

# WP5 - X-Ray Polarimetry Explorers

H2020-MSCA-RISE-2016 – Grant Agreement N° 734303

## NEWS - General Meeting - 4-5 November 2019



European Commission

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# OUTLINE

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- **NEWS WP5 and IXPE Mission Status**
- **Status of secondments**

# WP5 OBJECTIVES AND DELIVERABLES

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- **IXPE Mission replaced and surpassed WP5 objectives and timeline, for the good!**
  - IXPE is on schedule for launch in 2021
  - NEWS objectives and milestones secured

## Objectives

O5.1: Build a fully functional lab prototype of a Gas Pixel Detector (GPD) for the focal plane of an X-ray polarimetric mission.

O5.2: Study and design the basic components of a space-grade data acquisition system for the GPD.

O5.3: Optimize event reconstruction and classification.

O5.4: Implement an observation-simulation framework for the X-ray polarimetry explorers.

O5.5: Define and implement science analysis tools for the X-ray polarimetry explorers.

# IXPE MISSION OVERVIEW

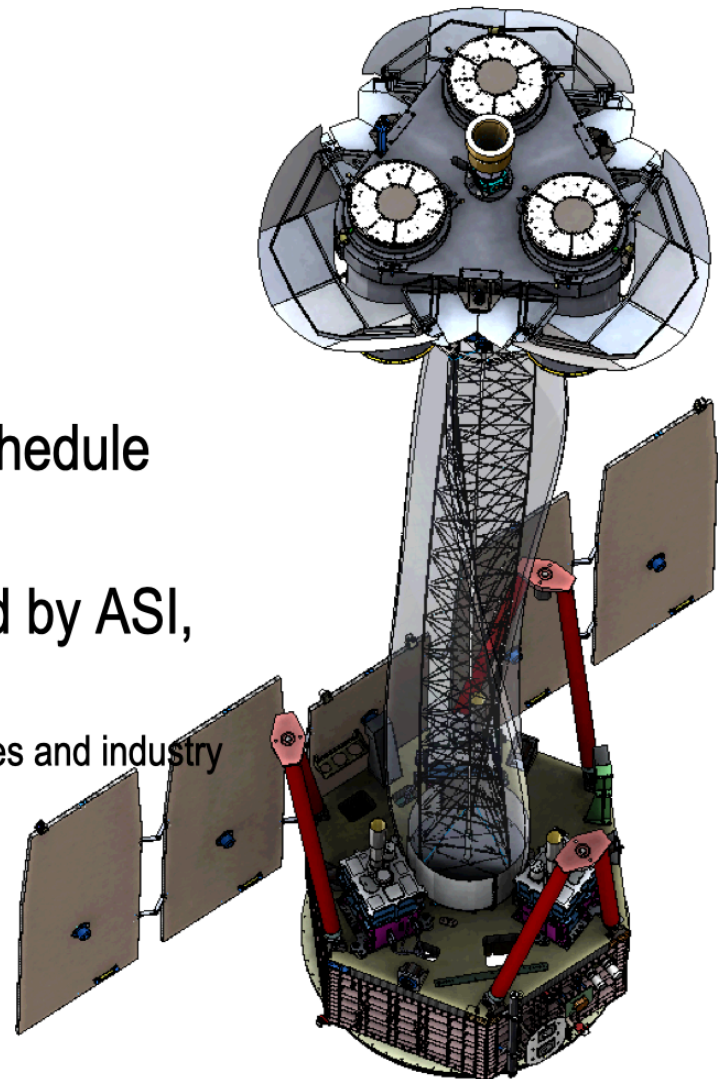
- IXPE is a NASA SMEX mission:

- Selected January 2017
- Italian contribution due December 2019
- Launch April 2021
- All reviews completed (M-CDR last week)

