GRAMS Project

Tsuguo Aramaki, Northeastern University

GRAMS = Gamma-Ray and AntiMatter Survey

- Astrophysical observations with **MeV gamma rays** and indirect dark matter searches with **antimatter** using a **LArTPC** detector
- First **balloon/satellite** mission with **low-cost**, **large-scale** LArTPC
  - LArTPC: **well-established** for underground **DM/neutrino** experiments
    - LArTPC as a Compton telescope and antimatter detector

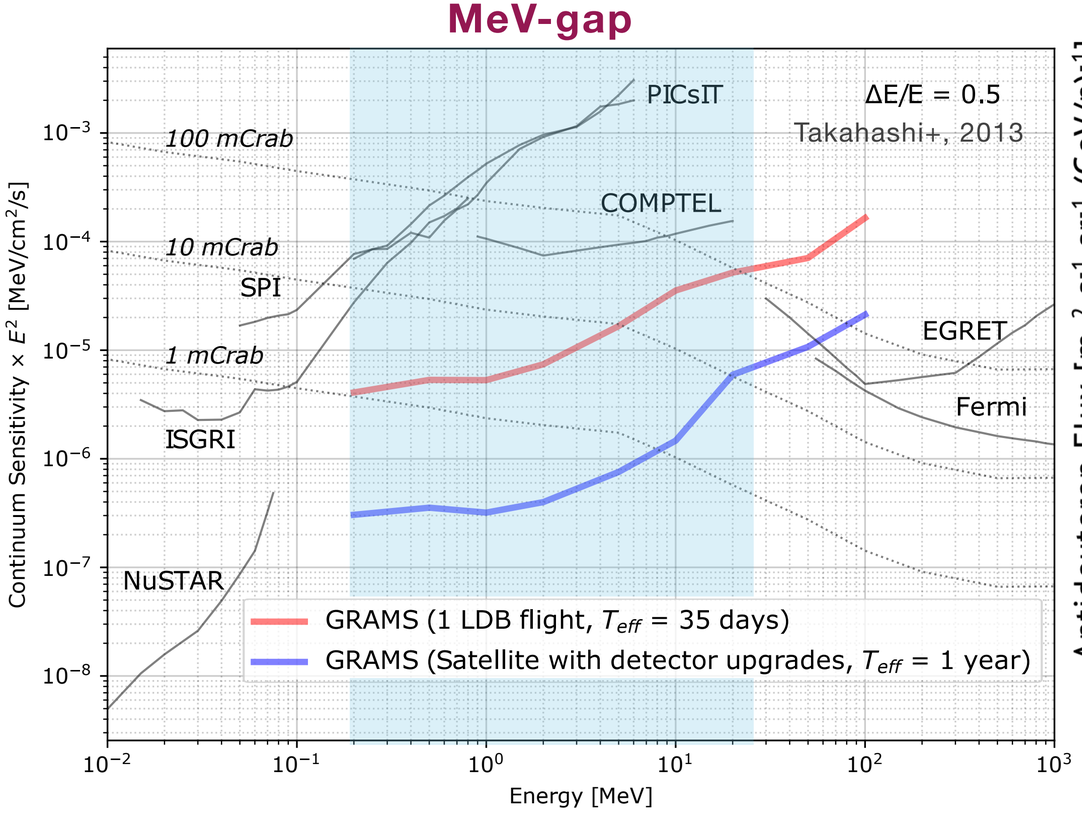
▸ Open up a new window into the **poorly-explored** MeV sky region

