IXPE
Imaging
X-Ray
Polarimetry
Explorer

Report on the activities at MSFC for the IXPE mission

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SECONDMENT SUMMARY

- **Visited Marshall Space Flight center 2 times**
  - April 2018
  - October 2018
- **MSFC is reference institute for the IXPE mission**
  - Mission management
  - Optics production
  - End-to-end calibration
- **My activity focused on the preparation of the calibration of the telescope**
  - Planning of the test campaign
  - Test of the GPD EM coupled with the Mirror EM

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IXPE Calibration Strategy

- **There are four four main parts to the X-ray calibration needed for science operations:**
  1. Detector Unit (DU) Calibration in Italy
  2. MMA Optics Calibration at Marshall
  3. Telescope (MMA + DU) Calibration at Marshall
  4. On-orbit Calibration with Filter Calibration Wheel Sources
  - My visit focused on item 3

- **Several parameters need detailed calibration**
  1. Modulation factor
  2. Spatial resolution
  3. Energy resolution
  4. Response to unpolarized beam
  - All of them as function of energy and position in the detector

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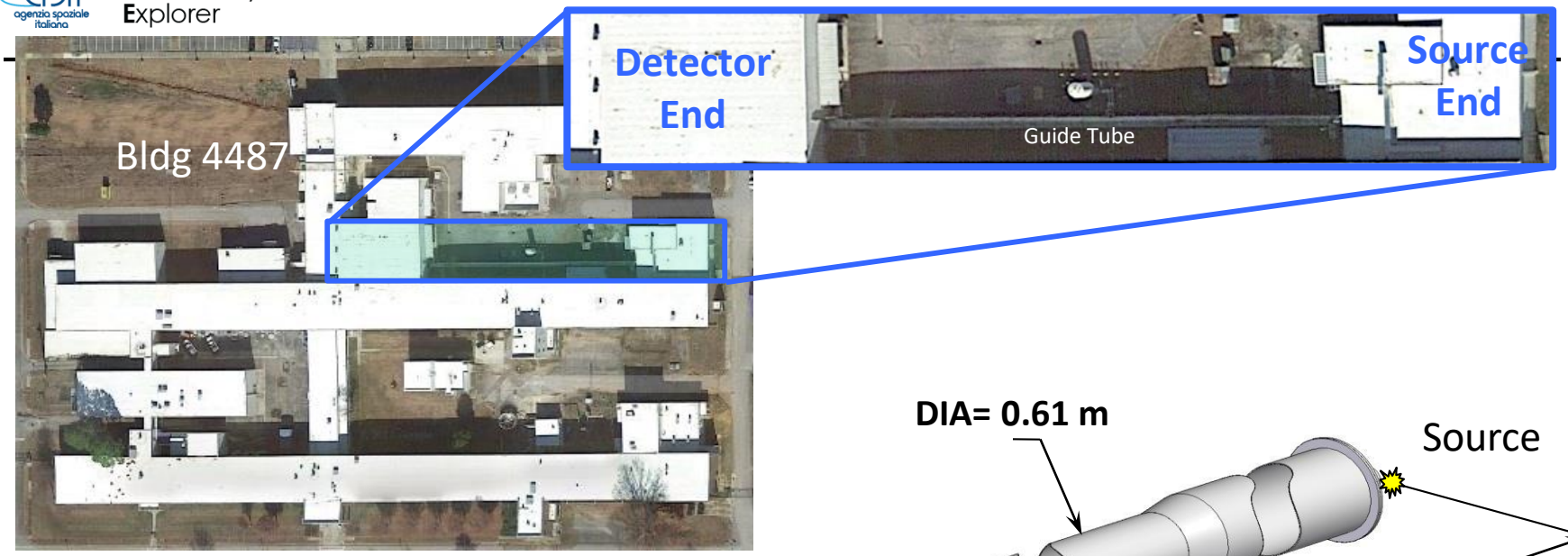
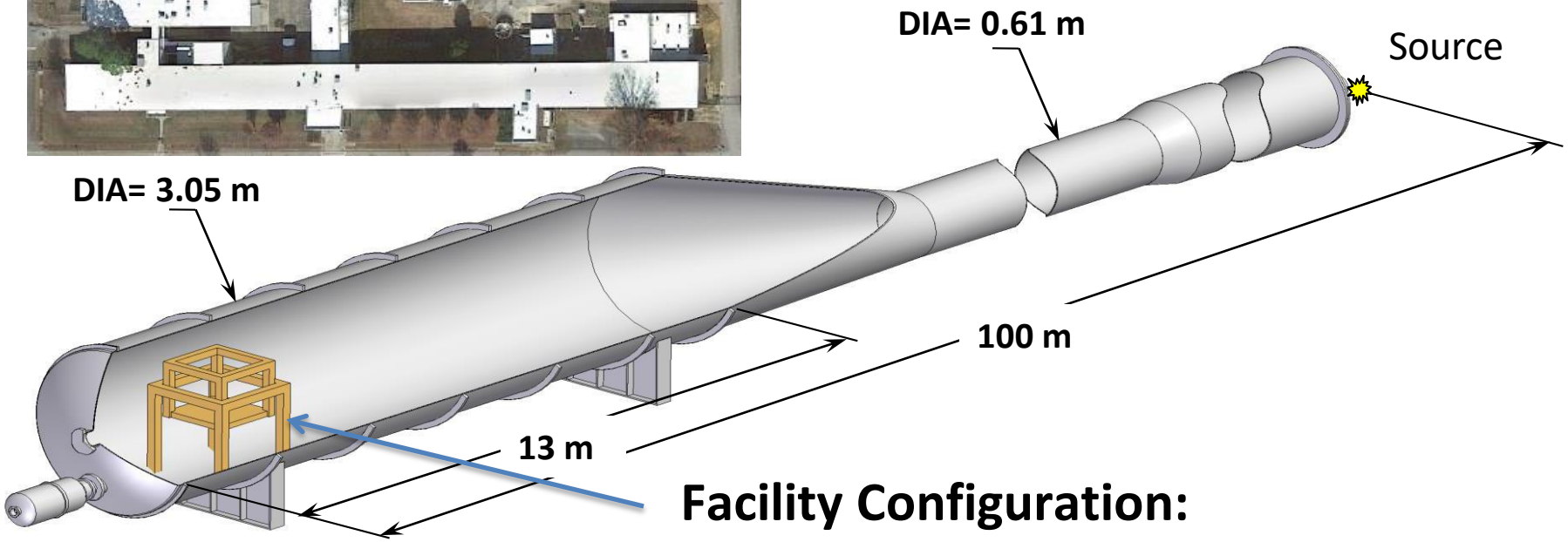
MARSHALL "STRAY LIGHT" FACILITY





Facility Configuration:

Optic and detector in main instrument chamber

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Engineering Model (EM) Verification

- **Engineering model MMA consists of:**
  - Flight-like spider and housing
  - 3 innermost shells
  - 3 outermost shells
  - Mass simulator
- **Engineering model GPD is a flight-like detector equipped with:**
  - Non-flight pcb
  - Flight-like mechanics, for interface and alignment
  - Lab-grade readout system

- **End-to-End Telescope Dry Run in summer 2019:**
  - EM MMA + EM GPD
  - Verify facility interface and performance (e.g. polarization of source available)
  - Practice detector operation

WORK IN PROGRESS

- **Definition of test plan**
  - For both EM and flight models
- **Definition of electrical and mechanical interfaces**
  - Identification of responsibilities: who does what
- **Definition of the documentation needed, in particular:**
  - Interface Control Document (ICD)
  - GPD-EM User Manual