# (IA) Session Report

Apr. 18, 2024 (K. Ogawa)

Date: Apr. 17, 2024
Time: 10:30 – 16:45
Shot#: 189669 – 189790 (122 shots)

Prior wall conditioning: NONE
Divertor pump: off
Gas puff: $H_2$, He
Pellet: LiF
NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(4.8, 4.2, 4.5, 3.9, 4.3, 5.6) MW

ECH(77GHz)=ant(5.5U-Out, 2O-UR)=P(0.698, 0.380) MW
ECH(154GHz)=ant(2-OLL, 2-OUL, 2-OLR)=P(0.705, 0.889, 0.982) MW
ECH(56GHz)=ant(1.5U)=P(-)kW
ICH(3.5U, 3.5L, 4.5U, 4.5L)=P(-, -, -, - )MW

Topics

1. Observation of gamma-ray emission from Li-H reaction for fast ion diagnostics (H. Matsuura (Kyushu Univ.), K. Ogawa)
2. Understanding the dependence of fast ion distribution on various magnetic field configurations using the newly installed Imaging Neutral Particle Analyzer (INPA) (S. Sangaroon (Mahasarakham Univ.), K. Ogawa)

# Observation of gamma-rays emitted by Li-hydrogen isotope reactions for fast ion diagnostics

H. Matsuura, K. Ogawa et al.

**Experimental conditions: :** ($R_{ax}$, Polarity, $B_t$, $\gamma$, $B_q$) = (3.6 m, CCW, 2.75 T, 1.2538, 100)

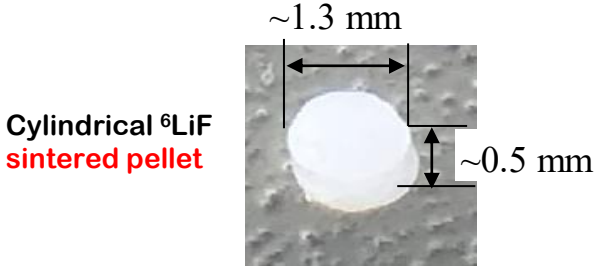
（#189671 - #189742）

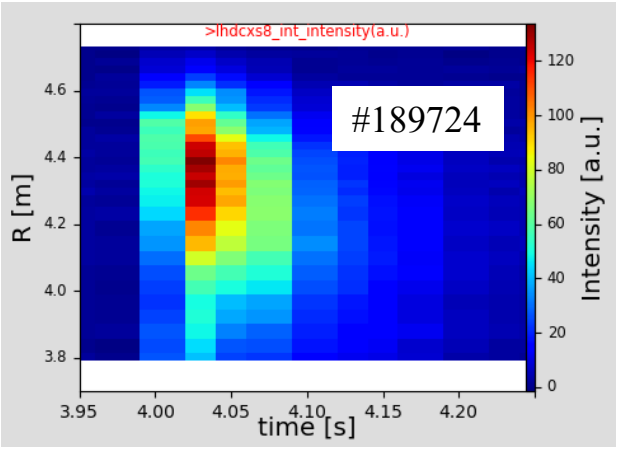
## Background and motivation:

