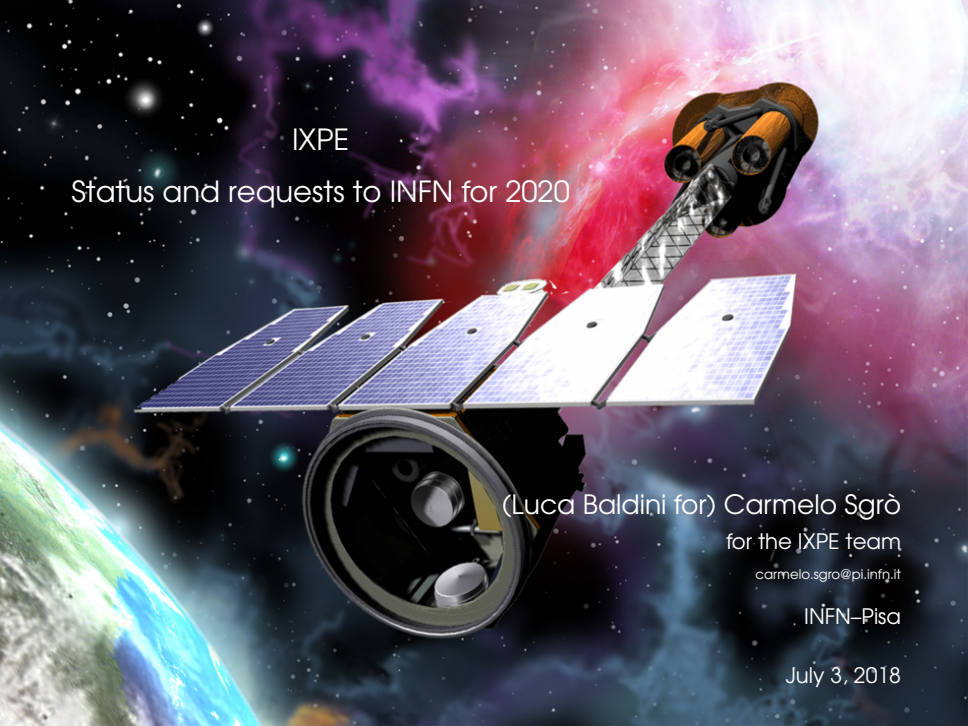


The background of the slide is a vibrant space scene. In the bottom left corner, a portion of the Earth's blue and green horizon is visible. The rest of the background is a deep black space filled with numerous white stars of varying sizes. A prominent feature is a bright, colorful nebula or galaxy in the upper right, with swirling clouds of purple, pink, and red. The IXPE satellite is the central focus, shown from a perspective that highlights its long, thin body and its two large, rectangular solar panel arrays extending outwards. The satellite's main body is black with some gold-colored components. At the rear, two large, cylindrical instruments are visible, pointing away from the satellite. The solar panels are white with a grid of blue photovoltaic cells. The overall composition suggests a high-tech, scientific mission in deep space.

IXPE

Status and requests to INFN for 2020

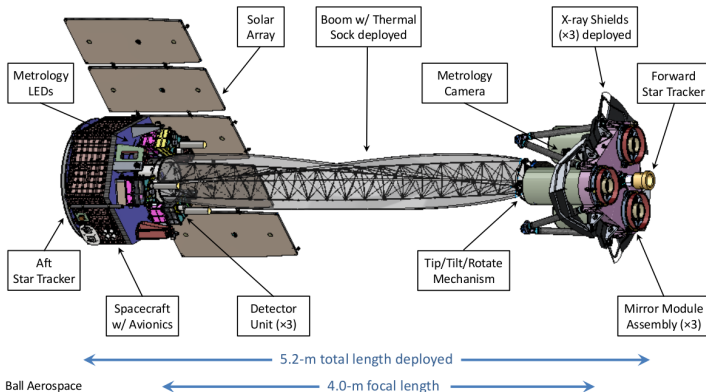
(Luca Baldini for) Carmelo Sgrò
for the IXPE team

