

Preparation status of the measurement of X-ray from Xi atom

GPPU status report May 2020

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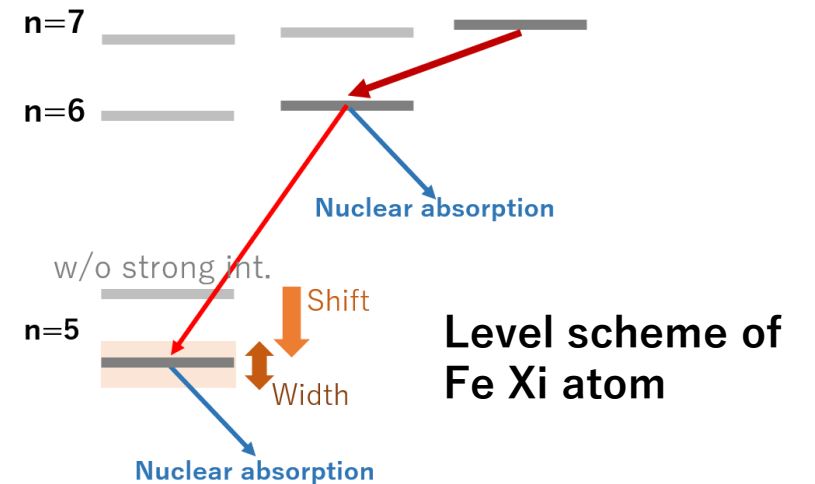
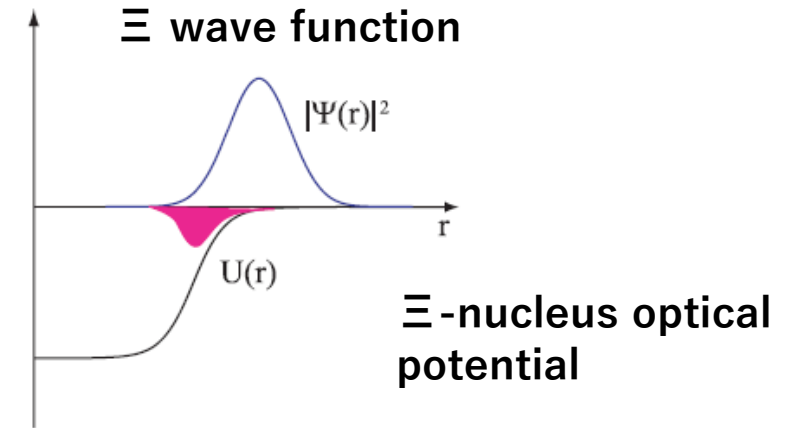
Introduction

[The study of Ξ N interaction]

- KEK E373: Ξ hypernucleus search with emulsion
→ Ξ N interaction is attractive (KISO event)
- J-PARC E05: Spectroscopic study of Ξ hypernucleus
→ The central part of the Ξ -nucleus potential
- **J-PARC E03: Measurement of X rays from Ξ atom**
→ The **peripheral part** of the Ξ -nucleus potential
[World first measurement of X-ray from Ξ atom]

The X ray gives direct information

- Energy shift \Rightarrow the real part of the potential
- Energy width \Rightarrow the imaginary part of the potential



Goal of my research

[J-PARC E03 experiment]

Measurement of the energy shift and width of X-ray from Fe- Ξ^- atom

1st phase

Purpose

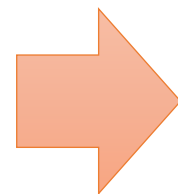
- Fe- Ξ^- X ray ($7 \rightarrow 6$)

If width < 1 keV

- ($6 \rightarrow 5$) shift
- Absorption strength from ($6 \rightarrow 5$) / ($7 \rightarrow 6$)

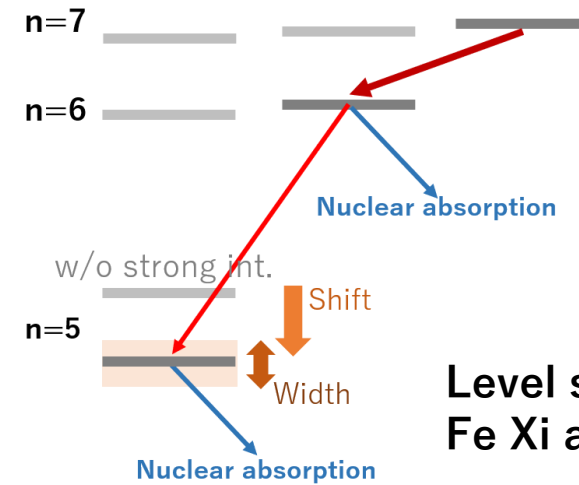
Request

- 19.5+ α days (50 kW)
- 430 k/spill Kaons



Outputs

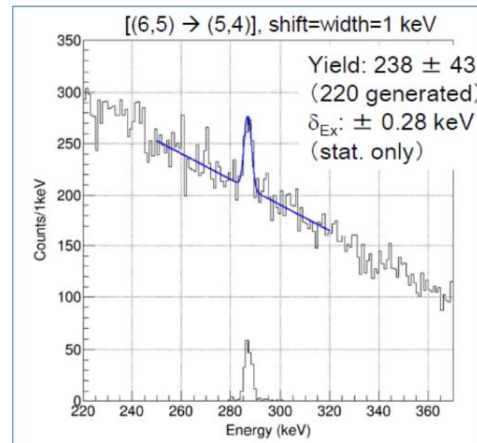
- **First measurement of Fe- Ξ^- X ray**
- **Chance to obtain finite ($6 \rightarrow 5$) shift & width information**
- **Information of absorption strength from ($6 \rightarrow 5$) / ($7 \rightarrow 6$)**



