Panel Discussion 2:

Baggage Inspection System

Developed by JAEA

for Detection of Concealed Special Nuclear Materials

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JAEA   : Japan Atomic Energy Agency

Nuclear Science and Engineering Center (NSEC)

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Motivation and Outline

Project: **2007-2009 JFY**

Japanese government (Cabinet Office and MEXT) had promoted technology developments for shoreline operation.

Motivation:

To control Special Nuclear Materials (SNM) by shoreline operation

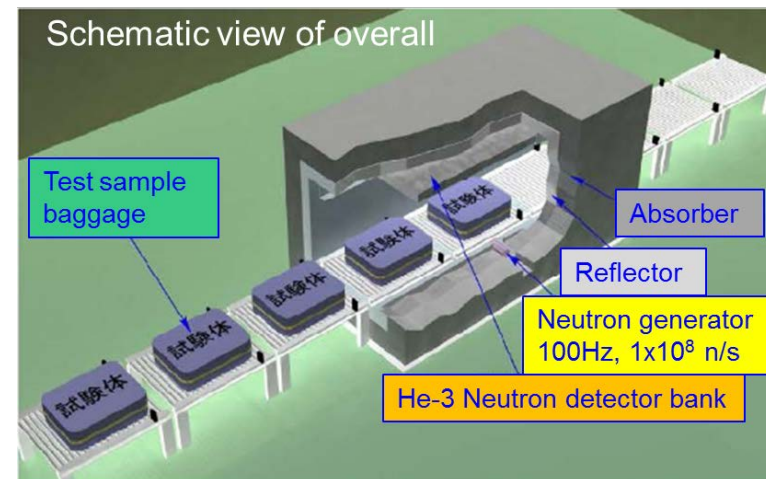**Organization on joint R&D:**   JAEA – University of Tokyo (Prof. Uesaka) – IHI

JAEA:

  Detection of SNM by neutron interrogation method

University of Tokyo:

  Detection of heavy metal by double-energy X-ray imaging method

IHI:

  Detection of γ-ray by passive γ-ray method

Schematic view of overall

Test sample baggage

試験体

Absorber

Reflector

Neutron generator 100Hz, 1×10^8 n/s
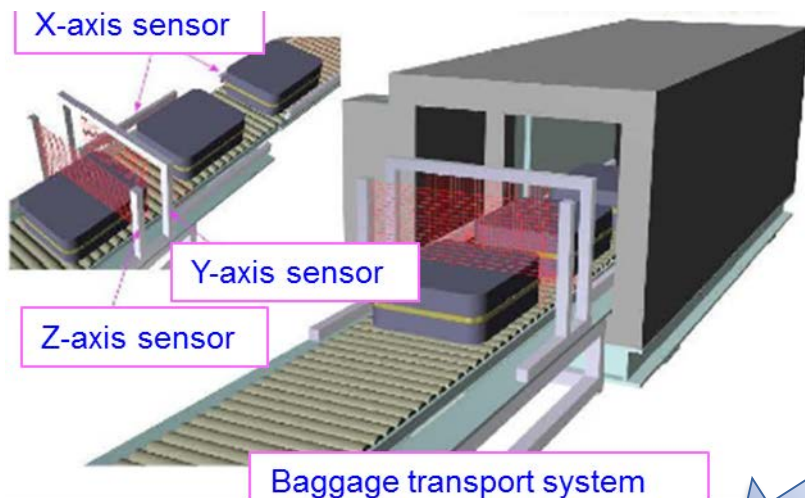
He-3 Neutron detector bank
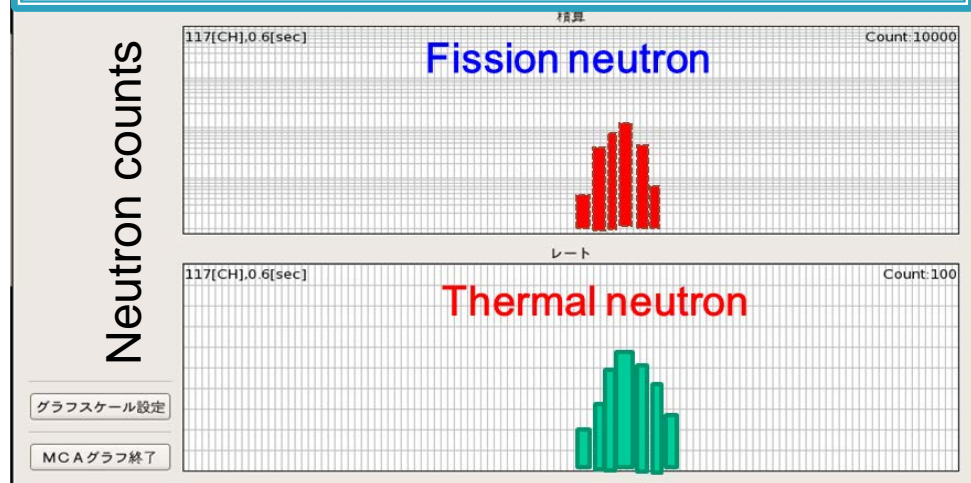
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Baggage Inspection System