carmelo.sgro@pi.infn.it

INFN-Pisa

July 3, 2018

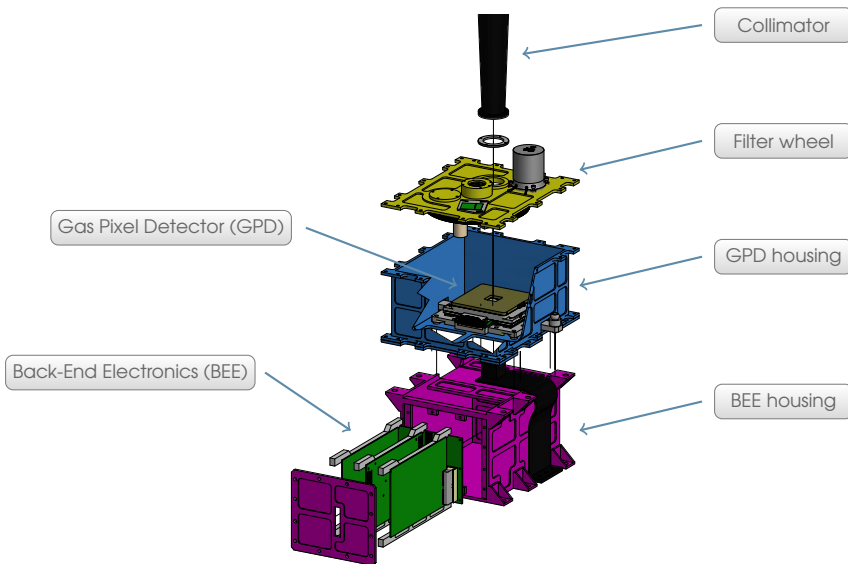
The Imaging X-ray Polarimetry Explorer

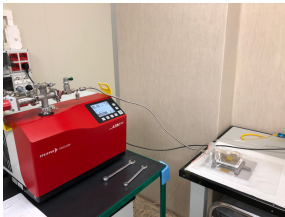
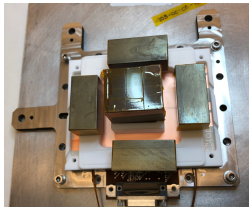


- ▷ Imaging and polarimetry in the 2–8 keV band
 - ▷ Three identical telescopes, each including polarization-sensitive detector and grazing-incidence optics
 - ▷ 2-year baseline mission, 1 year extension
- ▷ Based on the polarization-sensitive detectors developed at INFN-Pisa
- ▷ **INFN responsibility: detector, readout electronics, housing**

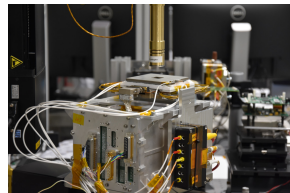
The Detector Unit (DU)

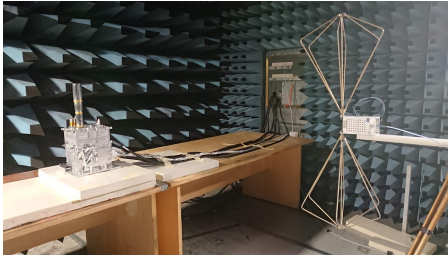
We will deliver 3 flight DUs + 1 spare



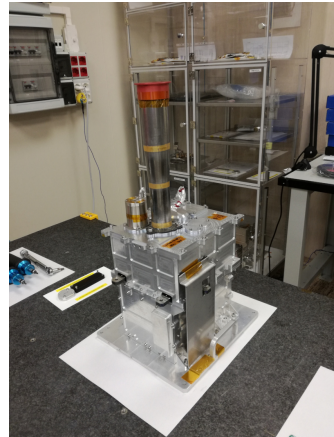


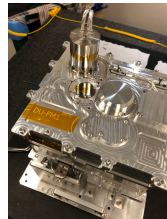
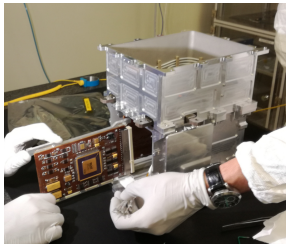
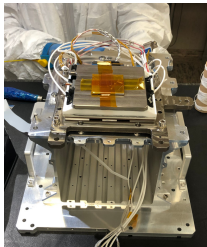
- ▷ 6 Flight Models produced, tested and characterized
- ▷ GPD production done almost entirely in house
 - ▷ Assembly in our cleanroom: metrology and alignment, gluing and leak test, electrical tests
 - ▷ Bakeout and gas filling done at OIT (Finland)
 - ▷ Functional and performance test done in Pisa and at the calibration facility at IAPS-Rome
- ▷ Reliable process in place, yield ~ 100%
- ▷ 4 more GPDs expected to complete the production





- ▷ Engineering Model integrated and tested
- ▷ Mechanically and functionally identical to the flight units
- ▷ Functional and performance test performed in our clean-room
- ▷ EMC/EMI test done at GSD (Pisa)
- ▷ Combined tests with the onboard computer (DSU) done at OHB-I (Milan)
 - ▷ With strong support of our elx team
- ▷ Currently at IAPS-Rome to verify the calibration equipment