- Cost-capped (200M\$) – rigid aggressive schedule

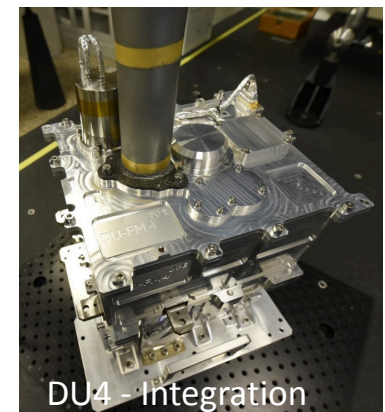
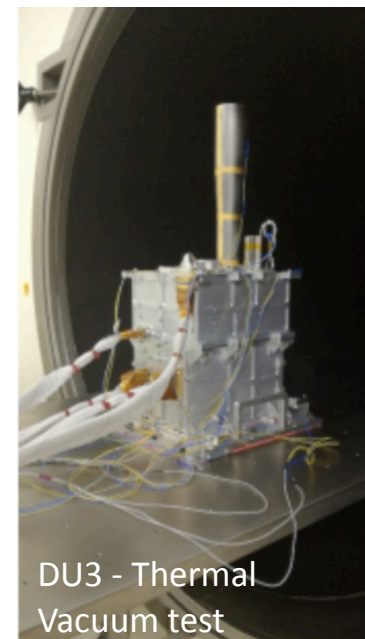
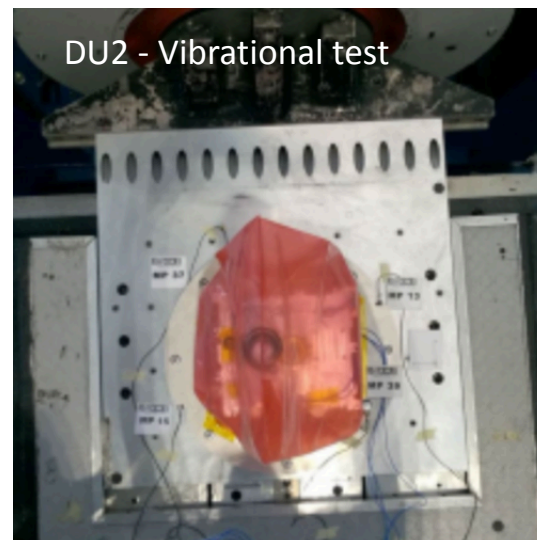
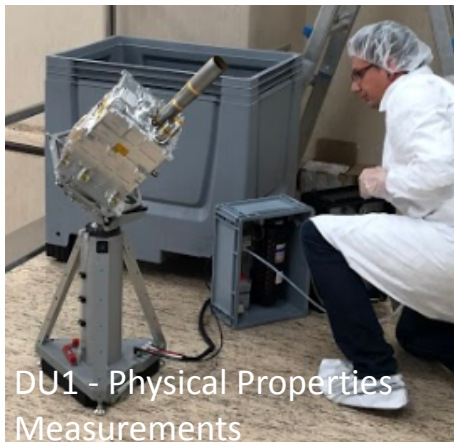
- Instrument, ie Italian Contribution supported by ASI, INAF, INFN

- ASI manages funding through 3 direct contracts to Institutes and industry
  - OHB-I (FCW, DSU)
  - INFN (DU)
  - INAF (System Engineering and Calibration)



