NEWAGE

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Contents

NEWAGE
Input for discussion

科研費 KAKENHI

Direction-Sensitive WIMP-search NEWAGE

NEWAGE

NEWAGE

- μ-PIC based TPC with electronics
- 3-D tracks

- Proposal

  PLB 578 (2004) 241-246

- First direction-sensitive DM limits

  PLB654 (2007) 58

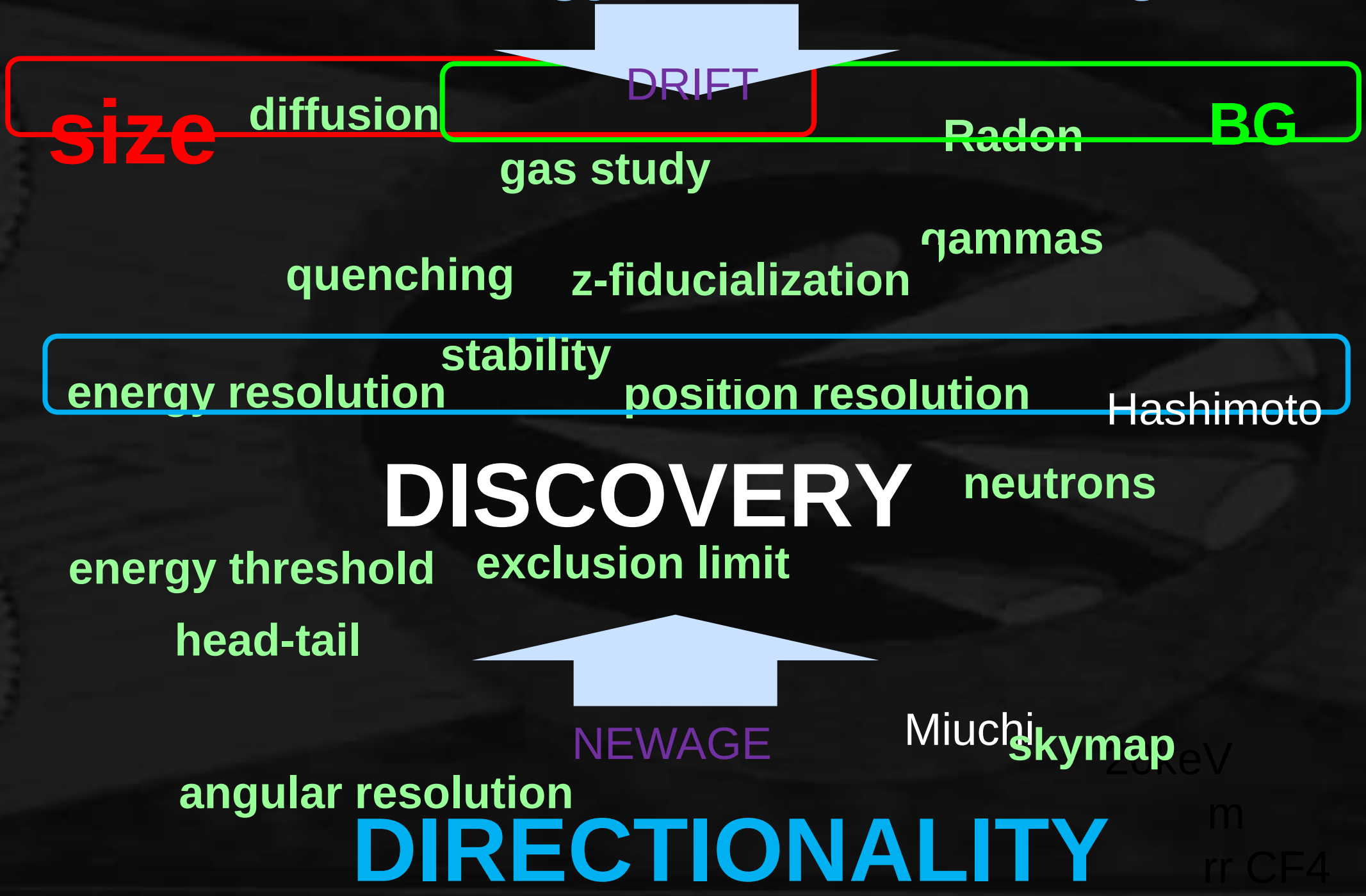

CYGNUS 07