- ▷ Flight Models are integrated in our clean-room
 - ▷ Mechanical assembly
 - ▷ Functional test
 - ▷ Metrology
- ▷ Environmental test (vibration & TVAC) in external facilities under INFN responsibility
- ▷ Calibration at IAPS-Rome prior to the delivery to MSFC
- ▷ FM 1 integrated and ready for environmental tests
 - ▷ Vibrations this week, TVAC next week
- ▷ FM 2 integration started this week



- ▷ Mission Critical Design Review (CDR) successfully held last week
- ▷ Launch vehicle not (officially) selected, yet
 - ▷ NASA HQ adamant that it will be ready for the nominal date (April 2021)
- ▷ Two main deliveries to MSFC
 - ▷ DU FM1 (flight spare): December 2019
 - ▷ DU FM2, 3 and 4: April 2020
- ▷ DU integration (mostly) completed by the end of 2019
- ▷ Main activities for 2020:
 - ▷ Complete the DU integration
 - ▷ Support the DU calibration at IAPS-Rome
 - ▷ Support the integration of the instrument (with onboard computer)
 - ▷ Instrument integration and test @ Ball Aerospace (Boulder, Colorado)
 - ▷ DU End-to-end test with X-ray mirrors at MSFC (Huntsville, Alabama)
 - ▷ Preparation for Science analysis (simulations and development of the analysis tools)

Nome	Affiliazione	FTE
Baldini L. (responsabile nazionale)	Università di Pisa	0.7
Barbanera M. *	TD INFN (tecnologo)	1
Bellazzini R.	INFN	0.5
Brez A.	INFN	0.5
Lucchesi L. *	TD INFN (tecnologo)	1
Magazzù G.	INFN	0.3
Minuti M.	INFN	1
Nuti A. *	TD INFN (tecnologo)	1
Pesce-Rollins Melissa	INFN	0.5
Pian Elena	SNS	0.5
Pinchera Michele	INFN	1
Sgrò C. (responsabile locale)	INFN	0.5
Shore S.	Università di Pisa	0.5
Spandre G.	INFN	0.5
Orsini L. *	TD INFN (tecnologo)	1
Nasimi H. *	TD INFN (tecnologo)	1
Cardelli C. *	CTER amministrazione	1
Totale FTE		12.5

* TD, ASI-INFN agreement n.2017-13-H.0

- ▷ Separazione chiara della preparazione (materiale e scientifica) della missione IXPE dal lavoro su ulteriori sviluppi tecnologici del GPD
 - ▷ Sezioni coinvolte: Pisa, Torino
 - ▷ 2/3 anni, budget di ~ 200 keuro
 - ▷ Responsabili nazionale e locale: G. Spandre, C. Sgrò
- ▷ Punti chiave: diminuzione del tempo morto e riduzione dei sistematici
 - ▷ ASIC di readout (multiproject, in collaborazione con un design center esterno)
 - ▷ Gas Electron Multiplier (in collaborazione con SciEnergy e Techtra)
 - ▷ Realizzazione di un sistema di bake-out e filling in house
 - ▷ Qualifica del processo di produzione
- ▷ Contesto: missioni future di polarimetria X, e.g., eXTP
- ▷ Progetto mirato ed estremamente ben definito
- ▷ Operazione *a saldo nullo* dal punto di vista delle risorse di Sezione e dell'anagrafica—1.5 FTE a Pisa da togliere a IXPE_INFN:

Nome	Affiliazione	FTE
Baldini L.	Università di Pisa	0.1
Bellazzini R.	INFN	0.4
Brez A.	INFN	0.3
Minuti M.	INFN	0.2
Sgrò C.	INFN	0.2
Spandre G.	INFN	0.3
Totale FTE		1.5

- ▷ Completamento dell'attività di costruzione delle DU
- ▷ Supporto elettronico all'integrazione dello strumento (DU e computer di bordo)
- ▷ Supporto meccanico ed elettronico all'integrazione con lo spacecraft presso Ball Aerospace (Colorado)
- ▷ Supporto meccanico ed elettronico alla calibrazione end-to-end (DU + ottiche) presso MSFC (Alabama)
- ▷ Supporto del personale dalla Sezione:
 - ▷ Minuti *full time* sul progetto ancora per il 2020
 - ▷ Alte tecnologie: Ceccanti ~ 4 MU (prevalentemente nella prima metà dell'anno)
- ▷ Spazi e attrezzature nella camera pulita (con profilo decrescente nel tempo)
 - ▷ assemblaggio meccanico
 - ▷ metrologia
 - ▷ test stand
 - ▷ storage
- ▷ Laboratorio GLAST
- ▷ Richieste finanziarie in fase di definizione
 - ▷ Fondi ASI coprono la maggior parte delle esigenze