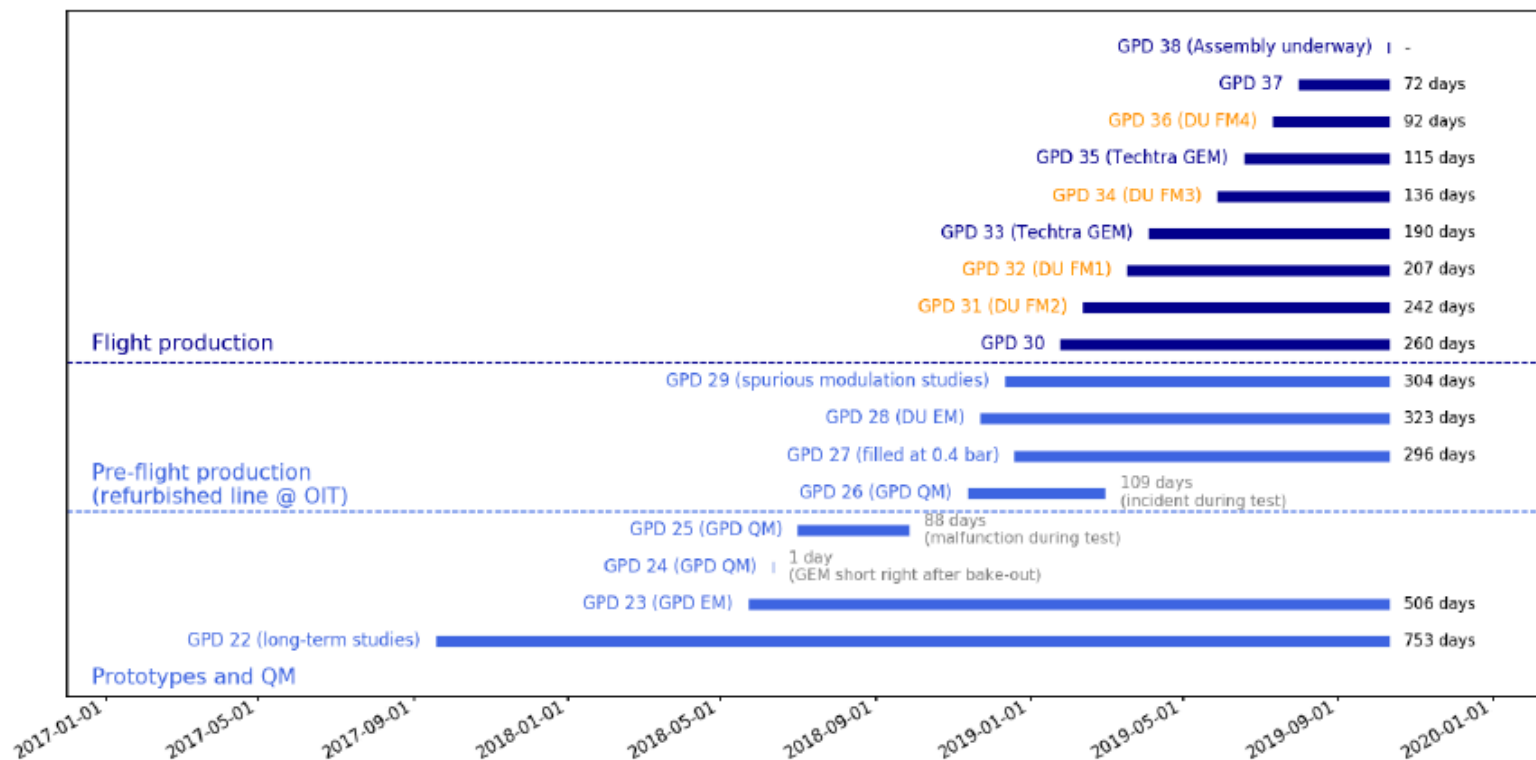
## IXPE MISSION STATUS

- Instrument Flight Modules delivery complete!
- Moving to missions-level activities
  - integration with Mirrors and Spacecraft at Ball
  - calibrations with X-rays at Marshall



