Imaging X-ray Polarimetry Explorer (IXPE)
Introduction & Overview

Science Collaboration Meeting
November 7, 2018
Rome, Italy

Martin C. Weisskopf, PI
NASA Marshall Space Flight Center
• Introduction and overview — Weisskopf
• Mirror Module Assemblies (MMAs) — Ramsey
• Instrument = Detectors (DUs) + Detector Service Unit (DSU) — Soffita
# The IXPE Team

<table>
<thead>
<tr>
<th>NASA</th>
<th>Marshall Space Flight Center</th>
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<tbody>
<tr>
<td>PI team, project management, SE and S&amp;MA oversight, mirror module fabrication, X-ray calibration, science operations, and data analysis and archiving</td>
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<th>OHB ITALIA</th>
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<td>Polarization-sensitive imaging detector systems</td>
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<th>I-SLASP</th>
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<td>Mission operations</td>
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<th>ROMA TRE</th>
<th>Stanford University</th>
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<td>Scientific theory</td>
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<th>McGill</th>
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OBSERVATORY DEPLOYED

Telescopes (3)
- Mirror Module Assembly (MMA) (3) with Thermal Shields (6)
- Detector Units (DUs) (3) & Detectors Service Unit

Payload Deployable Assembly

Top Deck Assembly

MMSS Center Tube

Deployable Boom with Thermal Sock

MMSS Launch Locks (3)

MMSS Bipods (3)

X-ray Shields

Tip-Tilt-Rotate (TTR) Mechanism

+Z Star Tracker

Solar Array

-Z DU radiator (hidden)

-Z Star Tracker (hidden)

Spacecraft

Northrop Grumman Innovation Systems

Northrop Grumman Innovation Systems

Mirror Module Support Structure (MMSS) Deck

Northrop Grumman Innovation Systems

Top Deck Assembly

- Telescopes (3)
- Mirror Module Assembly (MMA) (3) (hidden)
- Detector Units (DUs) (3)
- Detectors Service Unit (DSU) (hidden)

Northrop Grumman Innovation Systems

Northrop Grumman Innovation Systems
## Mission Description

<table>
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<tr>
<th>Parameter</th>
<th>Value</th>
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| **Launch Planning (Pegasus XL baselined)**     | 21 day launch period  
Can launch on any day on or after 04/20/2021  
Launch Dispersions: ±10 km insertion apse; ±80 km non-insertion apse |
| **Mission Duration**                           | 25 months including 1 month commissioning/payload verification       |
| **Initial Orbit State (based on nominal launch vehicle performance)** | Low Earth orbit (LEO)  
Altitude = 540 km, circular  
Semi-major axis = 6900 km  
Eccentricity = 0  
Inclination = 0 degrees |
| **Critical Events**                            | Launch phase including separation from launch vehicle  
Autonomous solar array deployment  
Commanded payload boom deployment |
| **Ground Stations**                            | Malindi, Kenya (primary station)  
Singapore NEN station (backup)  
TDRSS (early mission operations, contingency operations) |
| **Communications**                             | 2.0 Mbps downlink via S-band LGA (to ground)  
32 kbps downlink via S-band LGA (to ground)  
1 kbps downlink via S-band LGA (to TDRS)  
2 kbps uplink via S-band LGA (from ground) |
| **Fault Management**                           | Autonomously places Observatory in a safe configuration  
Ground control used for recovery process |
GROUND SYSTEM SUMMARY

- **SOC**
- **MSFC**
- **orbit Insertion**
- **Payload Deploys**
- **HEASARC**
- **GSFC**
- **MOC**
- **LASP**
- **Science Data**
- **Arrays Deploy**
- **TDRSS**
- **Malindi Ground Station**
- **Singapore Ground Station**

**S-band Uplink**
- 2 kbps CMDs

**S-band Downlink**
- 2 Mbps Science and TLM
- 32 kbps Contingency Ops
- 1 kbps to TDRSS

**Commands/Telemetry/Event Logs/Parameter Uploads**

**Data**

**Launch**
## Upcoming Milestones

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<tr>
<th>Date</th>
<th>Description</th>
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<tr>
<td>April 2019</td>
<td>Critical Design Review</td>
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<tr>
<td>July 2019</td>
<td>MMA fabrication complete</td>
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<td>August 2019</td>
<td>Detector calibrations complete</td>
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<td>January 2020</td>
<td>End-to-end (Telescope) calibration complete</td>
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<td>March 2020</td>
<td>Ship to Ball Aerospace</td>
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<td>April 2021</td>
<td>LAUNCH!!!!!</td>
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