

Experiments at JAEA and GSI

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10.10.2019



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Cosmological Lithium Problem

The primordial abundances of light elements produced by the Big Bang Nucleosynthesis (BBN): D, ^3He , ^4He , ^7Li , ...

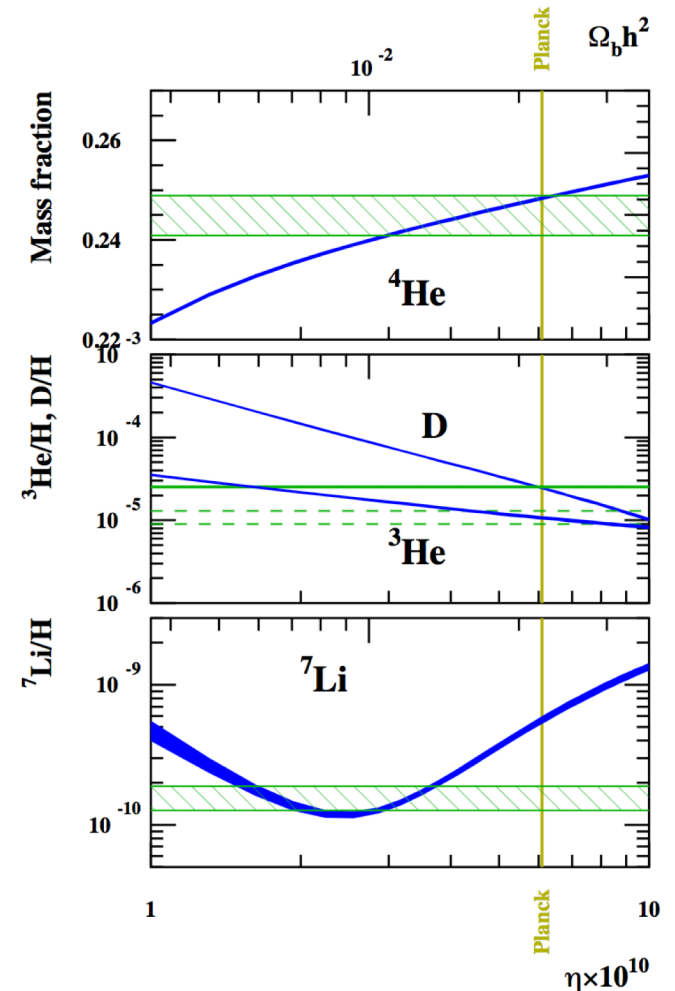
Only the ^7Li abundance prediction is 3-4 times larger than observed value!

What are the possible solutions from nuclear physics?

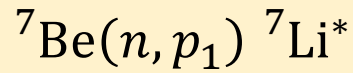
>> Destruction of ^7Be (the main source of ^7Li)

The cross section of the $^7\text{Be}(n, p_1) ^7\text{Li}^*$ (0.478 MeV; $1/2^-$) reaction is missing!

Note: Li-7 is readily disintegrated by the (p, α) reaction during BBN.

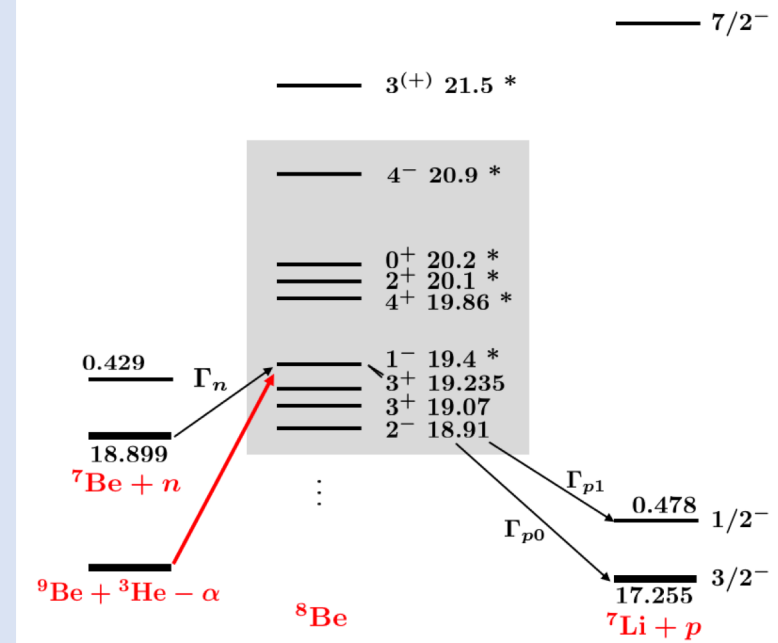
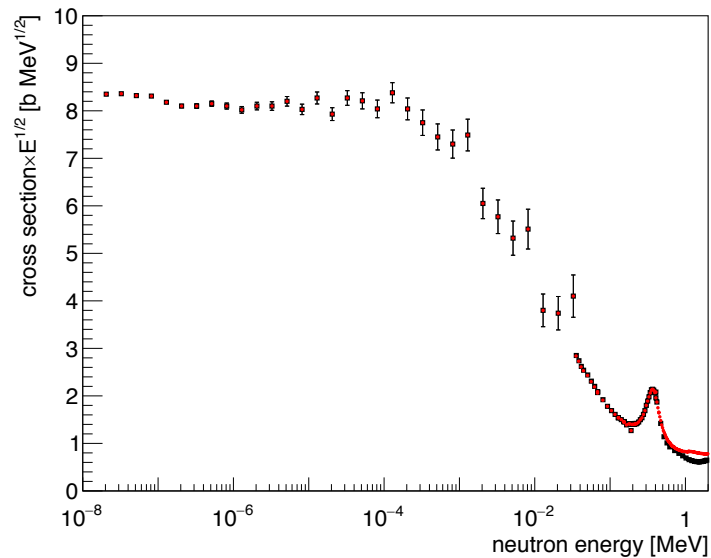


