X-ray Test Facility Cross-Calibration

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X-ray Test Facilities

- Japan
  - 30m (ISAS) Pencil beam
- China
  - XF100 (IHEP) Long beam
  - 12-m (NAOC) Long Beam
  - Shanghai (Tonji) Pencil beam
- USA
  - XRCF 518-m (MSFC) Long beam
  - 100-m (MSFC) Long beam
  - 100-m (GSFC) Long beam
  - 47-m (PSU) Long beam

- Europe
  - PANTER (MPE,DE) 130-m Long beam
  - LLBTF (Leicester, UK) 27.5-m Long beam
  - XACT (Palermo, IT) 35-m Long beam
  - IKI60 (IKI, RU) 60-m Long beam

  - BESSY (cosine, DE) Pencil beam
  - ALBA (cosine, SP) Pencil beam

  - BEaTriX (Merate, IT) 12-m Parallel beam
  - Vert-X (MLT, IT, design) 12-m Parallel beam

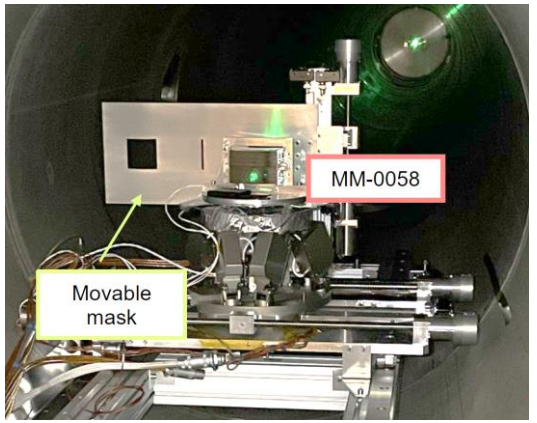
Ground Facility Cross Calibration

- Important for measurement and understanding of on- and off-axis:
  - PSF
  - Effective Area / Vignetting
- Comparing measurements with simulations
  - Important to understand if optics perform as expected
- Making predictions for parallel illumination in orbit
  - Needed to have a solid starting point for in orbit calibration

Current Ground Facility Cross Calibration

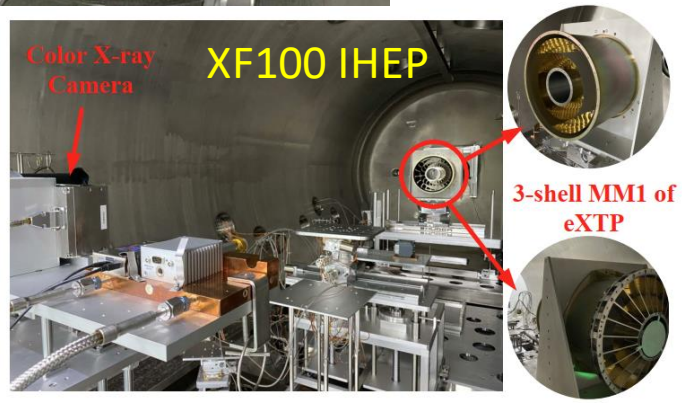
NewATHENA

- BESSY – ALBA – BEaTriX – PANTER
  - MM-0037 → mandrel-based optic (f = 12 m)
  - MM-0058 → first flight like Silicon Pore Optic (f=12m)
- XRCF – PANTER
  - MM-0036 → Silicon pore optic (f = 12 m)