- Underground results

  PLB686 (2010) 11, PTEP (2015) 043F01s

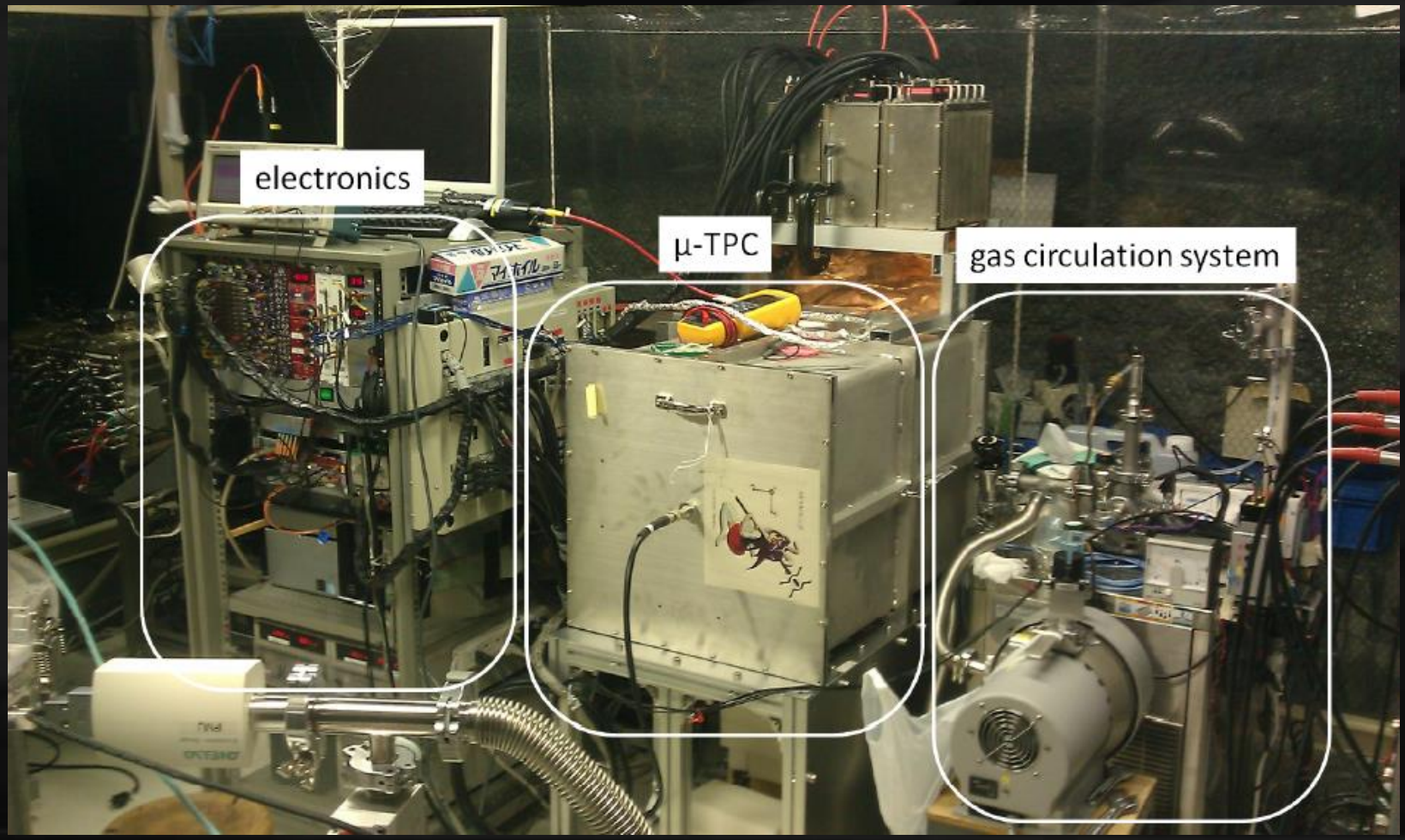
- Phase for “low BG detector”

NEWAGE strategy since its new ages



NEWAGE detector

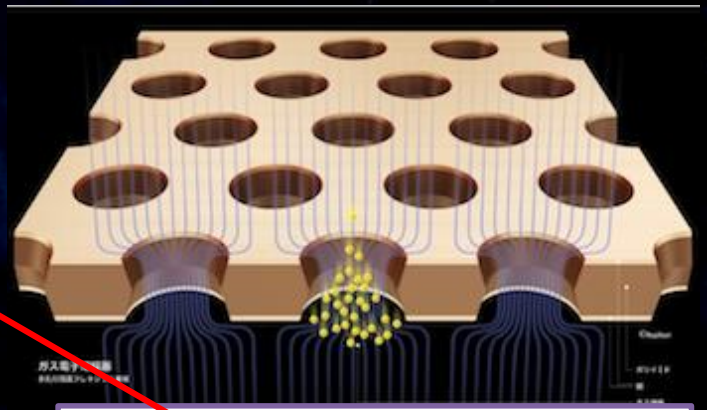
- NEWAGE-0.3b’
- Detection Volume: 31×31×41cm^3
- Gas: CF4 at 0.1atm (50keVee threshold)
- Gas circulation system with cooled charcoal