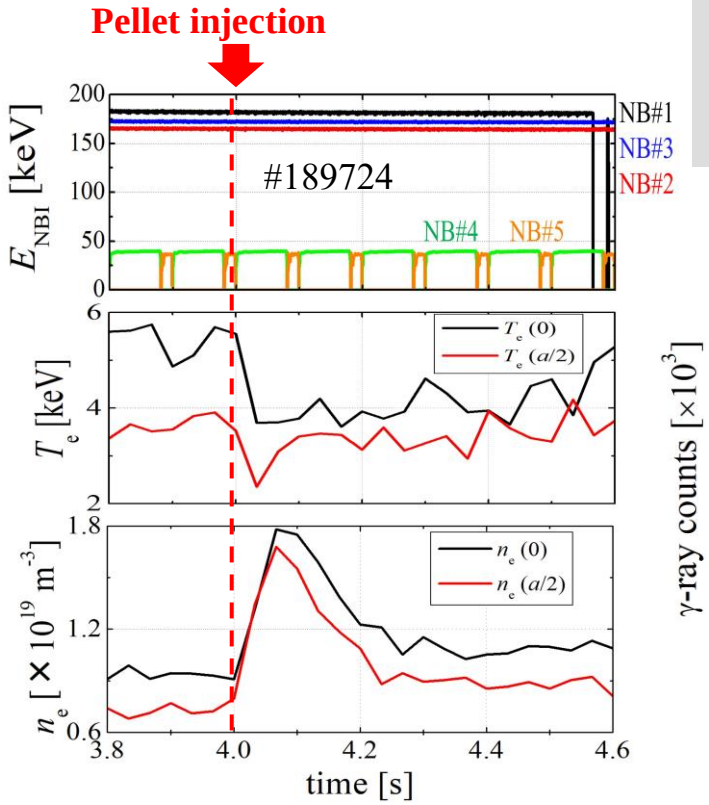
Observation of gamma rays from the $^6$Li(p,γ)$^7$Be and $^6$Li(d,pγ)$^7$Li reactions was carried out to understand fast-ion diagnostics using gamma-rays, e.g. α-d, α-Be reactions in the future fusion plasma.

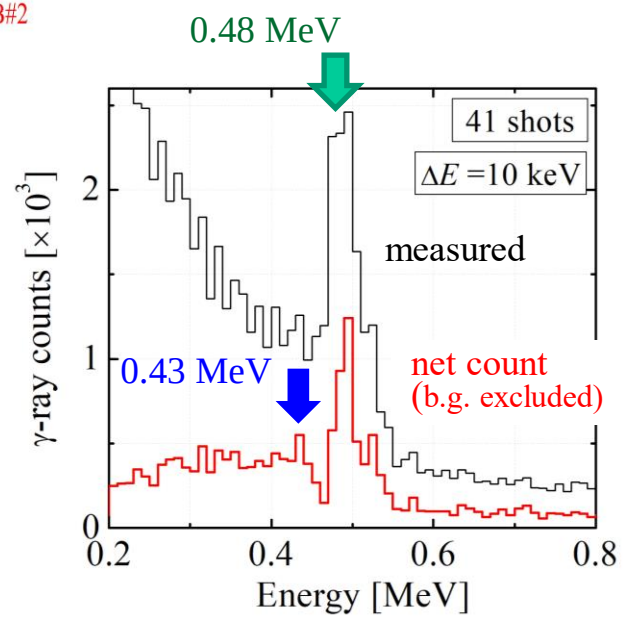
## Results:

- At 4.0 (or 3.8) s after the beginning of plasma discharge, a $^6$LiF pellet was injected into a hydrogen plasma with H-NBs (#1 + 2 + 3).
- Net γ-ray counts during the 0.2 seconds after pellet injection for 41 shots were piled up.
- The 0.43 (0.48) MeV γ-rays which may be emitted from the $^6$Li(p, γ)$^7$Be ($^6$Li(d, pγ)$^7$Li) reactions were measured with sufficient accuracy (count rate).



# Understanding the dependence of fast ion distribution on various magnetic field configurations using the newly installed Imaging Neutral Particle Analyzer (INPA)

S. Sangaroon (MSU), K. Ogawa (NIFS), M. Isobe (NIFS), W. Paenthong (SOKENDAI), X.D. Du (GA),
A. Wisitsorasak (KMUTT), N. Poolyarat (TINT), B. Chatthong (PSU), T. Onjun (TINT)

**Experimental conditions: (Rax, Polarity, Bt, γ, Bq) =**
(3.60 m, CCW, 2.75 T, 1.2538, 100.0%) Shots: #189746 - #189766
(3.75 m, CCW, 2.64 T, 1.2538, 100.0%) Shots: #189767 - #189789
*On 29/04/2024, we have: 3.6 m, CW, 2.750 T for density scan.
*On 16/04/2024, we have: 3.9 m, CW, 2.538 T for density scan.

