eXTP: an European-Chinese X-ray mission to study the state of matter under extreme conditions

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on behalf of the eXTP/WFM consortium

- eXTP: enhanced X-ray Timing and Polarimetry Mission
- A flagship X-ray observatory mission from the Chinese Academy of Sciences (CAS), with a large European contribution (2 of 4 instruments)
- Now in Phase B. Launch planned in 2027. Nominal lifetime: 5 yrs; goal: 8 yrs
- Core programme plus guest observer programme. Observatory will be open to the worldwide scientific community

eXTP: general description

https://www.isdc.unige.ch/extp/

launch expected in 2027

Now in Phase B

Energy range (keV)

0.5 - 10 **SFA (Spectroscopic Focusing Array)**
grazing incidence X-ray telescopes,
Silicon Drift Detectors

2 - 10 **PFA (Polarimetry Focusing Array)**
X-ray telescope optimized for polarimetry,
Gas Pixel Detectors

2 - 30 **LAD (Large Area Detector)**
Large-area Silicon Drift Detectors,
capillarity plates collimators

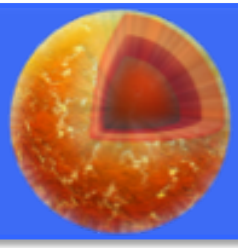
2 - 50 **WFM (Wide Field Monitor)**
Large-area Silicon Drift Detectors,
coded mask

EU Instruments
LOFT (ESA M3) heritage

- LAD PI: Marco Feroci, INAF/IAPS, Rome, Italy
- WFM ***PI: Margarita Hernanz***, ICE-CSIC & IEEC, Barcelona, Spain

eXTP: science drivers

Dense matter

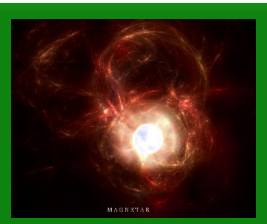


Constrain EOS of ultra-dense matter: Neutron Stars

Accretion in strong gravity

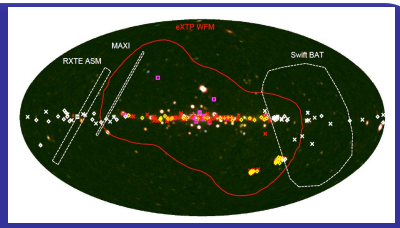
Tests of General Relativity in Black Holes and Neutron Stars

Strong magnetism



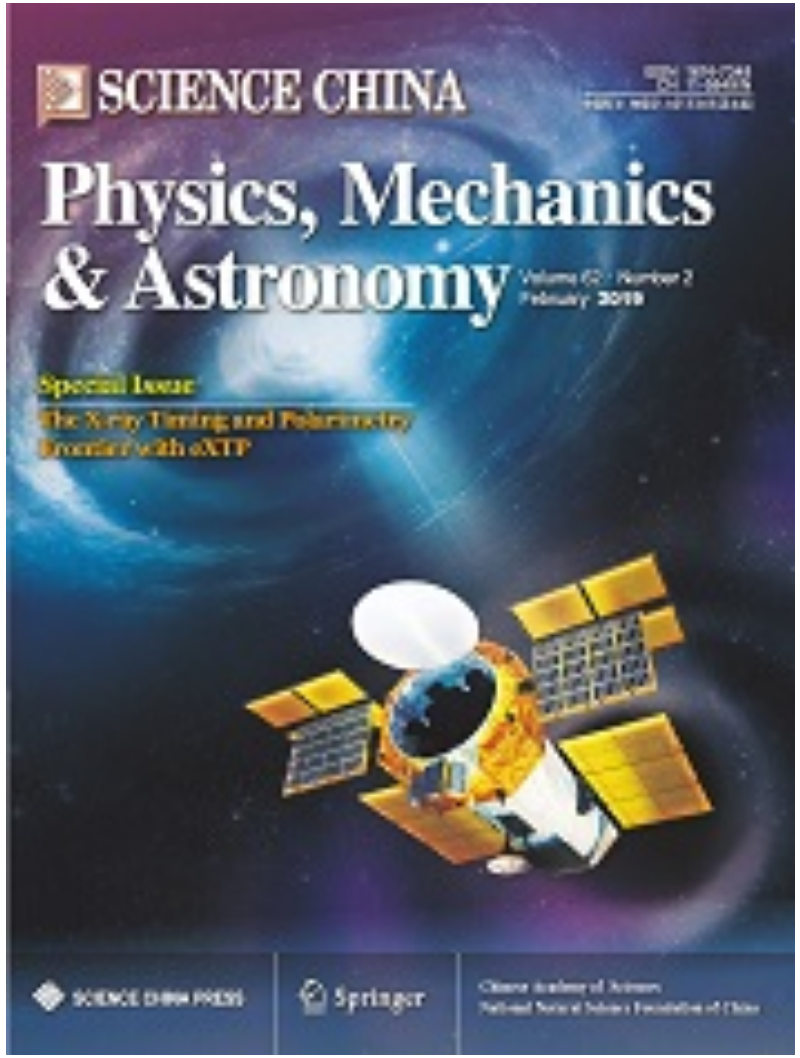
Light and matter in ultra-strong magnetic fields