## O5.1 BUILD PROTOTYPE GPD - DONE

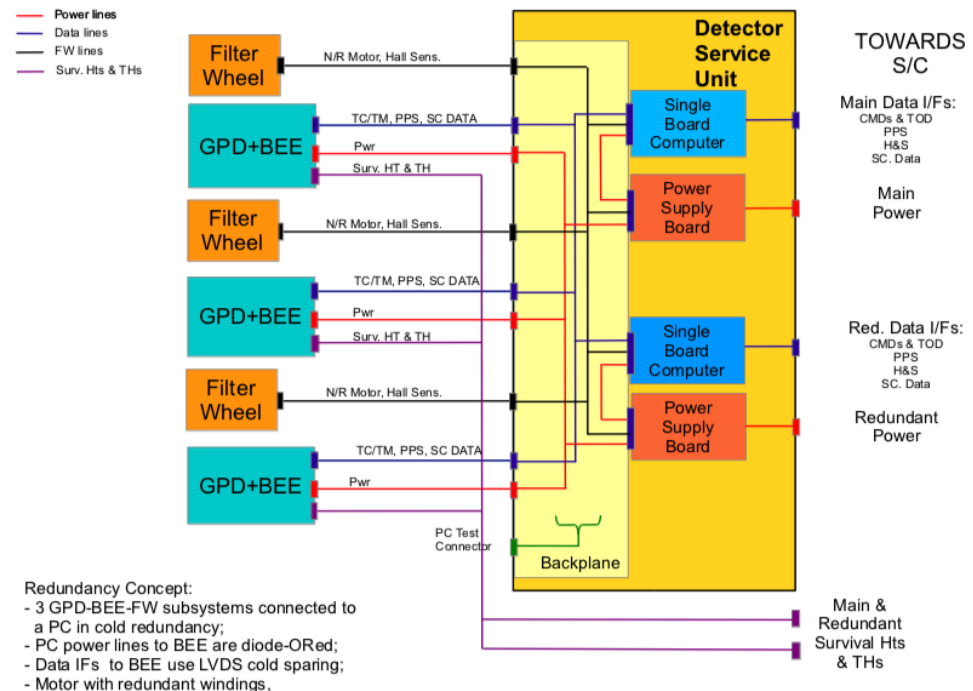
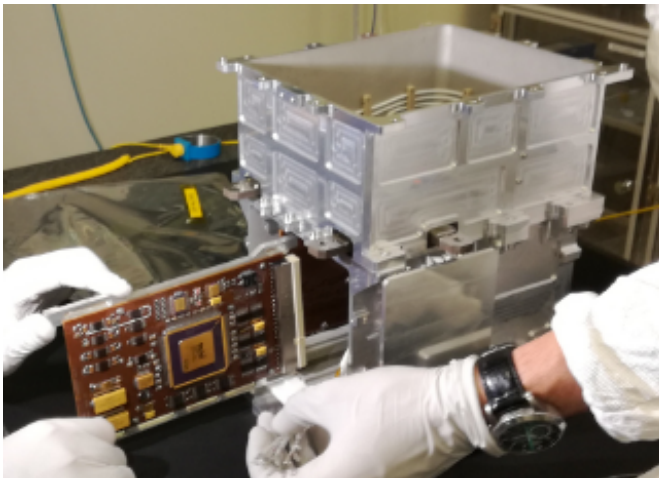
- We built many more, including all the flight models for the mission and qualification models for defining the process and assess systematic uncertainties





