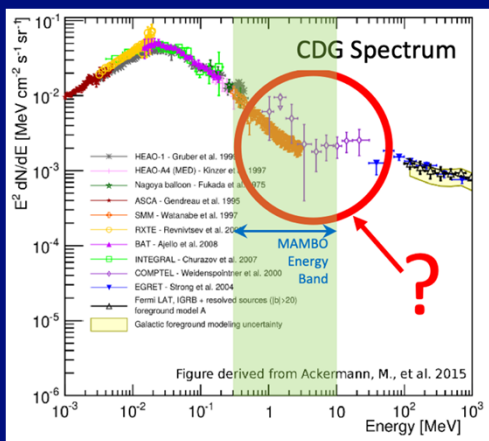




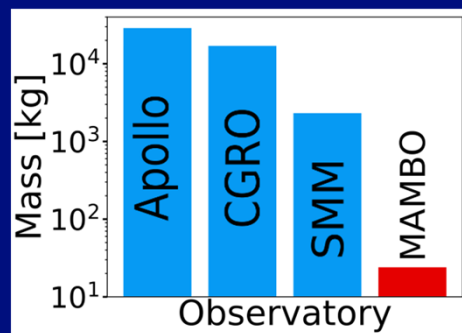
The Mini Astrophysical MeV Background Observatory (MAMBO) CubeSat Mission

Peter F. Bloser & Markus P. Hehlen (for the MAMBO Team)
Los Alamos National Laboratory

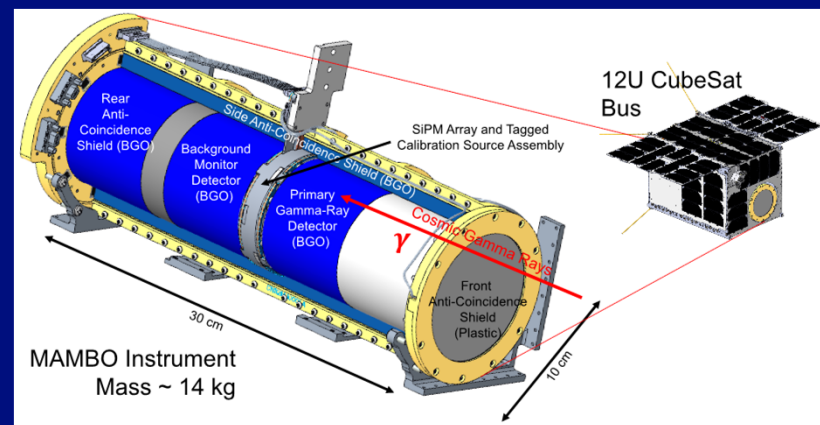
The origin of the astrophysical *Cosmic Diffuse Background* (CDG) radiation in the MeV energy band has remained a mystery for 40 years:



- Previous measurements suffered from large errors due to instrumental background
- A 12U CubeSat would provide “quiet” environment due to low mass:



