# Daily Report for 2025-11-26

M. Yoshinuma

**Date: November** 26, 2025
**Time:** 10:00 – 17:15
**Shot:** 197822 –197967
**Prior wall condition:** He GDC
**Divertor pump:** No
**Gass puff:** He, H2
**Pellet, IPD:** Impurity Pellet (B, LiF), TESPEL(B, Li), IPD(B, LiF)
**LID:** No
**NBI:** #1, #2, #3, #4, #5
**ECH:** 2-OUR(77GHz), 5.5-UO(77GHz), 2-OU(154GHz), 2-OLL(154GHz)
**ICH:** 4.5U, 4.5L, 3.5U

**Topics:**

1) Characterization of p-11B reaction near 163keV and 675keV resonances via α0, α1, γ branching ratios in LHD (B. Liu, M. Osakabe, K. Ida)
2) Study of the fast-ion acceleration by ICRF heating for p-11B fusionreaction (S. Kamio, M. Osakabe)
3) First measurements of aneutronic p-Li fusion reactions in a magnetically confined plasma (M. Zarnstorff, M. Osakabe)

Piggyback) Effects of boronization on plasma facing surface (S. Masuzaki)

# Characterization of p-11B reaction near 163keV and 675keV resonances via α0, α1, γ branching ratios in LHD

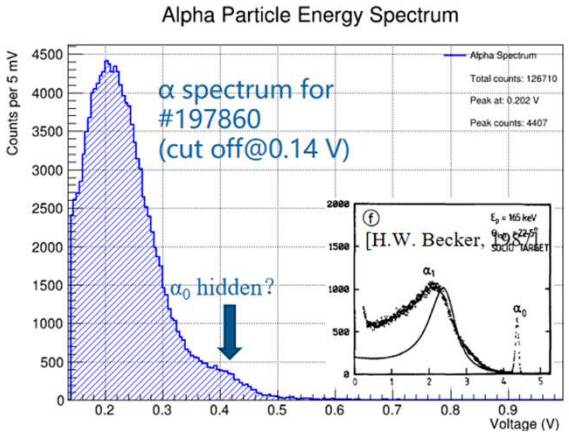
Bing Liu, Huang Xianli, Li Zhi, Qi Ji, Xiao xiao, Guo Dong, Shi Yuejiang, Liang Yunfeng, Martin Peng *et al.* ENN

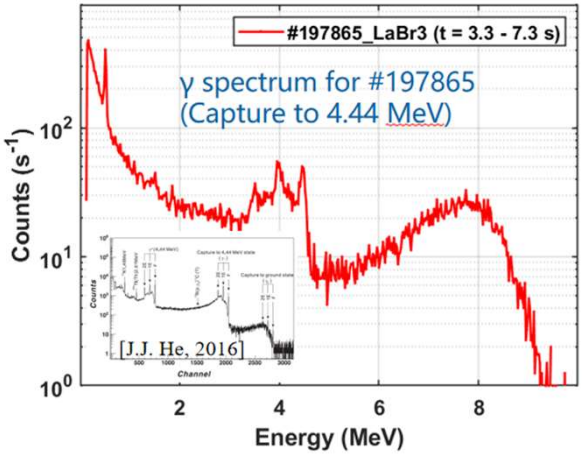
**Experiments were organized into four parts below, covering all objectives.**

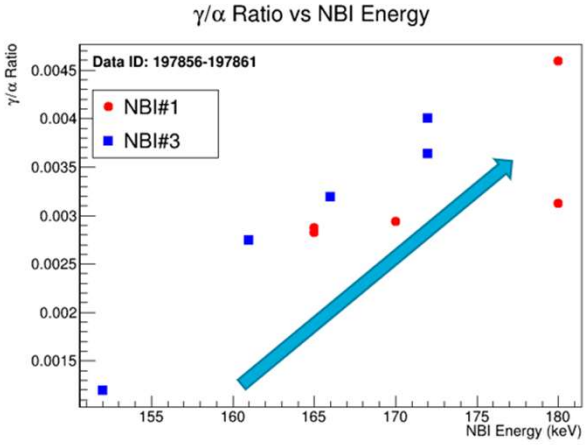
- Helium dominant discharge for ICRF+NBI with He-H-NBI scheme
- NBI beam energy scan (180-160 keV) to observe α0 generation.
- Optimizing p-$^{11}$B reaction rate vs. boron concentration and profile.
- Hydrogen dominant discharge for ICRF+NBI with H-$^{11}$B-NBI scheme

**Preliminary results:**

- p-$^{11}$B α and γ were measured. $\alpha_0$ was marginally observed in the α spectrum (no sharp peak may due to detection resolution constraints).
- Characteristic γ-ray full-energy peaks and escape peaks were clearly identified, verifying the p-$^{11}$B reaction.
- The α/γ branching ratio was analyzed near the low-energy resonance regime;
- ICRF+NBI-driven fast particle production and p-$^{11}$B towards higher energy regime are under further analysis.