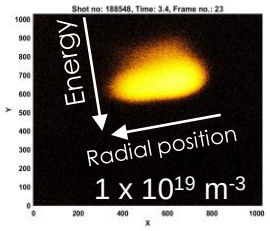
## Motivation & Objectives

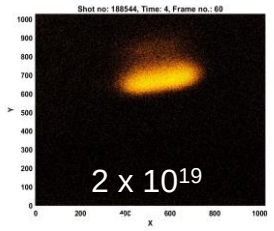
- This proposal aims to achieve a deeper understanding of energetic particle behavior during P-NB injection in the LHD, utilizing the newly installed INPA across a range of magnetic field configurations. This includes variations in magnetic field strength ($B_t$), magnetic axis position ($R_{ax}$), and plasma density ($n_e$).

## Results

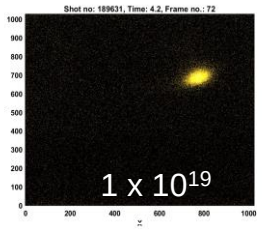
- We successfully observed helically trapped beam ion behavior during P-NB injection while conducting density scans ranging from ~1 to 4 x $10^{19}$ $m^{-3}$ under various magnetic field configurations.

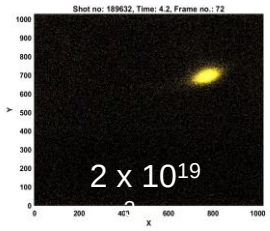
3.6 m, CW, 2.75 T



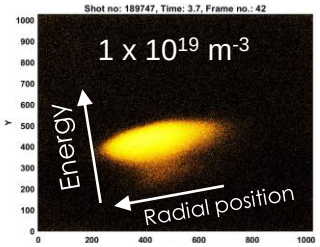



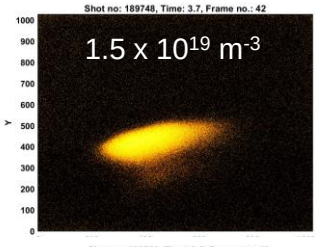

3.9 m, CW, 2.538 T

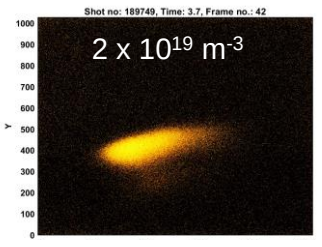


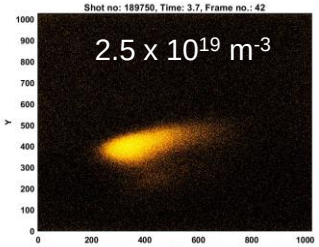



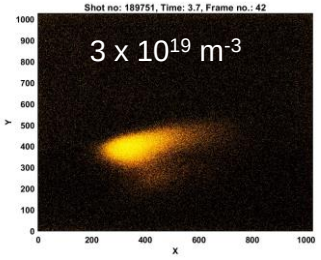

3.6 m, CCW, 2.75 T

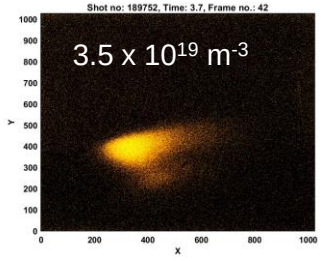


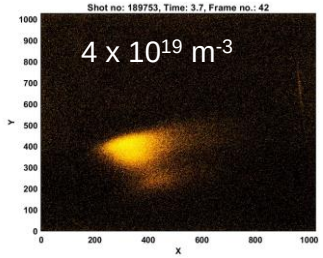




3.75 m, CCW, 2.64 T