

GPPU Progress Report

Mainly about JAEA topic



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PhD 2nd year

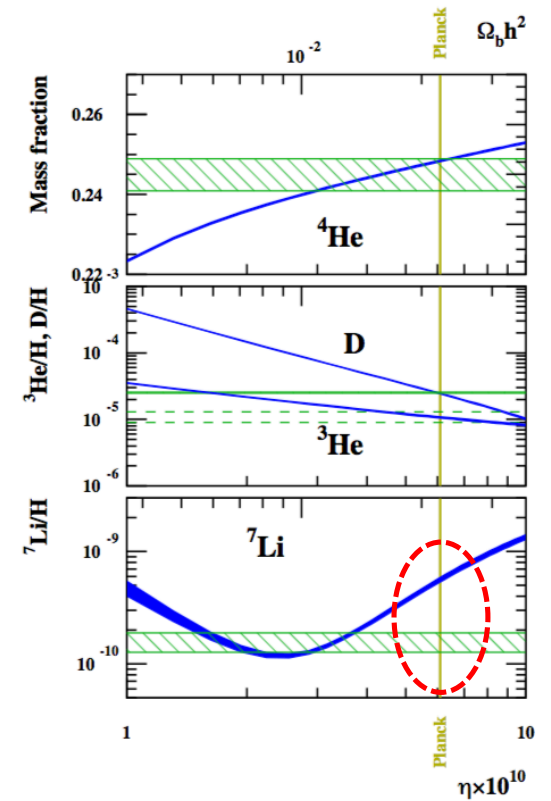
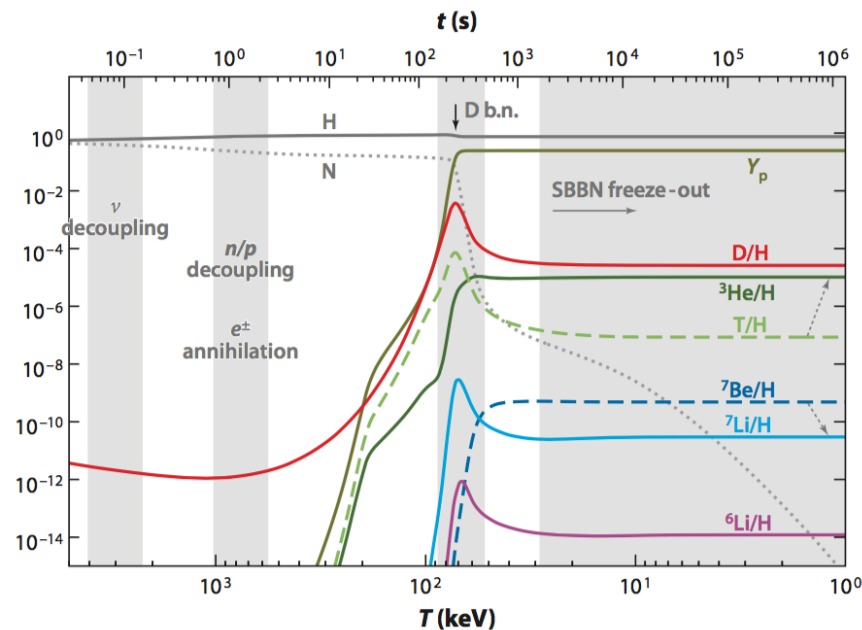
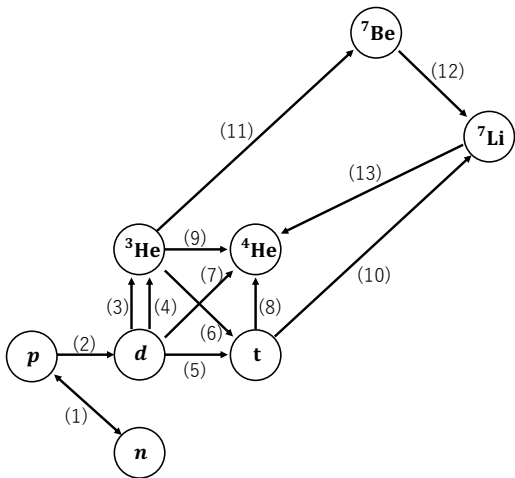
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Introduction

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The Cosmological Lithium Problem

- Big Bang Nucleosynthesis (BBN)
- A large discrepancy between observation and theory for ${}^7\text{Li}$ abundance
- A decrease in ${}^7\text{Be}$ abundance may solve the problem.