Observatory science



Monitoring of transient sources, including e.m. counterparts of Grav. Waves, for rapid follow-up.

eXTP White Papers (science & instruments): dedicated volume in Science China (Springer) - vol. 62 (2019)



2019SCPMA..6229506I — 1.000 — 02/2019 — A E X D R C
in't Zand, Jean J. M.; Bozzo, Enrico; Qu, JinLu; Li, Xiang-Dong; Amati, Lorenzo; Chen, Yang; Donnarumma, Immacolata; Doroshenko, Victor; Drake, Stephen A.; Hernanz, Margarita; and 174 coauthors
Observatory science with eXTP
Hernanz, Torres (ICE), José, Linares, Sala (UPC), Torrejón (UA), Pérez Torres (IAA)

2019SCPMA..6229505S — 1.000 — 02/2019 — A E X D R C
Santangelo, Andrea; Zane, Silvia; Feng, Hua; Xu, RenXin; Doroshenko, Victor; Bozzo, Enrico; Caiazzo, Ilaria; Zelati, Francesco Coti; Esposito, Paolo; González-Caniulef, Denis; and 31 coauthors
Physics and astrophysics of strong magnetic field systems with eXTP
Rea, Coti-Zelati (ICE)

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De Rosa, Alessandra; Uttley, Phil; Gou, LiJun; Liu, Yuan; Bambi, Cosimo; Barret, Didier; Belloni, Tomaso; Berti, Emanuele; Bianchi, Stefano; Caiazzo, Ilaria; and 92 coauthors
Accretion in strong field gravity with eXTP
Agudo (IAA), Linares (UPC), Miniutti (CAB), Migliari (ESAC)

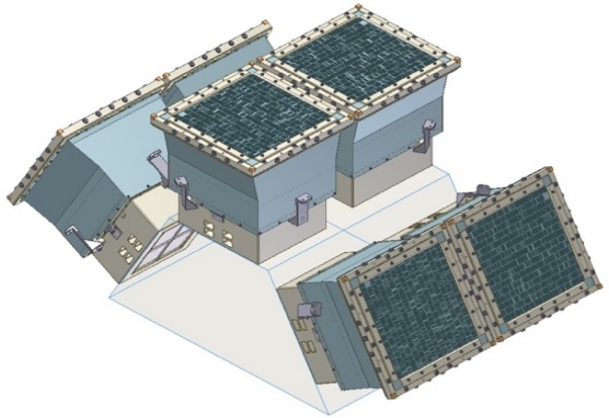
2019SCPMA..6229503W — 1.000 — 02/2019 — A E X R C
Watts, Anna L.; Yu, WenFei; Poutanen, Juri; Zhang, Shu; Bhattacharyya, Sudip; Bogdanov, Slavko; Ji, Long; Patruno, Alessandro; Riley, Thomas E.; Bakala, Pavel; and 66 coauthors
Dense matter with eXTP
Tolós, Patruno (ICE), Linares (UPC)

2019SCPMA..6229502Z — 1.000 — 02/2019 — A E X R C
Zhang, ShuangNan; Santangelo, Andrea; Feroci, Marco; Xu, YuPeng; Lu, FangJun; Chen, Yong; Feng, Hua; Zhang, Shu; Brandt, Søren; Hernanz, Margarita; and 143 coauthors
The enhanced X-ray Timing and Polarimetry mission—eXTP
Hernanz, Gálvez, ... (ICE)

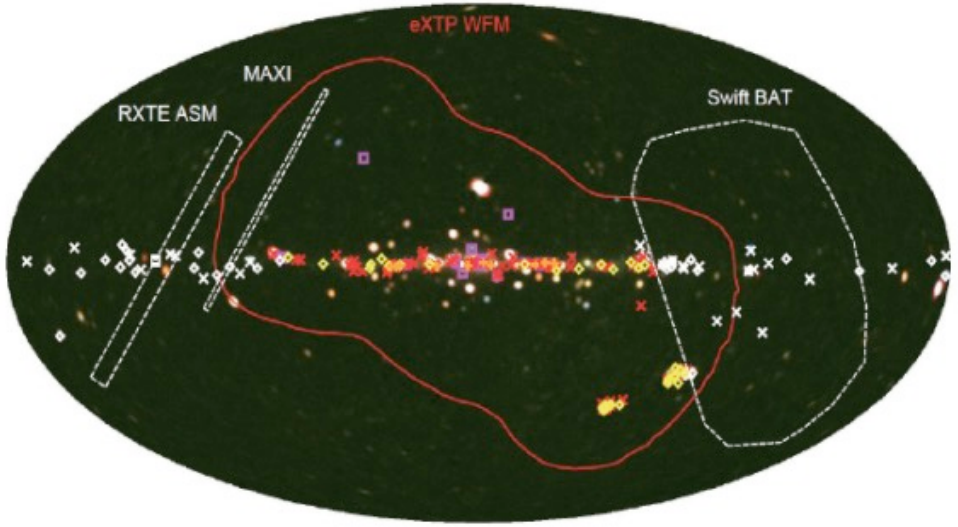
Science case

Mission

eXTP: Wide Field Monitor



- Field of View: 4 steradian (at 20% response)
- Imaging, <5 arcmin angular resolution, 1 arcmin PSLA
- Effective area: 80 cm^2 @6 keV (1 unit, on axis)
- Same design as LOFT/WFM, 3 units (**6 coded mask cameras**)
- Same detectors as LAD (SDD). Time resolution <10μs
- Energy band: 2-50 keV
- Energy resolution: 300 eV FWHM @6 keV