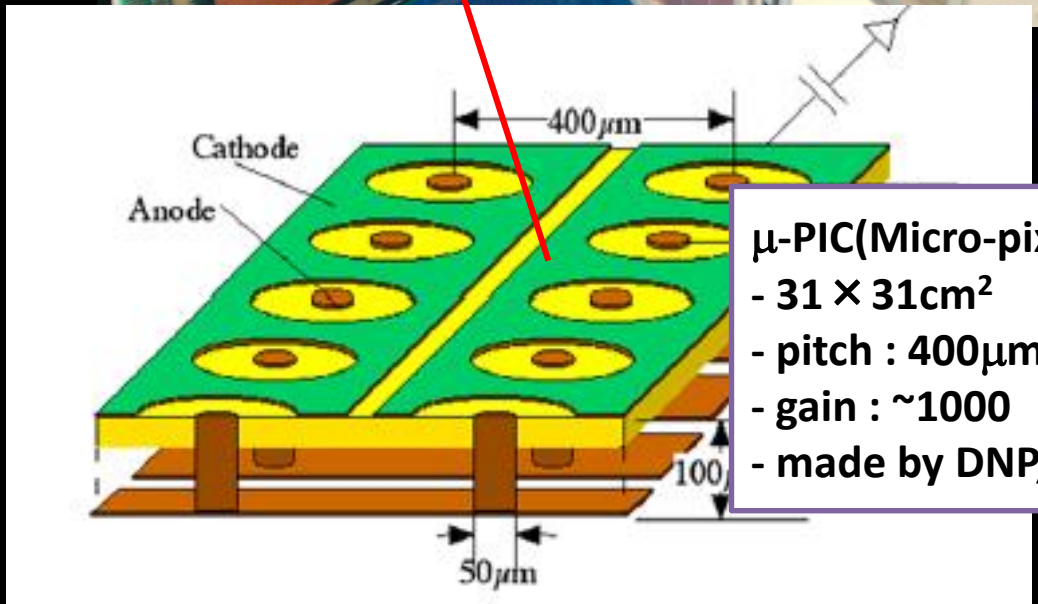


NEWAGE-0.3b' inside view

- Detection Volume: 30×30×41cm^3

Field cage
Drift length: 41cm
PEEK + copper wires



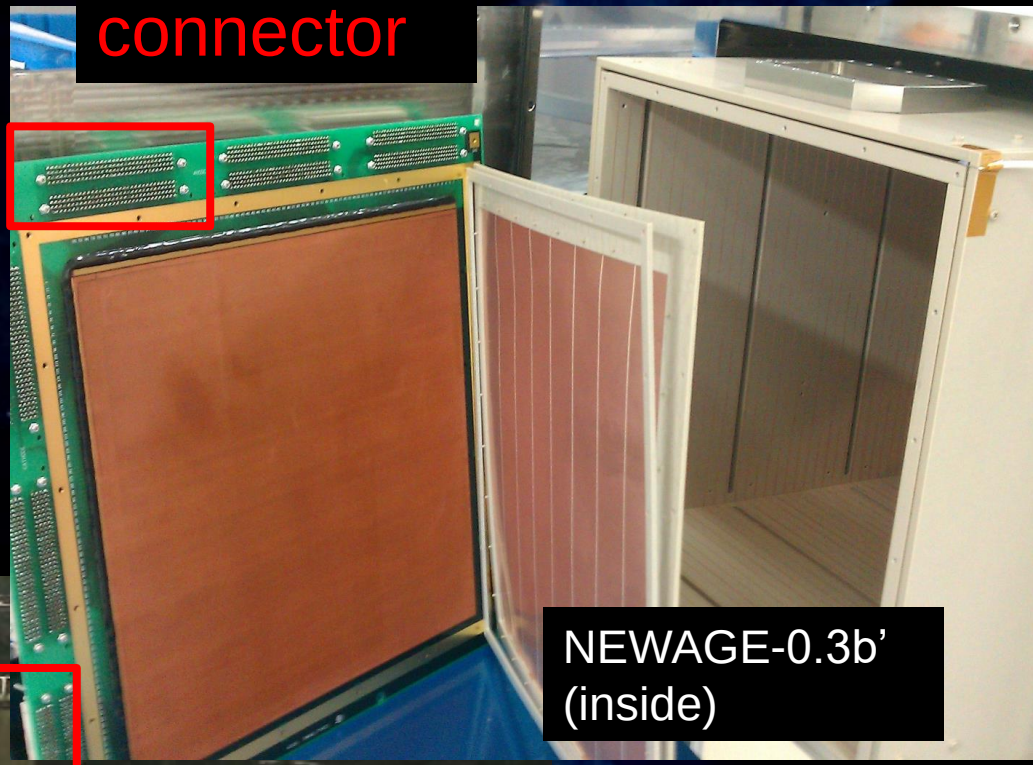


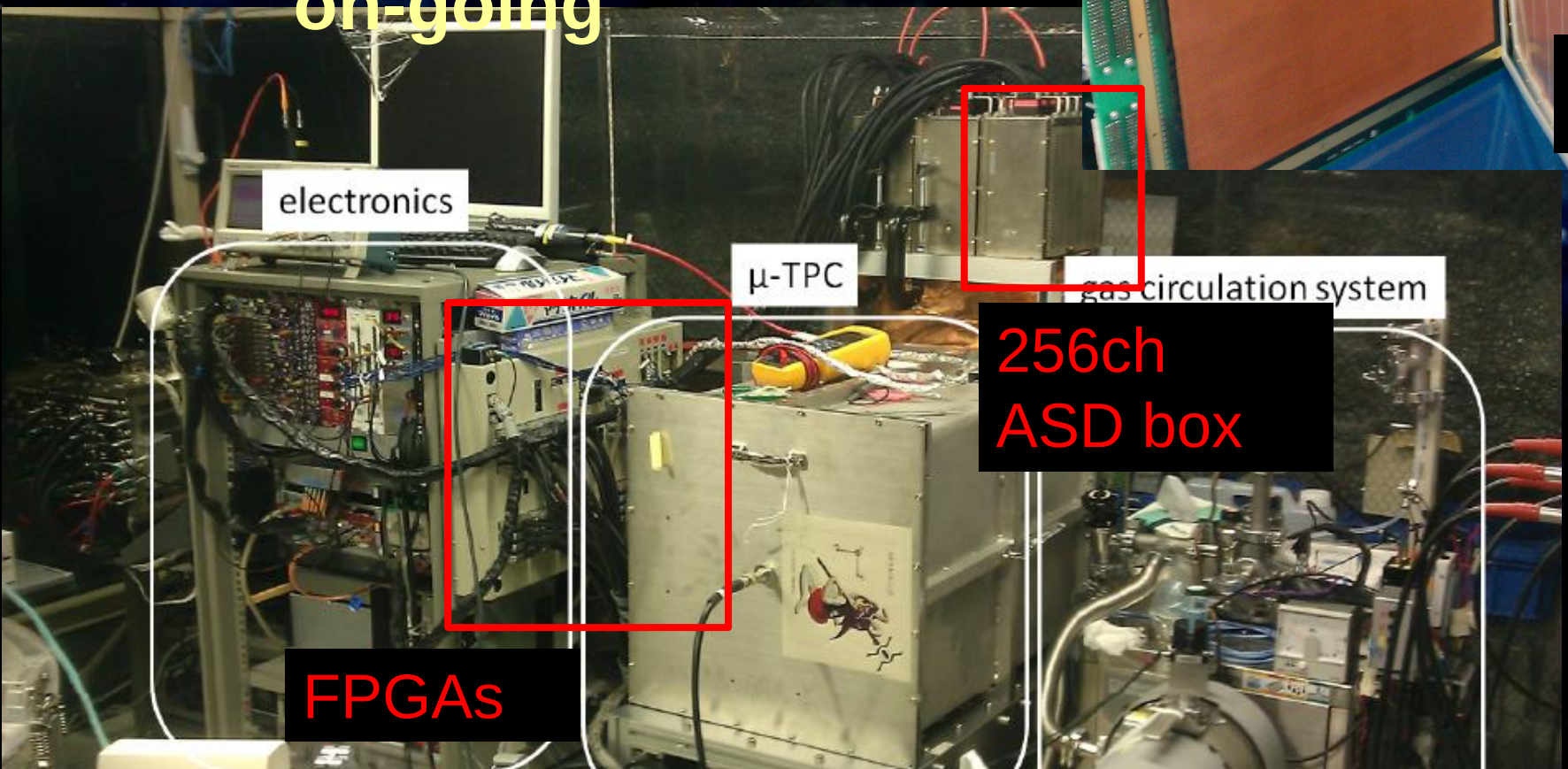
μ-PIC(Micro-pixel chamber)
- 31×31cm^2
- pitch : 400μm
- gain : ~1000
- made by DNP, Japan