# Study of fast-ion acceleration by ICRF heating with p-$^{11}$B fusion reaction

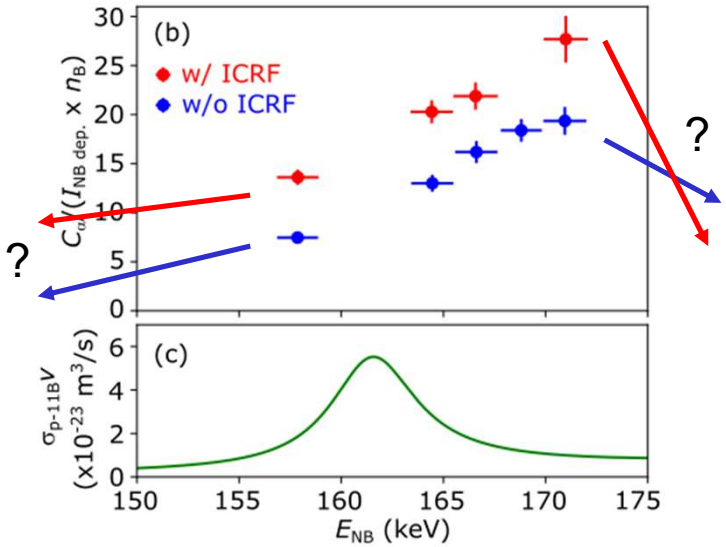
**(S. Kamio, R. M. Magee, K. Ogawa, J. Wang, H. Gota, T. Tajima, M. Osakabe)**

**Shot #:197889-197934 (46 shots)**

**Experimental conditions:** ($R_{ax}$, Polarity, $B_t$, $\gamma$, $B_q$) = (3.60 m, CCW, 2.75 T, 1.254, 100%)

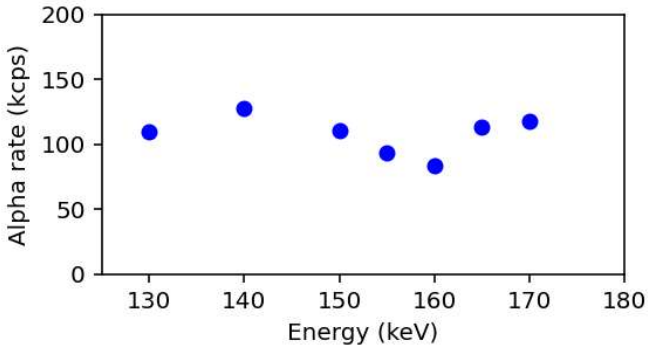
**Purpose of the Experiment**

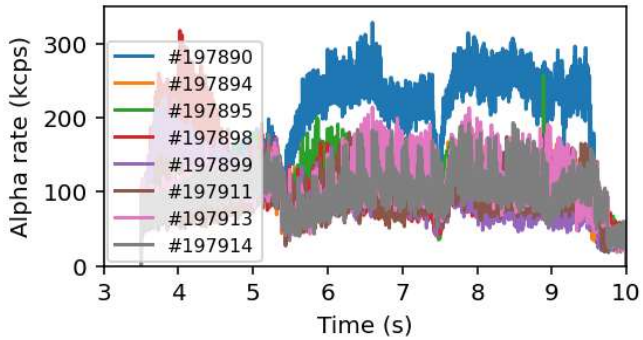
Perform an NB injection energy scan. Investigate how the p-$^{11}$B fusion reaction rate changes as the beam energy moves away from the cross-section peak.




**Executive Summary**

- Because the minority-ion fraction did not decrease, it is unclear whether the ICRF heating functioned effectively.
- Some insight into the dependence on minority-ion fraction may still be obtained, although interpretation may be challenging.
- High-energy beam conditions could not be achieved in this campaign.
- NB-termination data were successfully acquired and can be compared with GNET code simulations.
- Even without usable ICRF data, the low-energy beam-scan data and GNET simulations will serve as valuable reinforcement of last year's results.




These are preliminary results. Noise is currently included in the count rate, so the calculation will be revised.

# First Measurements of Aneutronic p-Li Fusion Reactions in Magnetically Conf. Plasma

M.Zarnstorff, K.Ogawa, M.Osakabe, S.Masuzaki, T.Qian, S.Ray, N.Tamura, R.Lunsford ... 26 November 2025

**Experimental conditions:** #197937 - #197967)

( Rax, Bax, Polarity, $\gamma$, $B_q$) = (3.55, 2.75, CCW, 1.2538, 100.0%)

*no LID correction*

## Motivation and method:

- Document p-6Li and p-7Li reactions through fusion products. Vary density and temperatures to compare with model sensitivities
- Fueling by LiF: Impurity Pellet, TESPEL, IPD
- Both Lithium-6 and Lithium-7
- Heating: NNBI alone and with ECH, ICRF
- Detect fusion products: PIPS, Gamma, FILD, RGA, …

## Results:

- Clear changes in PIPS and Gamma detectors
  FILD? RGA? Others?
- Need to analyze carefully: alpha particles vs x-rays and gammas (including effect of fluorine)
- Only got 2 shots with $^{7}$Li pellets for comparison.
- Not able to use metallic Li granules to avoid fluorine