Methodology



(n, p_0) cross section

Γ_{p1}/Γ_{p0} ratio



- ${}^7\text{Li}(p, n_0) {}^7\text{Be}$ reaction
- “R-matrix Theory”

- (Next slide)

Experiment at JAEA

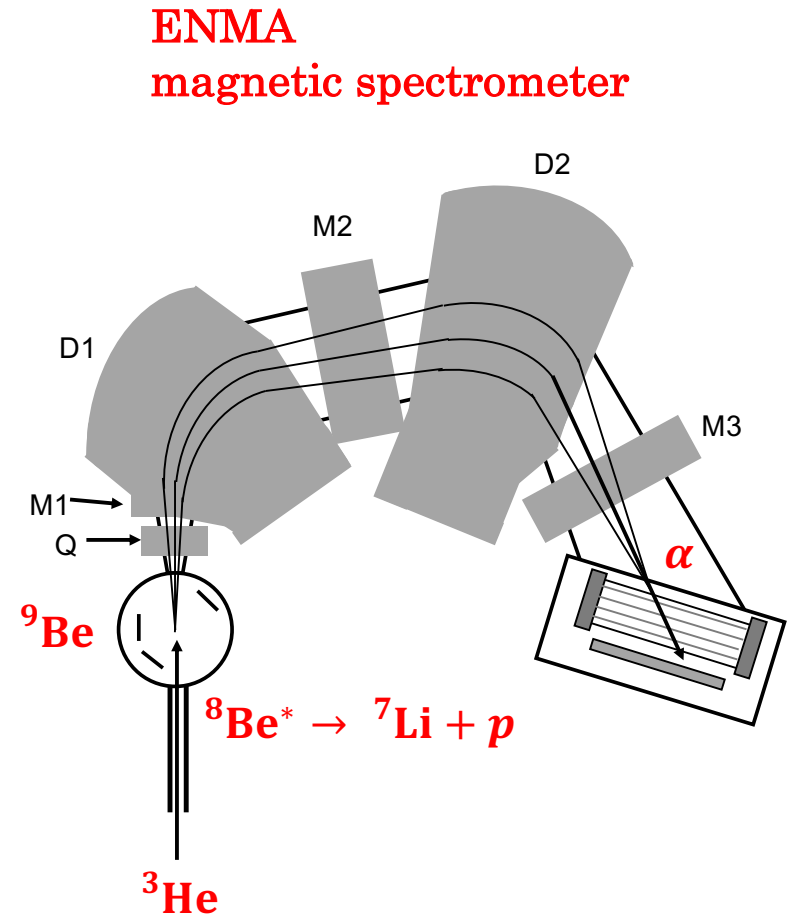
Γ_{p1}/Γ_{p0} ratio

2018 April

- The ${}^9\text{Be}({}^3\text{He}, \alpha){}^8\text{Be}^*(p){}^7\text{Li}$ reaction measurement at 30 MeV
- ENMA beam-line
- Preliminary results obtained
- More statistics needed.

plan for 2019/2020

- The ${}^9\text{Be}(p, d){}^8\text{Be}^*(p){}^7\text{Li}$ reaction measurement at 30 MeV



