WP5 - X-Ray Polarimetry Explorers

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

NEWS - General Meeting - 4-5 November 2019

EGO - Virgo



European Commission

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OUTLINE

- NEWS WP5 and IXPE Mission Status
- Status of secondments

WP5 OBJECTIVES AND DELIVERABLES

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 Institues 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 frontend 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





- 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

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

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