<u>Principle of detection:</u>

(1) Interrogate a small amount of neutrons into a baggage

(2) Detect the fission neutrons from concealed SNM in the baggage
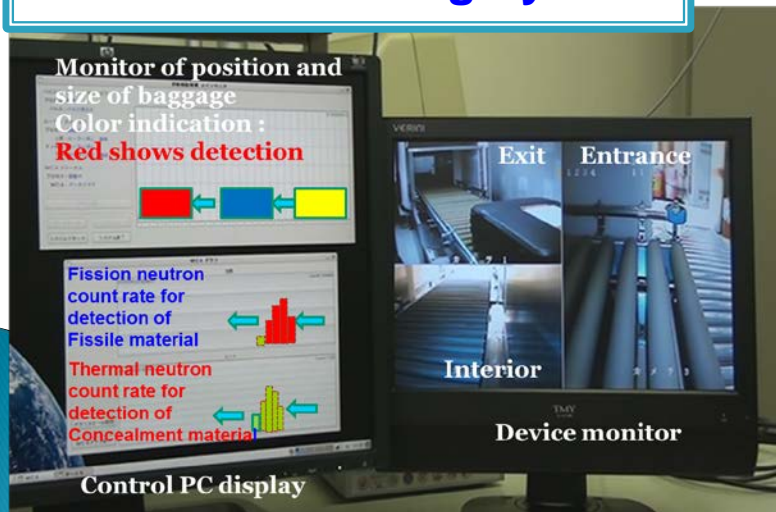
(3) Also detect the existing of concealment material

Detection of Concealed SNM in Baggage

Measurement of Baggage Size

X-axis sensor

Y-axis sensor

Z-axis sensor

Baggage transport system

Detection of Fission & Thermal Neutron

Neutron counts

117[CH],0.6[sec]   Count:10000

Fission neutron

117[CH],0.6[sec]   Count:100

Thermal neutron

グラフスケール設定

MCAグラフ終了

Remote Monitoring System

Monitor of position and size of baggage
Color indication :
Red shows detection

Fission neutron count rate for detection of Fissile material

Thermal neutron count rate for detection of Concealment material

Exit   Entrance

Interior

Device monitor

Control PC display

Demonstration Result:

Small amount of SNM and concealment material could be detected under the normal baggage transport speed, that is, within few seconds.

Summary of Baggage Inspection System

- JAEA had developed the baggage inspection <u>prototype</u> system for shoreline operation and demonstrated in 2009.

- If the government will take strong measures against nuclear terrorism, JAEA is ready to offer the technology.
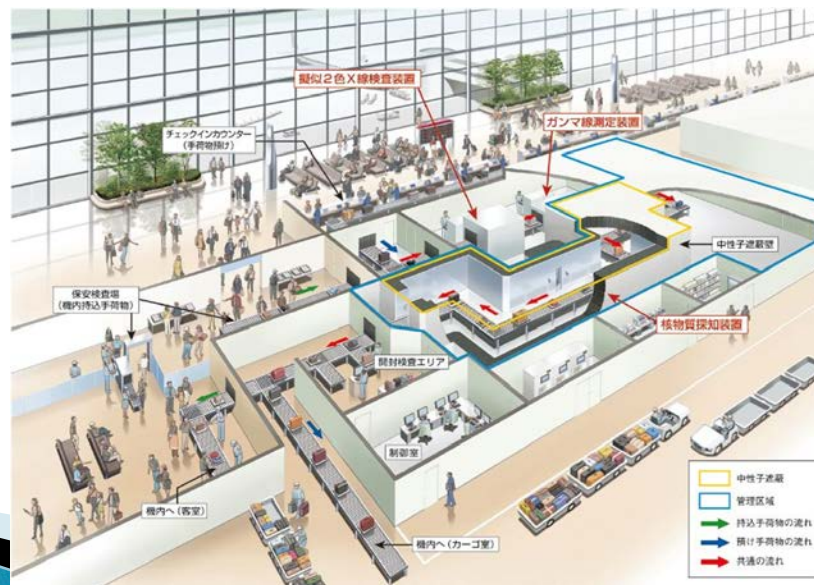
Present R&D supported by MEXT (2015-2017 JFY)*:*

"Development of Active Neutron NDA Technique"
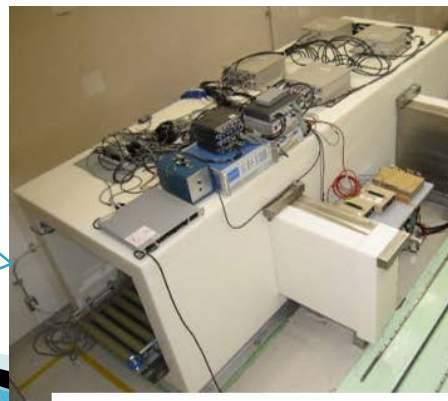
DDA (Differential Die-Away analysis):

Measurement of total amount of fissile materials (SNM)

PGA (Prompt Gamma-ray Analysis):
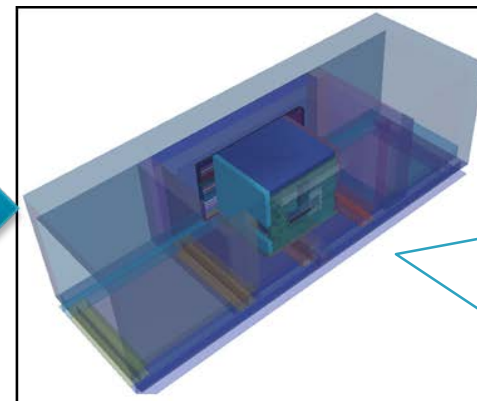
Detection of an explosive material

Now: **Remodeling** of the demonstrator "*Active-N*"

Baggage **inspection** system for nuclear security

Remodel

+ Fuel **NDA** system for nuclear non-proliferation

Active−N (Mark I)

Active−N (Mark II)