M. Pospelov, Annu. Rev. Nucl. Part. Sci. **60**, 539-568 (2010)

A. Coc, arXiv:1707.01004v1 [astro-ph.CO]

${}^7\text{Be}(n, p) {}^7\text{Li}$ reaction

...followed by the (p, α) reaction

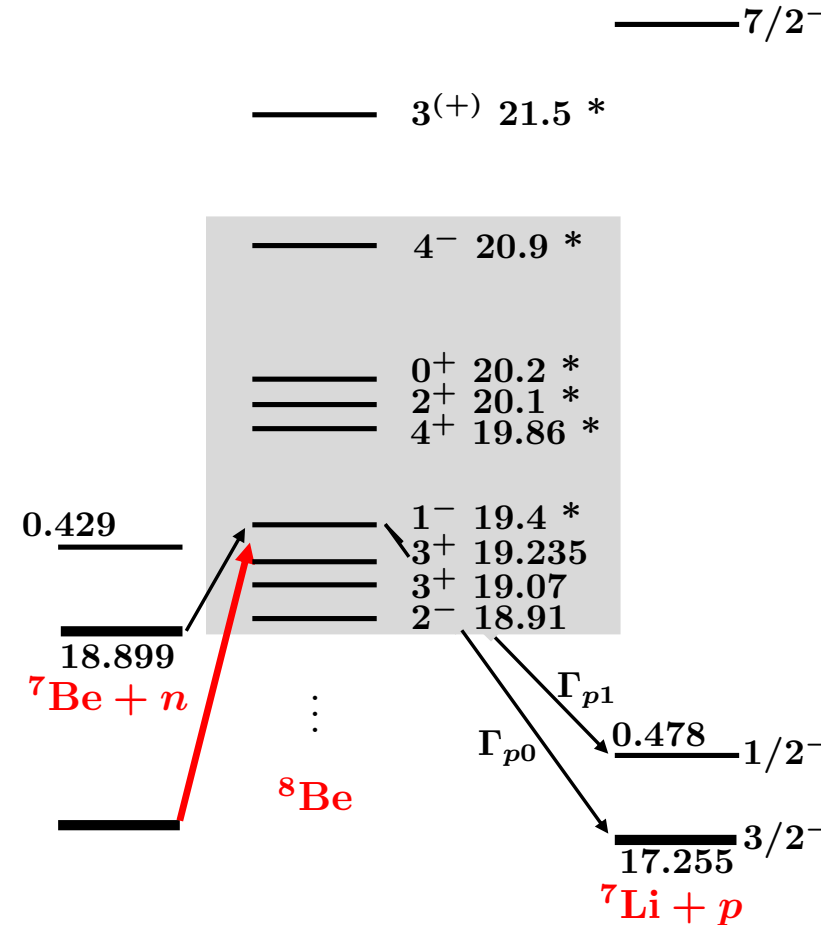
Objective

${}^7\text{Be}(n, p_1) {}^7\text{Li}^*$ reaction cross section using the (p, n) data

Idea

$$\sigma_{n,p}(E_n) = \frac{\pi}{k_n^2} g(J) \frac{\Gamma_n \Gamma_p}{(E_n - E_r)^2 + \Gamma^2/4}$$

- Experimental determination of Γ_{p1}/Γ_{p0}
- Evaluation of the (n, p_1) reaction's impact on the total reaction rate
- Update the BBN calculation code