GEM
- 31×32 cm^2
- 8-segmented
- hole pitch : 140μm
- hole diameter: 70μm
- insulator : LCP 100μm
- gain : ~5
- made by Scienergy, Japan

NEWAGE-0.3b' readouts

- μ-PIC is X-Y readout
- General purpose FPGA-based electronics since early 2000's.
- Updates are always on-going



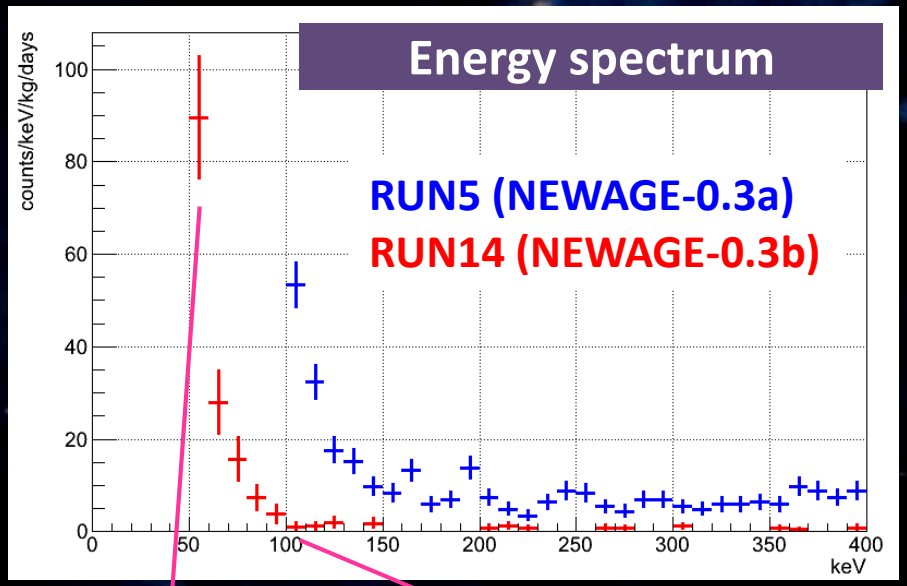


NEWAGE
Kamioka RUN14 results

NEWAGE underground run

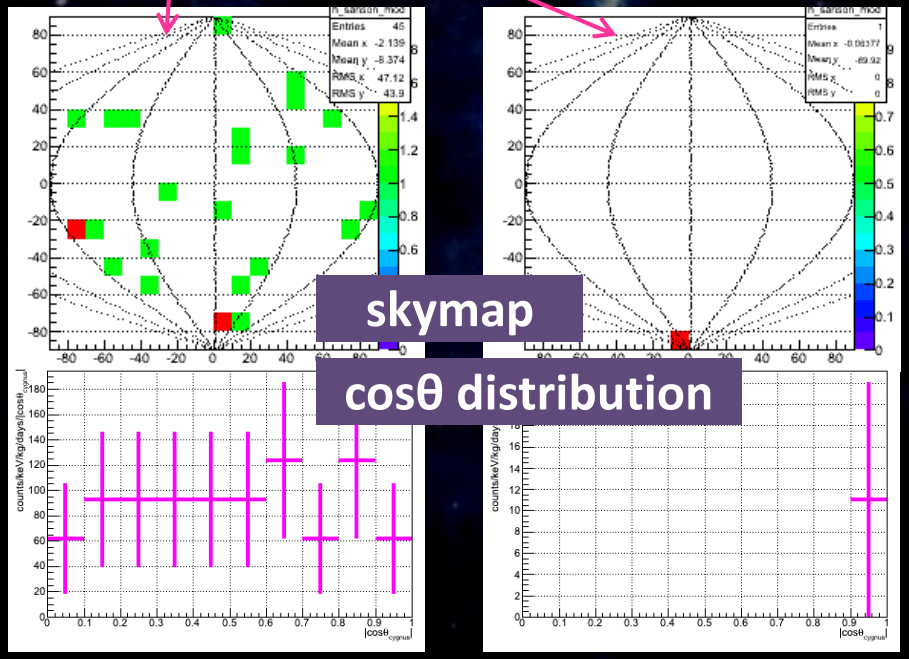
RUN14

- period : 2013/7/20-8/11, 10/19-11/12
- live time : 31.6 days
- fiducial volume : 28x24x41cm^3
- mass : 10.36g
- exposure : 0.327 kg･days

