C reaction rate affects the production of heavy elements**

**Discovery, accelerated**

## References

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