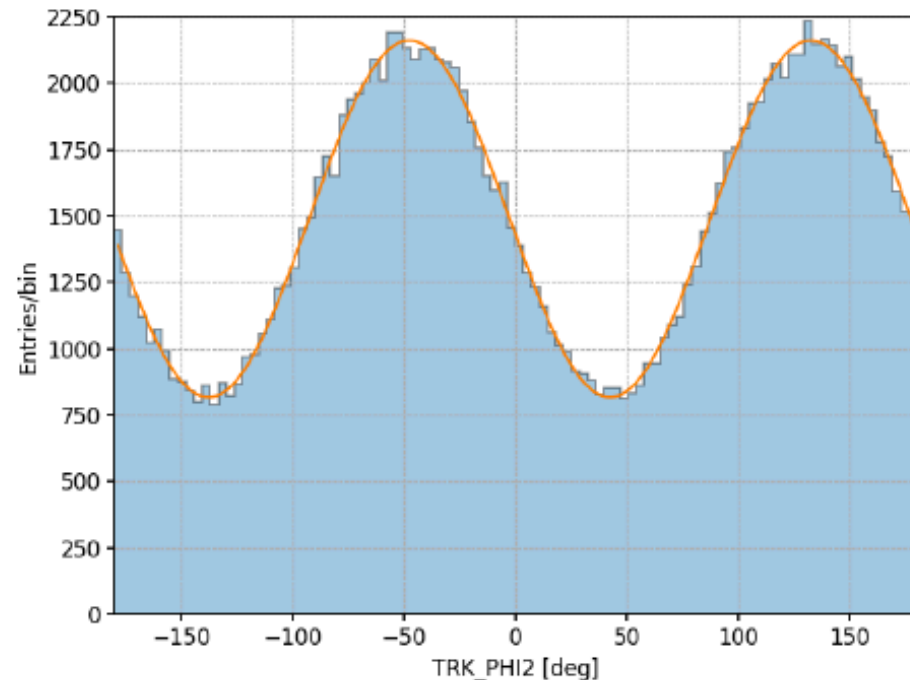
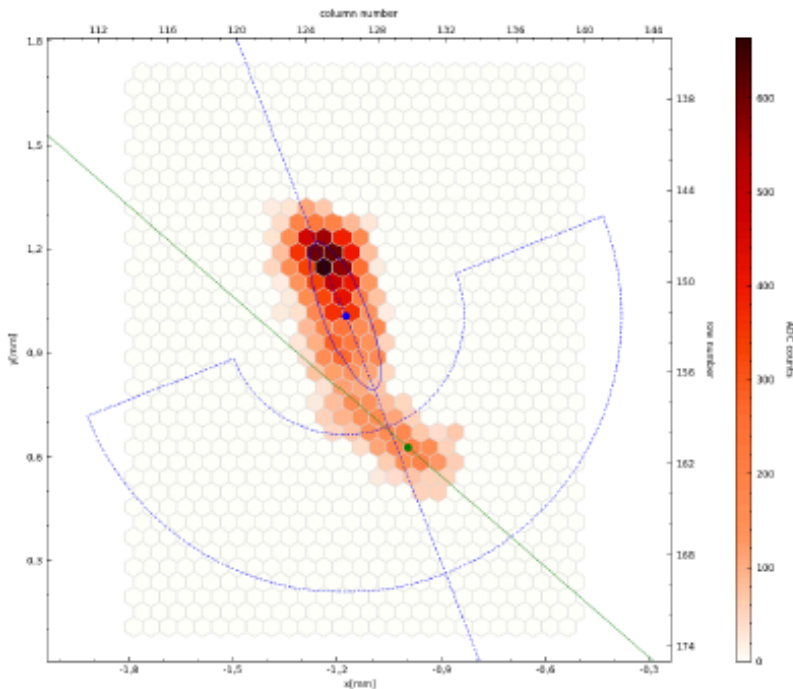
## O5.2 DESIGN DAQ FOR SPACE OPERATIONS - DONE

- The entire electronics chain from the detector front-end up to onboard computer for event building and data transmission is designed, documented, and mostly available for the 2021 launch



## O5.3 EVENT RECONSTRUCTION - 70% DONE

- **Baseline algorithm for the missione in place (gpdsw)**
  - supports Integration, Test, Calibration, Operations
- **Optimizations with Machine Learning ongoing**