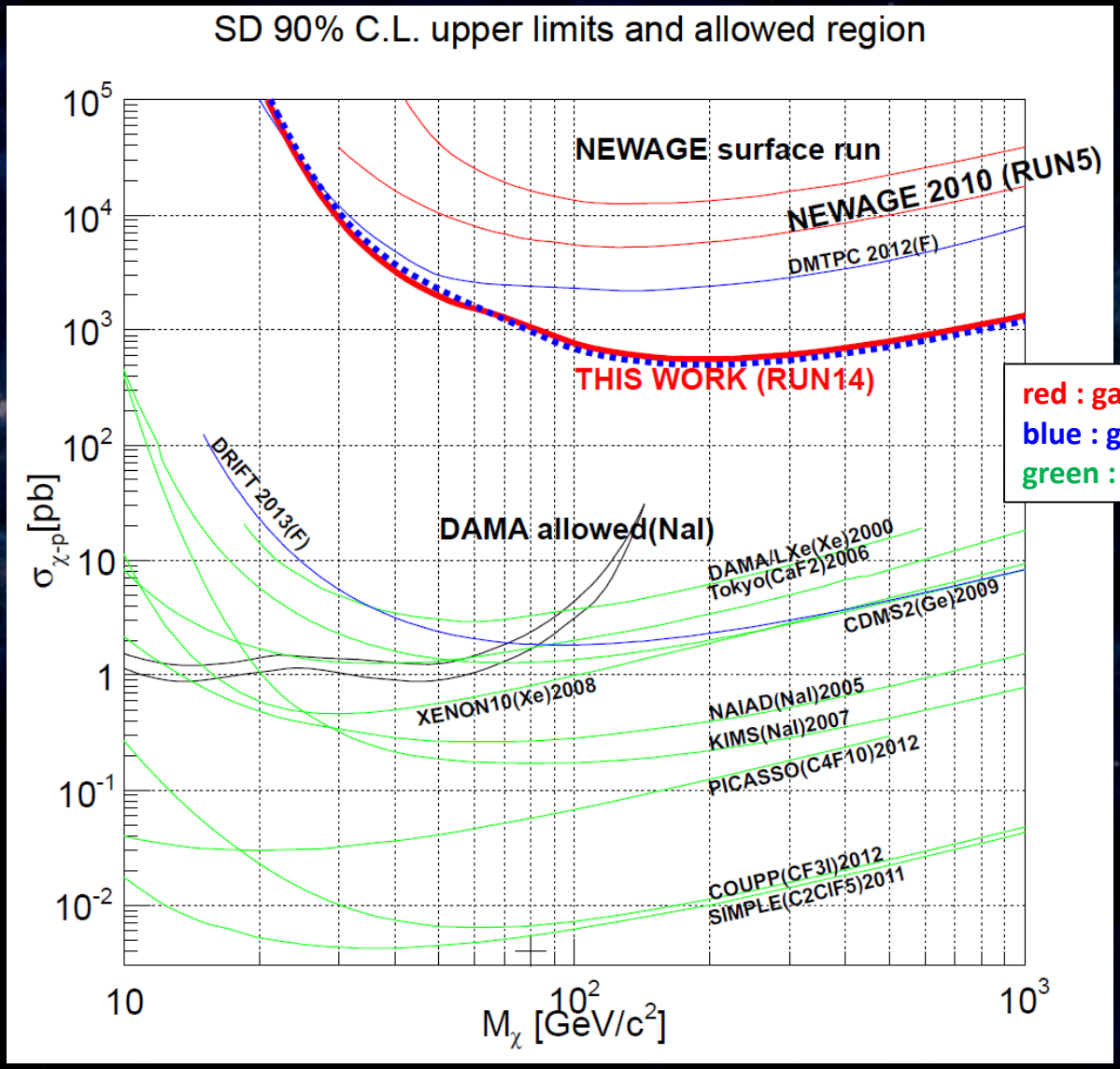


- *Energy spectrum*
  - Threshold : 100 => **50keV**
  - BG rate : **1/10**@100keV

- *Skymap, cosθ distribution*
  - Set limit by significant difference in 2-binned measured cosθ and DM-wind simulated cosθ



Direction-sensitive limit

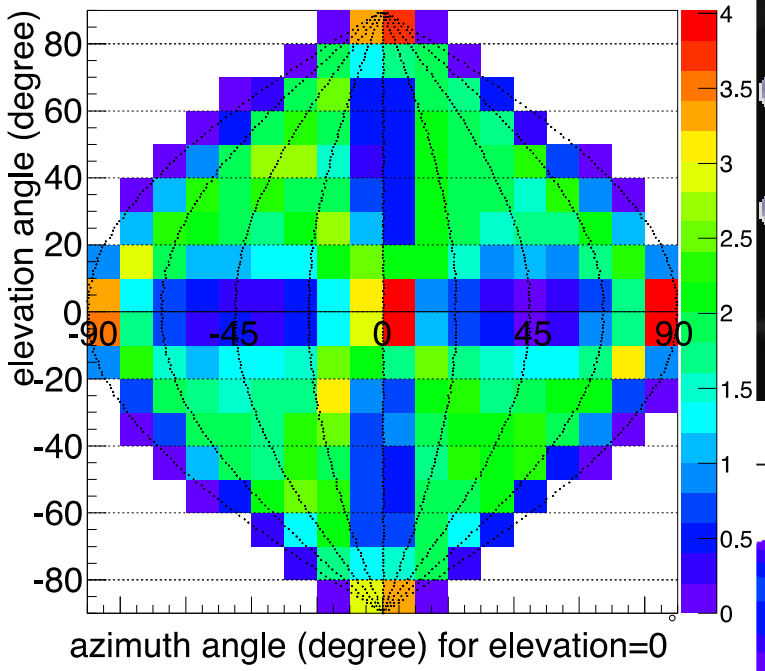


- Obtained limit : 557pb @200GeV
  (Best direction-sensitive limit)
- Improved one order of magnitude from previous RUN5