2018

The ${}^9\text{Be}({}^3\text{He}, \alpha){}^8\text{Be}^* \rightarrow {}^7\text{Li} + p$ reaction measurement at 30 MeV for the resonances in ${}^8\text{Be}$ at 18.91-20.1 MeV

$$3^+(E_x = 19.235 \text{ MeV}) = 3.4 \pm 2.2 \%$$

$$1^-(E_x = 19.4 \text{ MeV}) : \text{not observed}$$

$$4^+(E_x = 19.86 \text{ MeV}) = p_1 \text{ dominant}$$

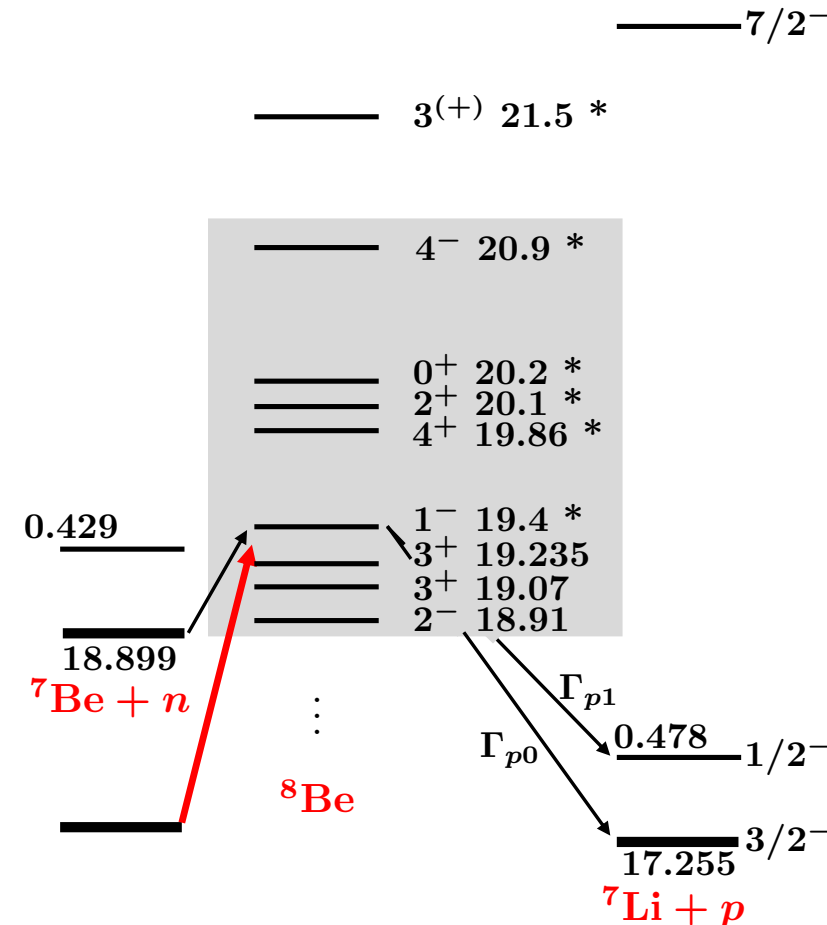
$$2^+(E_x = 20.1 \text{ MeV}) = 0_{-0}^{+22} \% (p_0 \text{ dominant})$$

- JPS presentation (2020 autumn)
- Trying to publish in PRC as the second author

2021?

The ${}^7\text{Li}({}^3\text{He}, d){}^8\text{Be}^* \rightarrow {}^7\text{Li} + p$ reaction measurement with LiF at 30 MeV for the 2^- and 1^- resonances in ${}^8\text{Be}$

- The test and main measurements should be performed.



- The Accurate Slowing-down Measurements of Heavy Ions in the energy range of (30-300) MeV/u at GSI, Darmstadt Germany
- Experiments performed : U and Pb beam, more than 800 spectra taken
- Present status : analysis phase
- Weekly meeting with the GSI spokespersons (Prof. H.Geissel and Dr. S.Purushothaman)

Plans:

Almost 3 months → Next year? Depends on the JAEA topic.