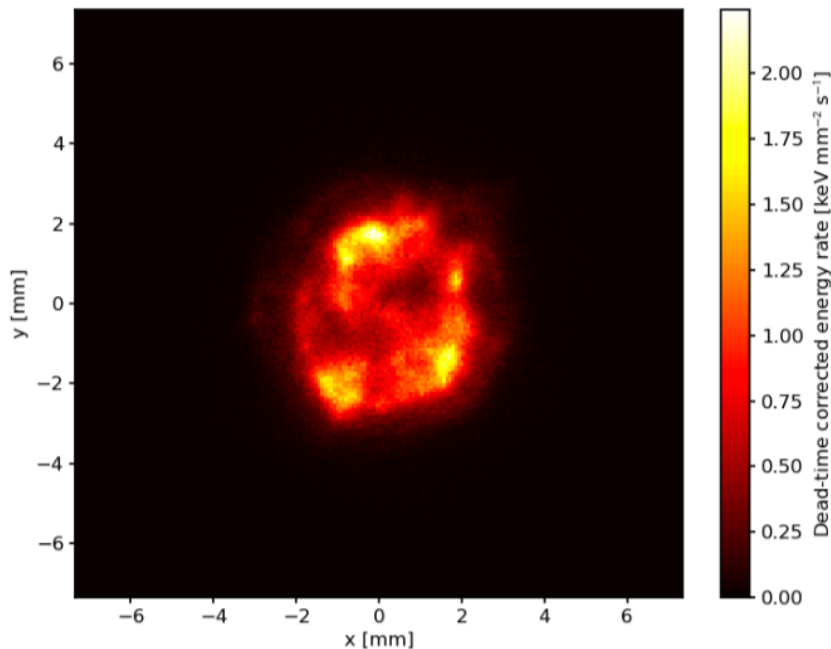




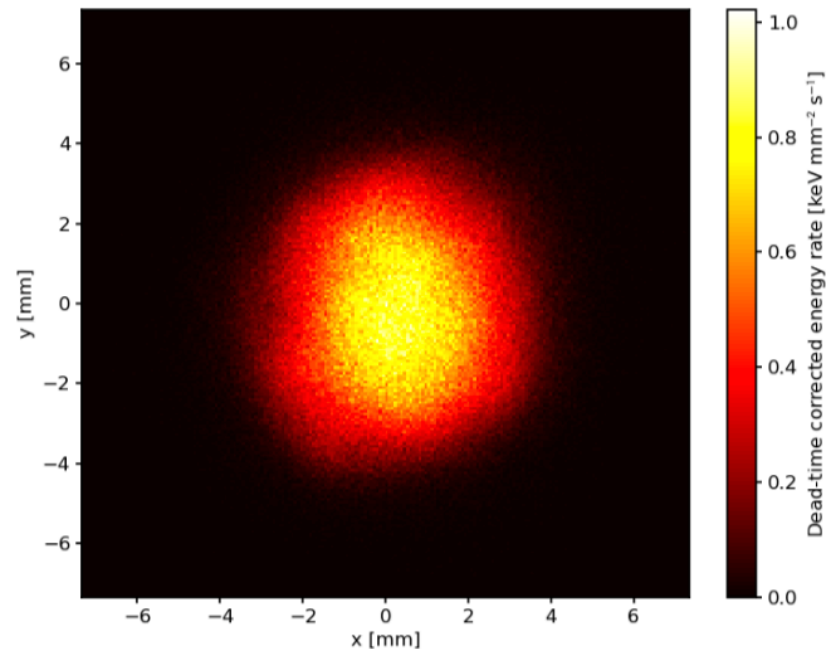
## O5.4 OBSERVATION SIMULATOR - 70% DONE

- Tool in place and in use to define observations plan
- Recent upgrades include observatory and detector effects (dithering, charging, spurious modulation)

Without dithering



With dithering





**IXPE**

Imaging  
X-Ray  
Polarimetry  
Explorer

## O5.5 SCIENCE TOOLS - 50% DONE

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- In preparation based on established data formats, detector reconstruction algorithms, standard tools for X-ray data analysis in multi wavelength context
- Input from observation simulations used for developments