Detection efficiency in Galactic-coordinate

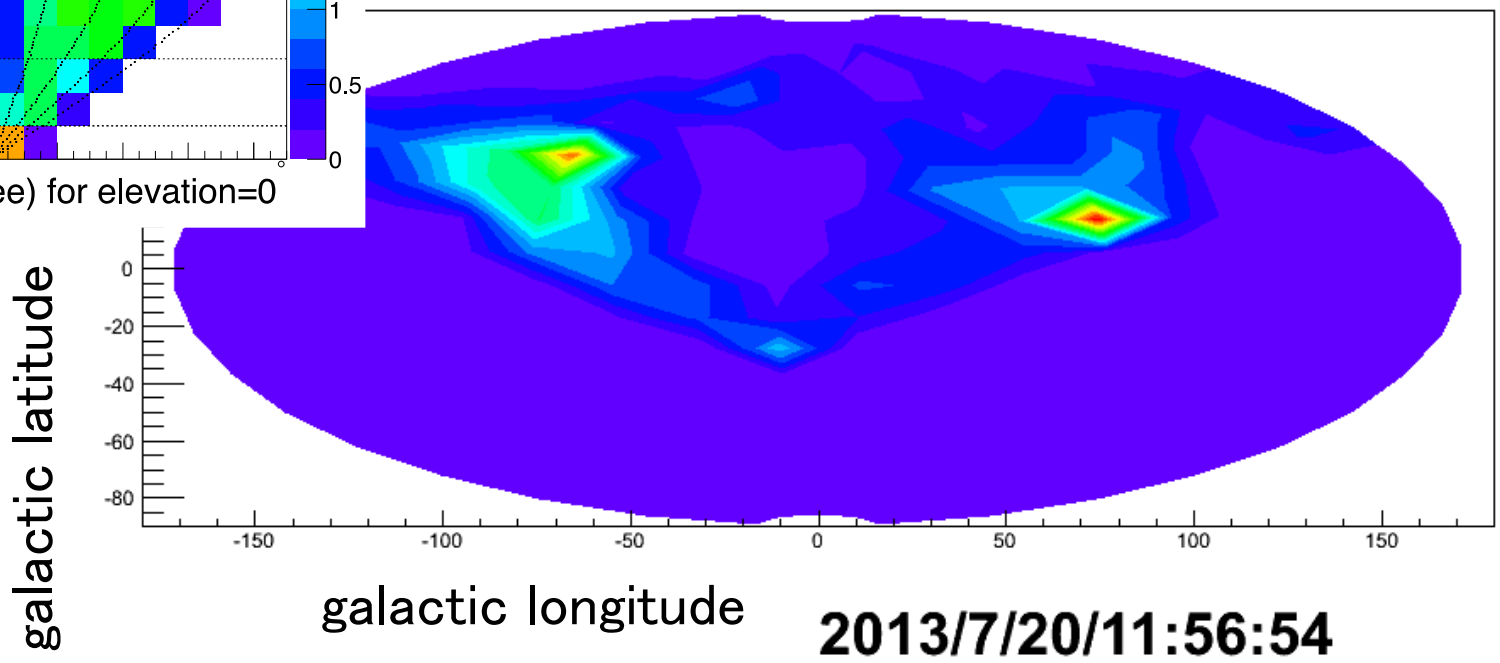
- Time variation of the efficiency map in the galactic coordinate

lab-coordinate



- auto-scanning is demonstrated
- "vertical" and "horizontal" detectors would be needed