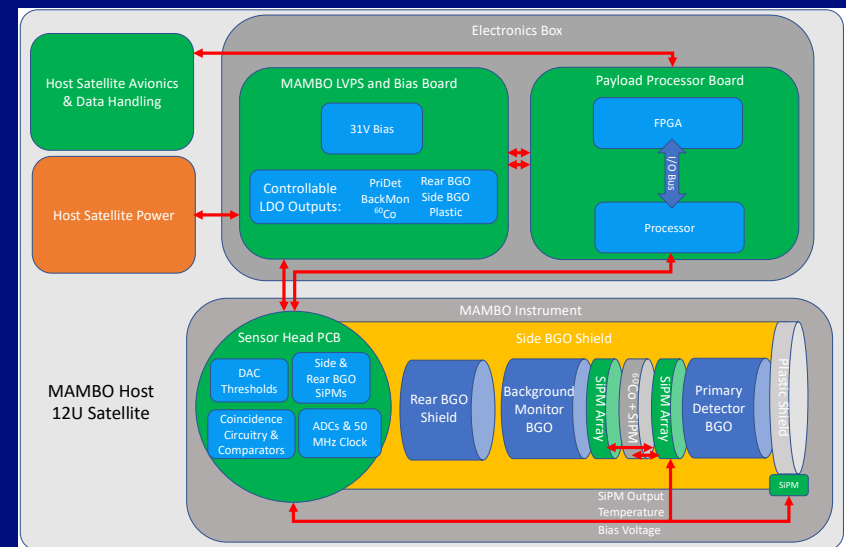
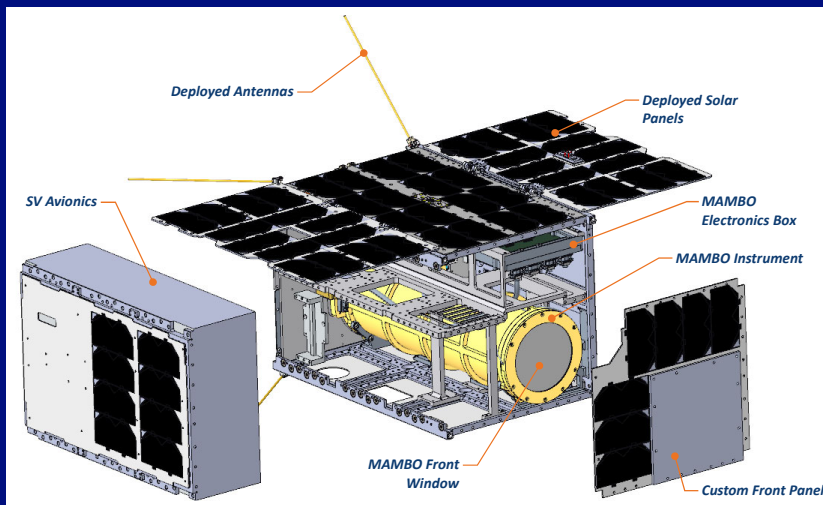
- MAMBO will make the best ever measurement of the MeV CDG using a commercial 12U bus
- The innovative shielded gamma-ray instrument directly measures and subtracts instrumental background
- Silicon photomultipliers (SiPMs) enable compact configuration



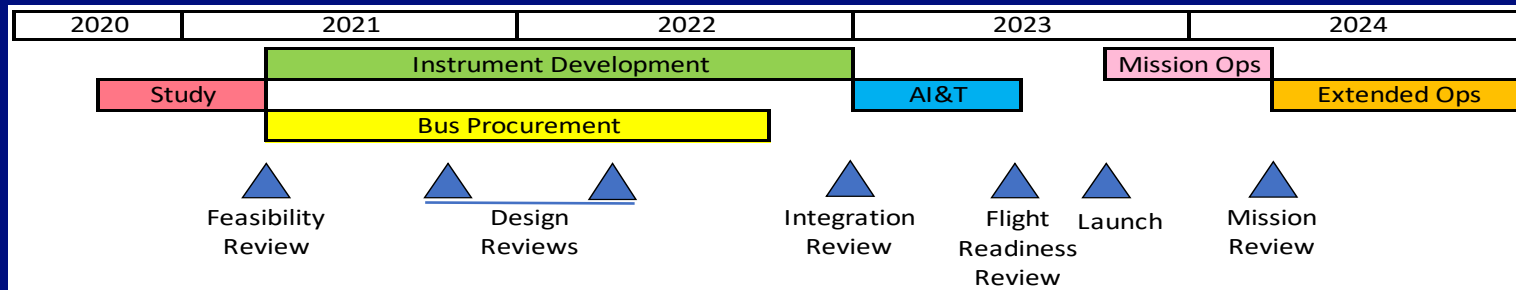
Spacecraft and Readout

- MAMBO will utilize the M12P bus from NanoAvionics
- Bus scheduled to be delivered to LANL in September 2022
- Total spacecraft mass: 23.9 kg (CBE)
- Will use Mercury-12 12U dispenser from Maverick Space Systems (25 kg limit)

- “Sensor Head PCB” contains analog-to-digital and coincidence electronics
- Low-voltage power supply (LVPS) and SiPM Bias Voltage Board
- Payload Processor based on SuperCam instrument flown on Mars 2020 rover



Mission and Timeline



- MAMBO will operate in circular LEO, ~400-500 km, $\approx 55^\circ$ inclination
- Estimate data rate of ≈ 600 MB per day
- Pointing accuracy/knowledge of $\sim 1^\circ$
- Point at high-Galactic-latitude regions for $\gtrsim 10^6$ seconds each
- Minimum of 6 months; desire 2+ years
- Will use commercial ground station network for telemetry and commanding
 - Commercial partner to be announced soon
- Six-month Feasibility Study completed in March 2021
- ~Two-year instrument development & bus procurement
- Six-month integration & test
- Launch via DoD's Space Test Program (STP/SERB)
- Have identified opportunity in September 2023: 55° inclination
- Six-month baseline mission
- Will propose to NASA for additional funding for extended operations