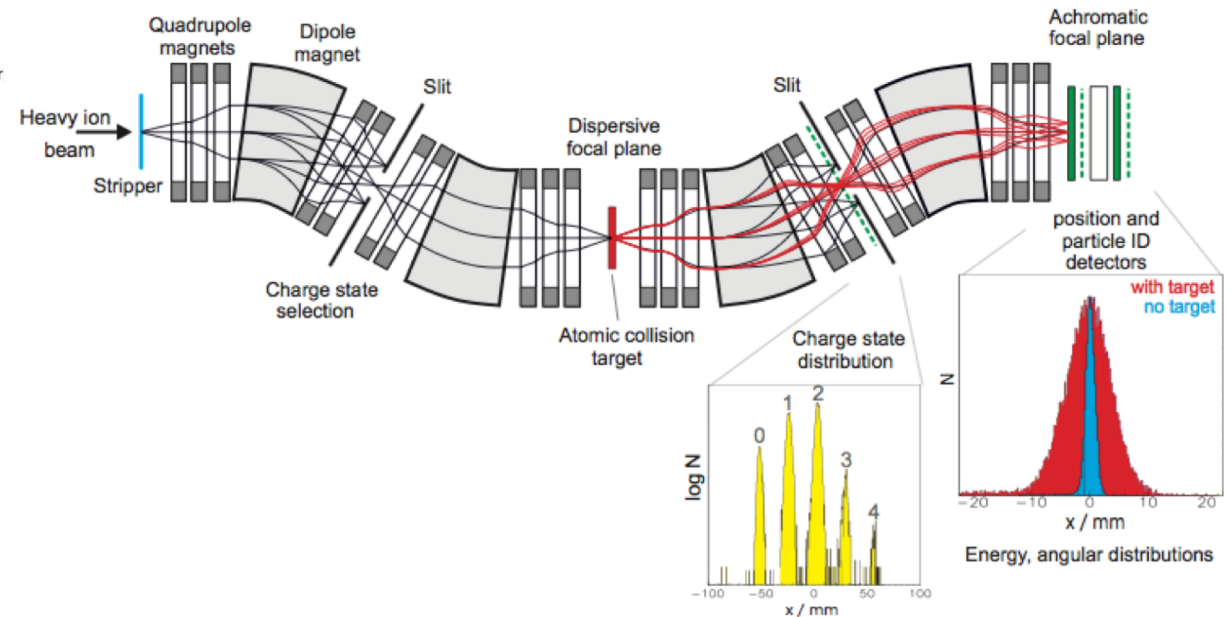
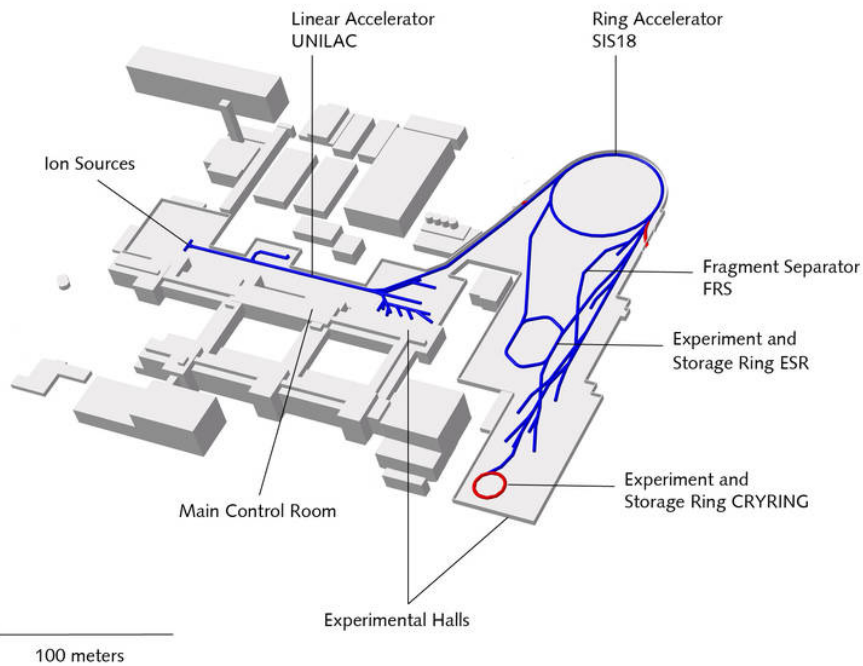
Experiment at GSI

“Accurate stopping-power measurement of heavy ions in gases and solids”

2018 Jul.-Dec. Exp. preparation

2019 Aug.-Oct. Exp. preparation

2019 Nov.- Beam time (Not yet scheduled)



https://www.gsi.de/en/researchaccelerators/accelerator_facility.htm

C. Scheidenberger, et al., Phys. Rev. Lett. 73 (1994) 50.