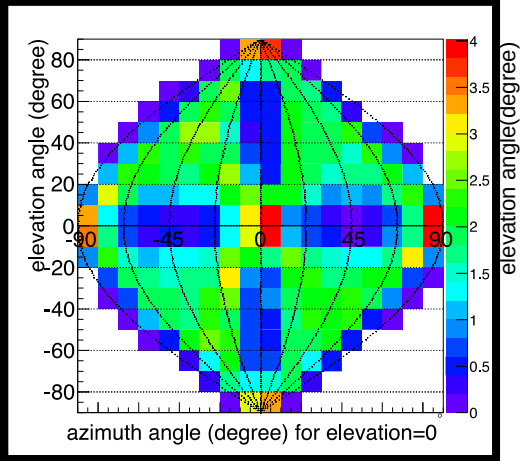
galactic coordinate

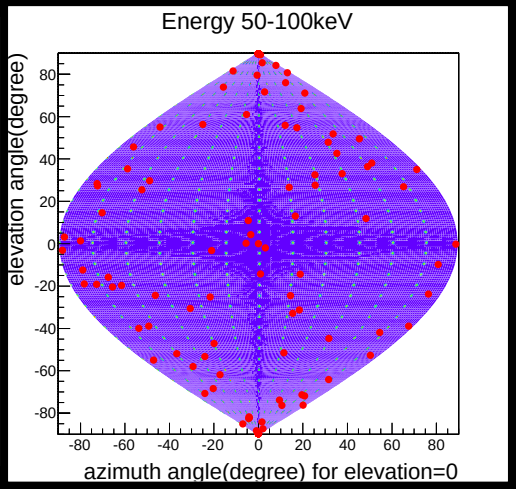


Galactic-plane sky-map

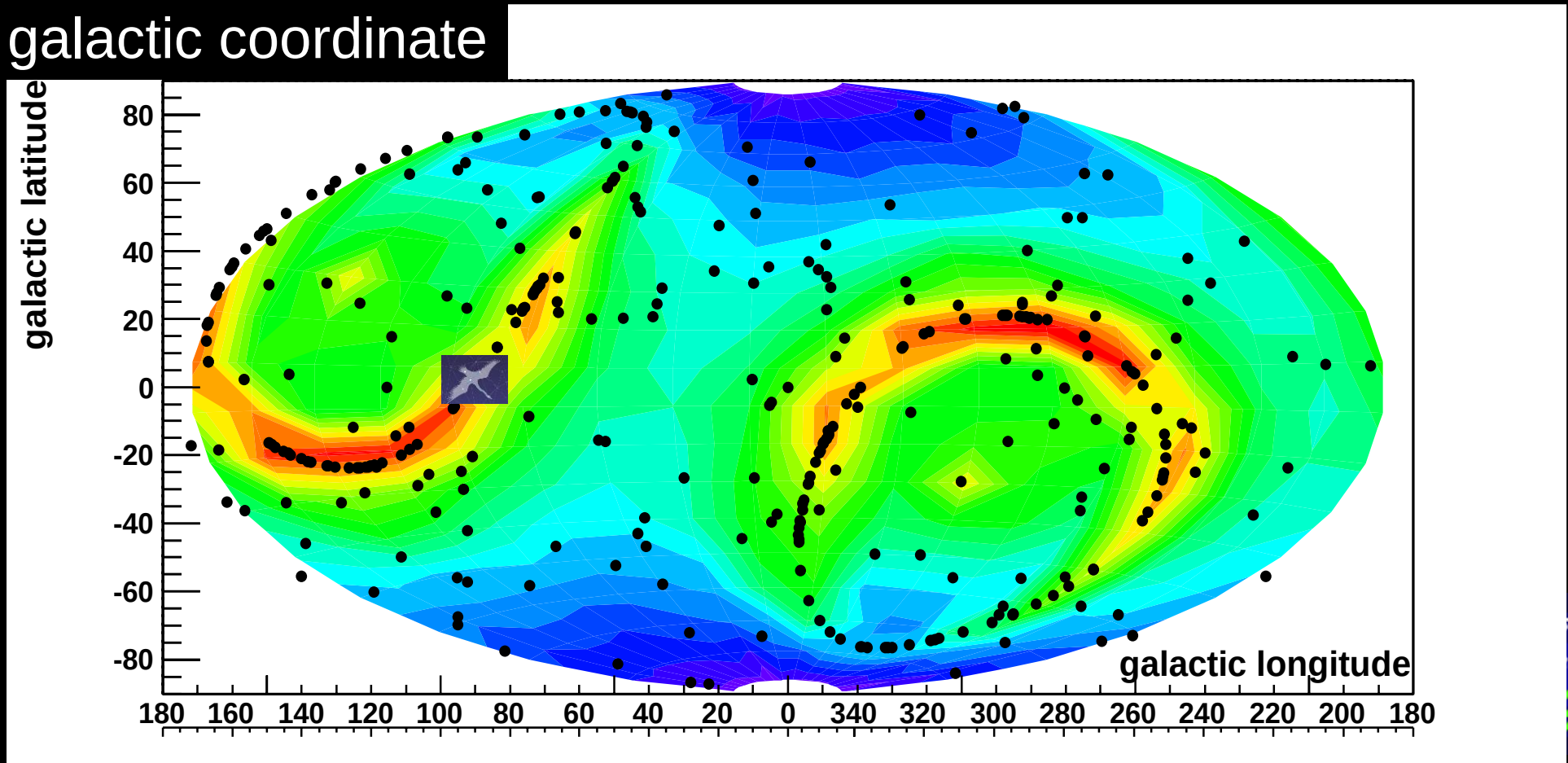
lab-coordinate

- correlation with efficiency = consistent with isotropic





galactic coordinate



Japan/NEWAGE status

“Revealing the history of the universe with underground particle and nuclear research”

科研費 KAKENHI

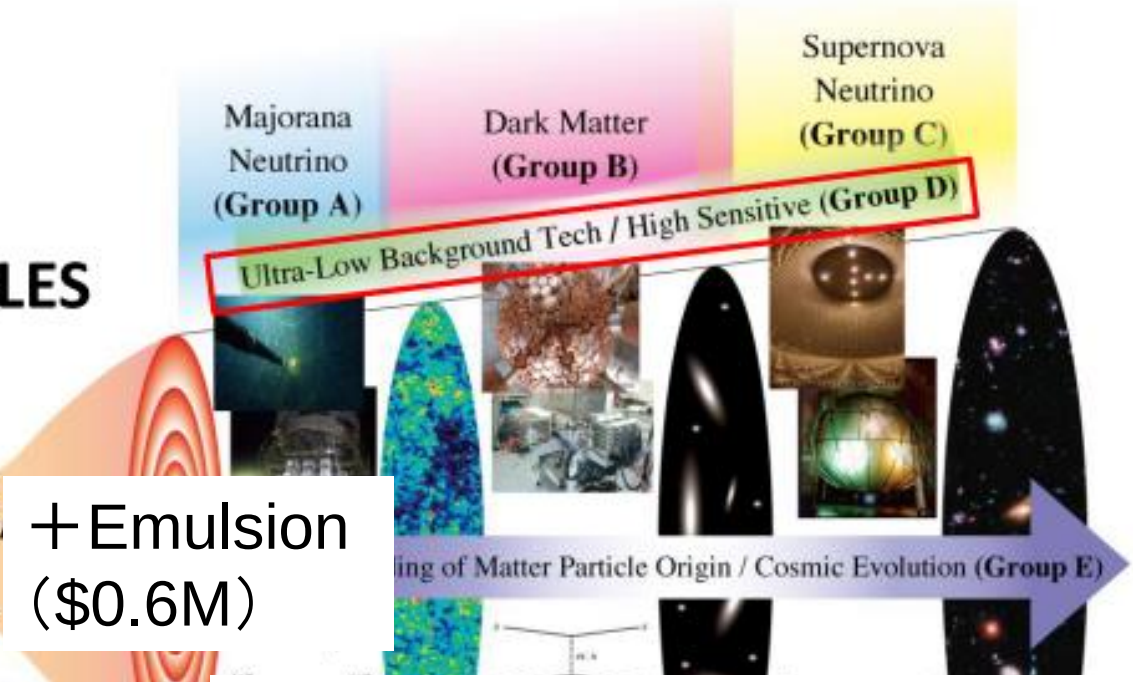
Takeuchi @NDM2014

http://www.lowbg.org/ugnd/

Cooperate among underground experiments, theorists, & low-BG researchers to achieve technical and scientific synergies.