X-ray ($6 \rightarrow 5$)

- Energy: 286 keV
- Shift: ~ 4 keV
- Width: ~ 4 keV

Level scheme of Fe Xi atom



2nd phase

Purpose

- Fe- Ξ^- X ray ($6 \rightarrow 5$)

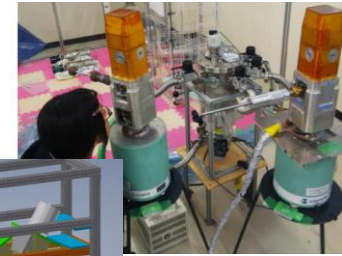
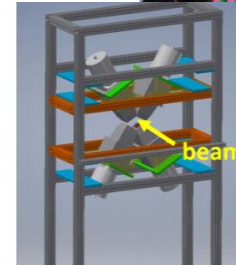
Request

- 33+ α days (>100 kW)
- 1400 k/spill Kaons

Present status

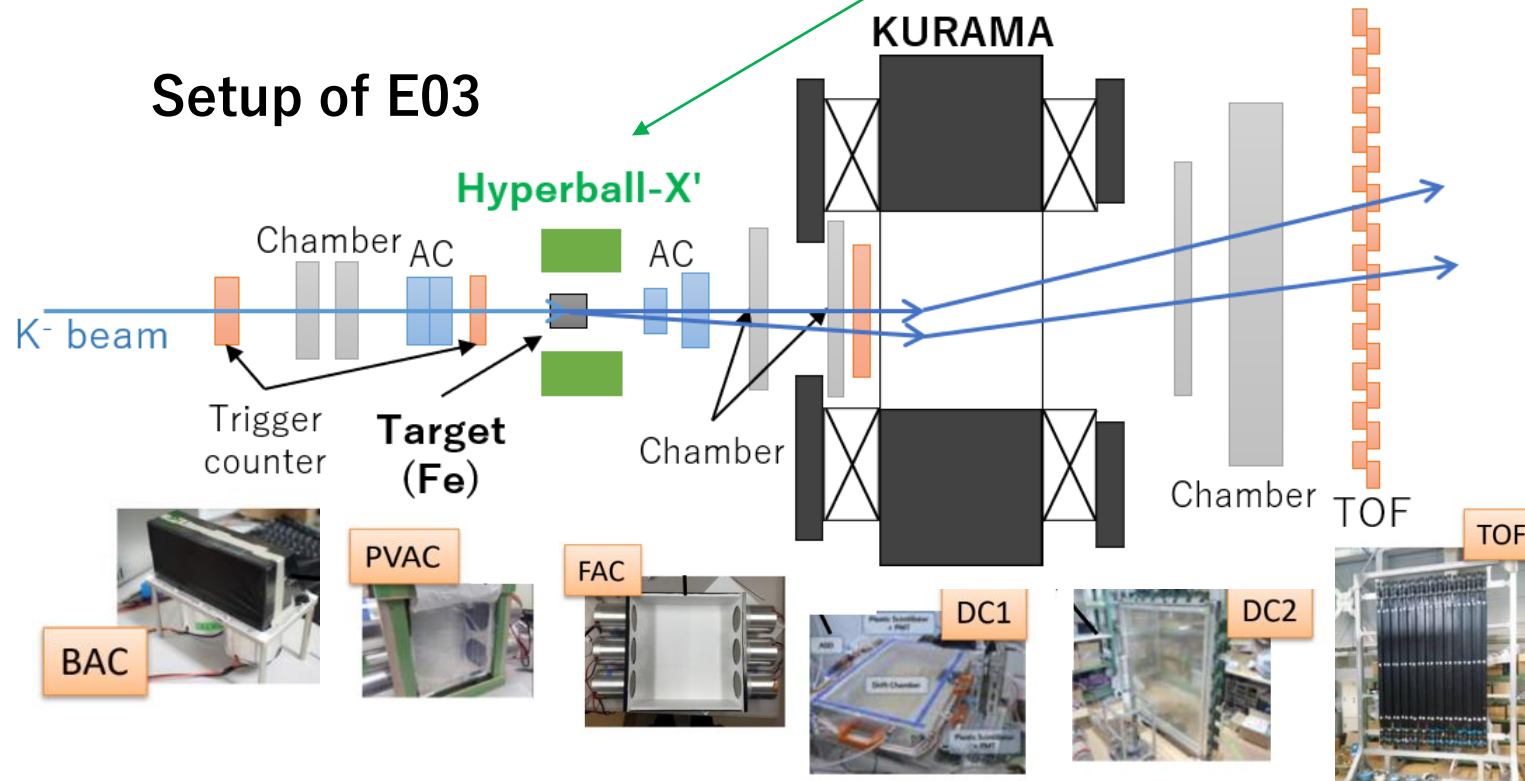
Detectors: ready

- Spectrometer
- Ge detector



HBX (Ge detector array)

- ✓ Frame assembling
- ✓ Maintenance of Ge detectors



Beam study: ongoing

- Beamtime: June

Due to changing the primary target, I need to check the Kaon beam condition.

Schedule

Fiscal year 2020

Apr.	May	June	July	Aug.	Sept.
	Join the other experiment + beam study for E03		Detector installation for E03 in J-PARC		

Fiscal year 2021

Oct.	Nov.	Dec.	Jan.	Feb.	March
Detector installation for E03 in J-PARC			E03 beamtime	Join WASA exp. in GSI	

- Beam study for E03: Next June
- E03 Beamtime: Jan, 2021

- Travel plan abroad: March, 2021
GSI, WASA experiment