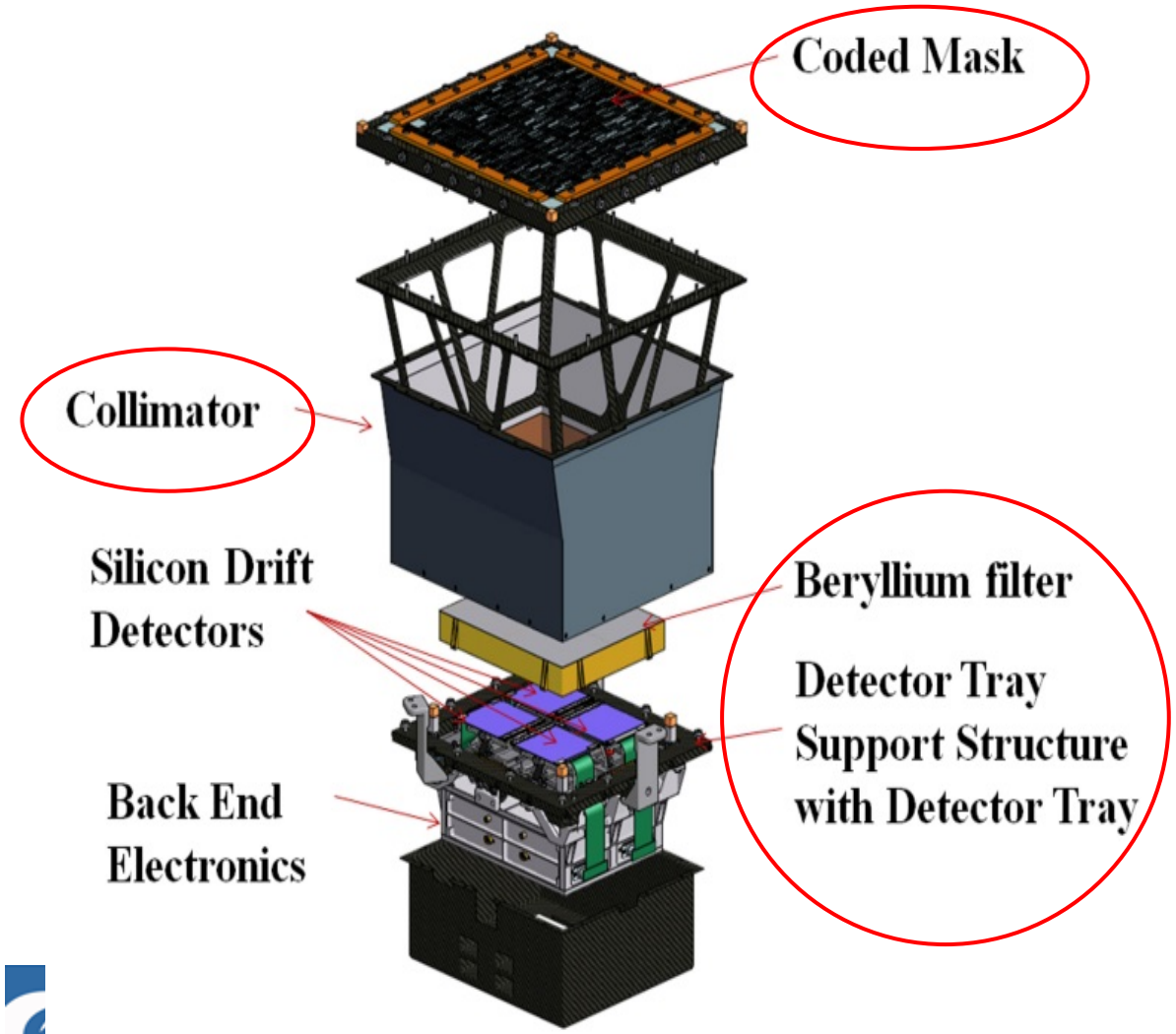


Comparison of the WFM FoV and that of most relevant facilities

The WFM has an unprecedented combination of large FoV and imaging capability down to 2 keV

eXTP: Wide Field Monitor

Exploded view of the WFM camera design



ICE- CSIC & IEEC contribution to the eXTP-WFM instrument

- IP (MH) of the WFM instrument. Project Office
- Mechanical design, manufacturing and test of the coded mask, collimator, Beryllium filter, detector tray and its support structure
- Thermal control, analysis and design of the WFM instrument
- AIV of the camera