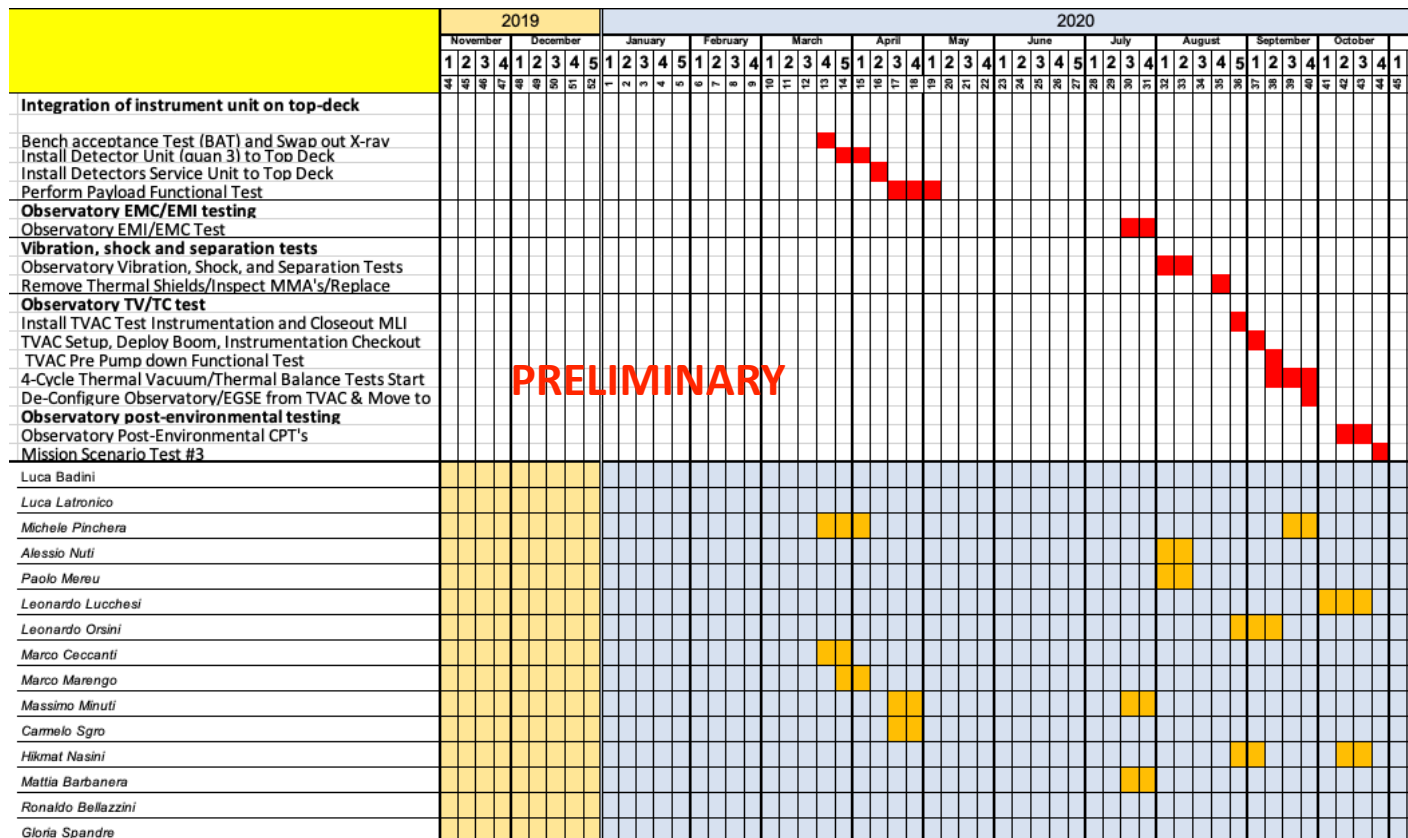
# WP5 SECONDMENT STATUS

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- **Team to complete formal flight hardware delivery by 2019**
  - all flight modules integrated and qualified, documentation to be finalized
- **Secondments limited so far to sporadic mission level events (ie meetings)**
- **Future secondments to increase significantly**
  - 8 months in 2020 for IXPE Integration and Calibration
  - 6 months in 2021 for launch support and preparation to science

# IXPE TIMELINE FOR INTEGRATION - 2020

- **Minimum 4 months to support integration activities**
- **Similar support for calibration activities to be defined**



- Project milestones ahead of proposal, flight hardware and support software in place
- Secondments to increase in 2020 for IXPE mission level activities in USA



IXPE Detector Unit 4 - final flight unit