▸ **Background-free** dark matter searches with antideuterons/antiheliums

Science Goals

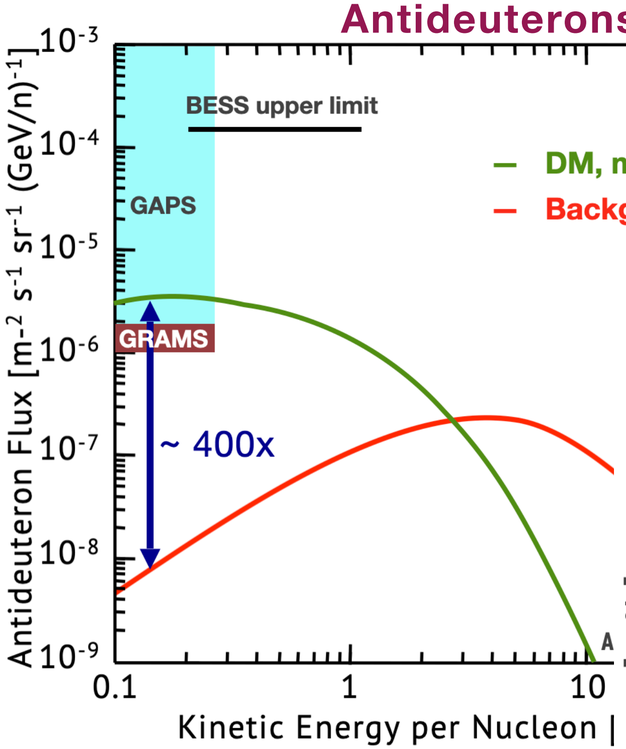
Tsuguo Aramaki, Northeastern University

MeV gamma-ray observations

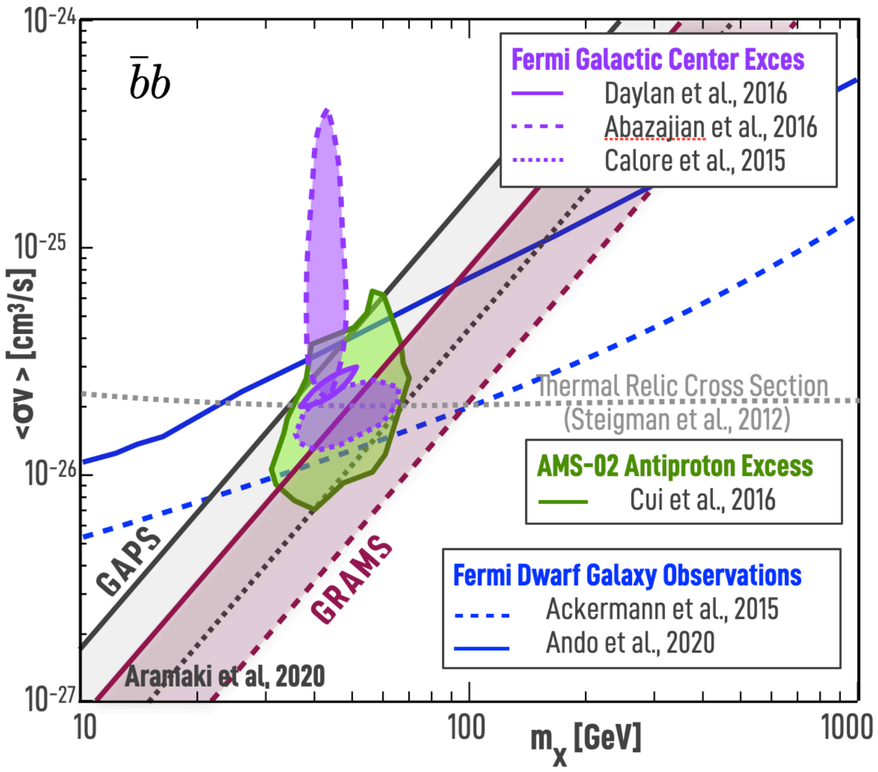


- **Balloon** flight: an order of magnitude improved
- **Satellite** mission: comparable to future missions

Dark matter searches with antinuclei



- **Background-free** dark matter searches
- Investigate **Fermi/AMS** potential DM signals



Collaboration/Schedule

Tsuguo Aramaki, Northeastern University

Scheduled events:

2023.7: Engineering flight from Taiki Aerospace Research Field.

2024: Antiproton (antideuteron) beam test scheduled at J-Parc

Proposed plan:

~2025: Prototype balloon flight

~2028: Science balloon flights

2030+: Satellite mission

5th Collaboration Meeting, June 2022

GRAMS Collaboration

USA

- Barnard College
- Columbia University
- NASA GSFC
- Northeastern University
- Oak Ridge National Lab
- UCB
- UT Arlington

International (Japan)

- Hiroshima University
- Kanagawa University
- Osaka University
- RIKEN
- Rikkyo University
- University of Tokyo/NDA
- Waseda University