Research groups:

- **A: Majorana ν**
  - A01: KamLAND, A02: CANDLES
- **B: Dark matter**
  - B01: XMASS, B02: NEWAGE
- **C: Supernova ν**
  - C01: GADZOOKS!, C02: SN network
- **D01: Low BG techniques**
- **E01: Theory**



＋Emulsion
（$0.6M）

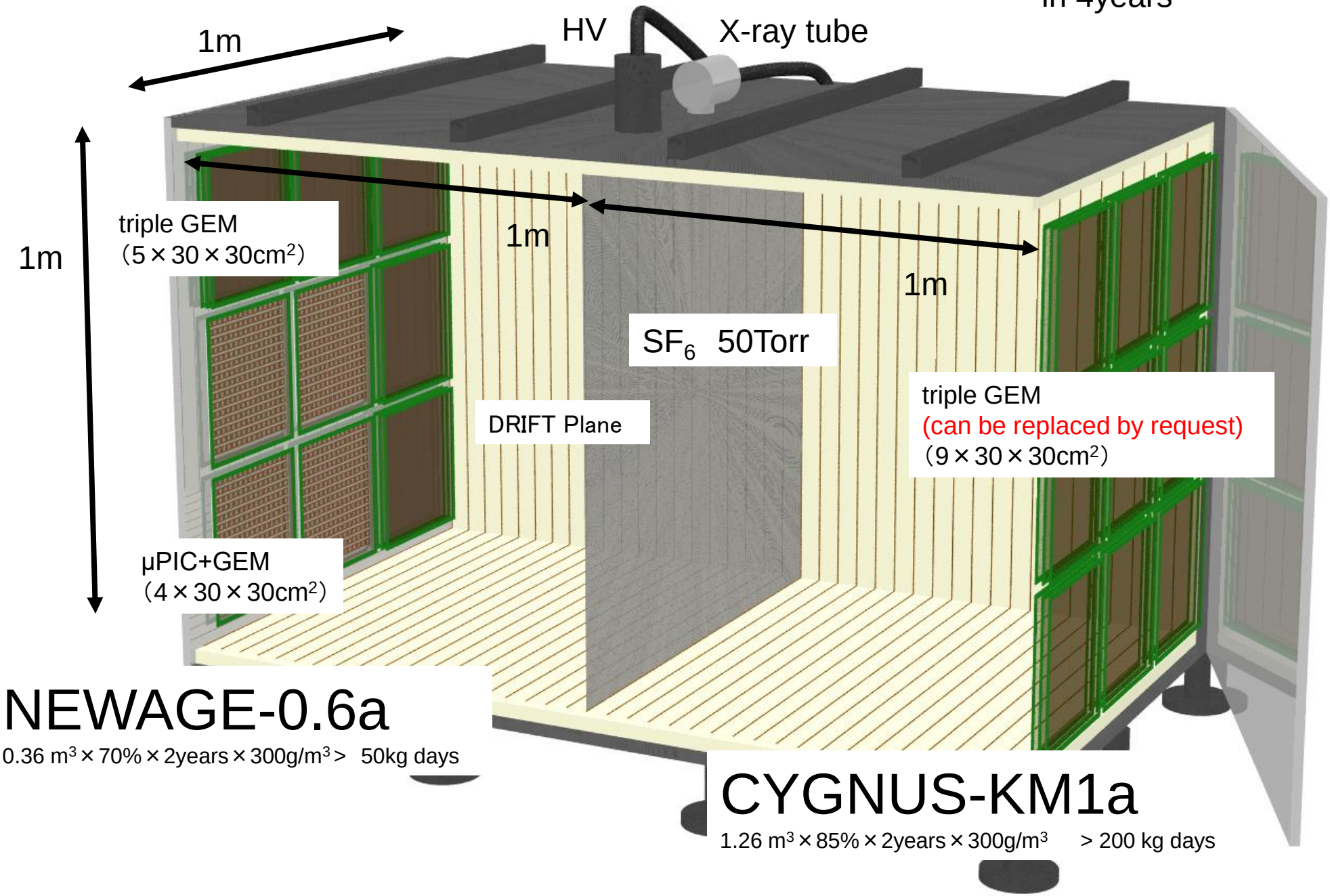
International workshop

May,2016

Tokyo

- Budget proposal for Japanese KAKENHI（Result in coming April）
  - Total 0.4M (40 million yen) (4 years)
  half-NEWAGE half-CYGNUS “observatory”

FUNDED:
total 0.35M(35million yen)
in 4years



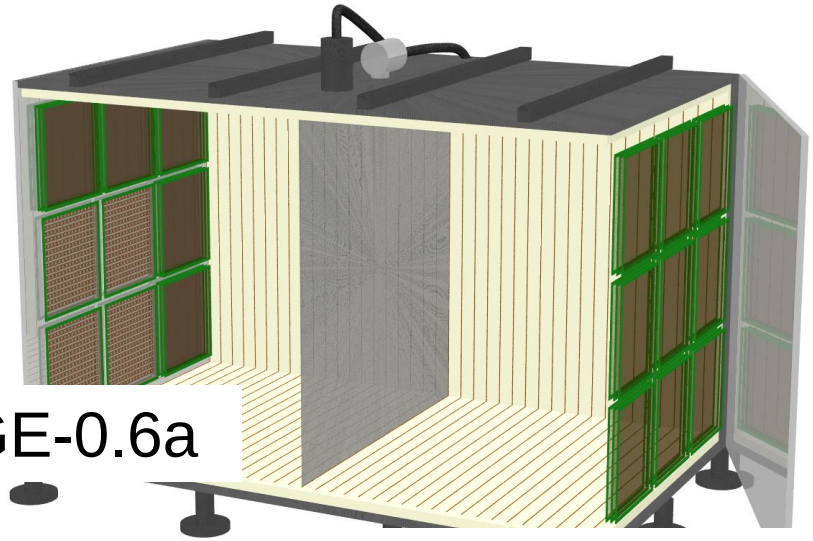
NEWAGE-0.6a

0.36 m³ × 70% × 2years × 300g/m³ > 50kg days

CYGNUS-KM1a

1.26 m³ × 85% × 2years × 300g/m³ > 200 kg days

- PLAN: develop 1m^3 low-BG volume
  - 2 years for construction
  - 2 years for initial measurement
  - “propose-based open observatory” in 4 years
- Hope to be a kick-off case of the CYGNUS project



NEWAGE-0.6a

CYGNUS-KM1a

Discussion