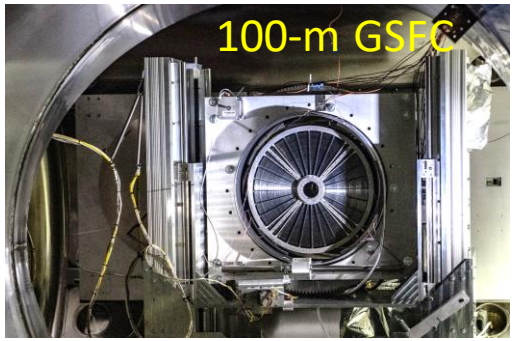
eXTP

- XF100 – PANTER
  - MM3 prototype → 3 mirror shell eXTP prototype nickel optic



XRISM

- ISAS 30-m – 100-m GSFC
  - Mirror Module/s → Resolve And Xtend mirrors



Illumination of Mirror Infinity vs. Finite Source Distance

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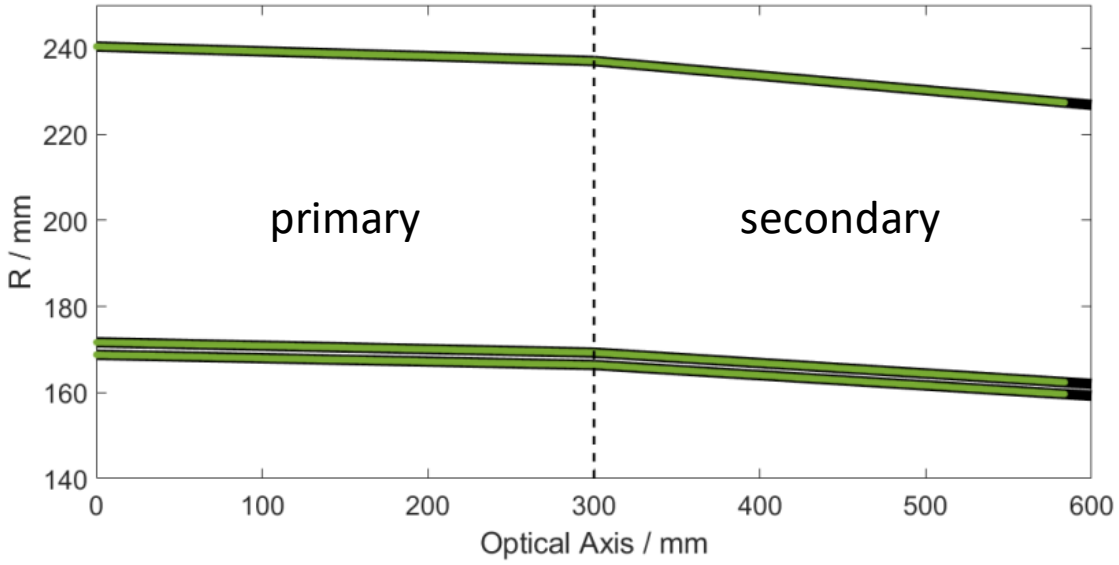
eXTP MM3 prototype

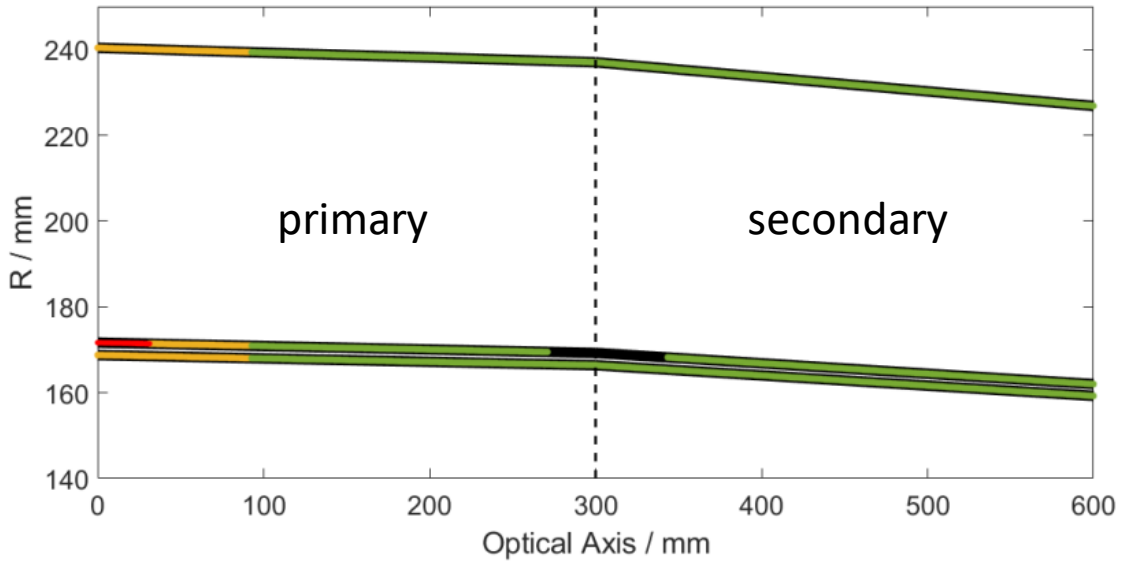
Double reflections
Unilluminated

Double reflections
Unilluminated
Single reflections from primary
Double reflections intersect inner shell

Infinity



Finite



Effective Area XF100 (IHEP)

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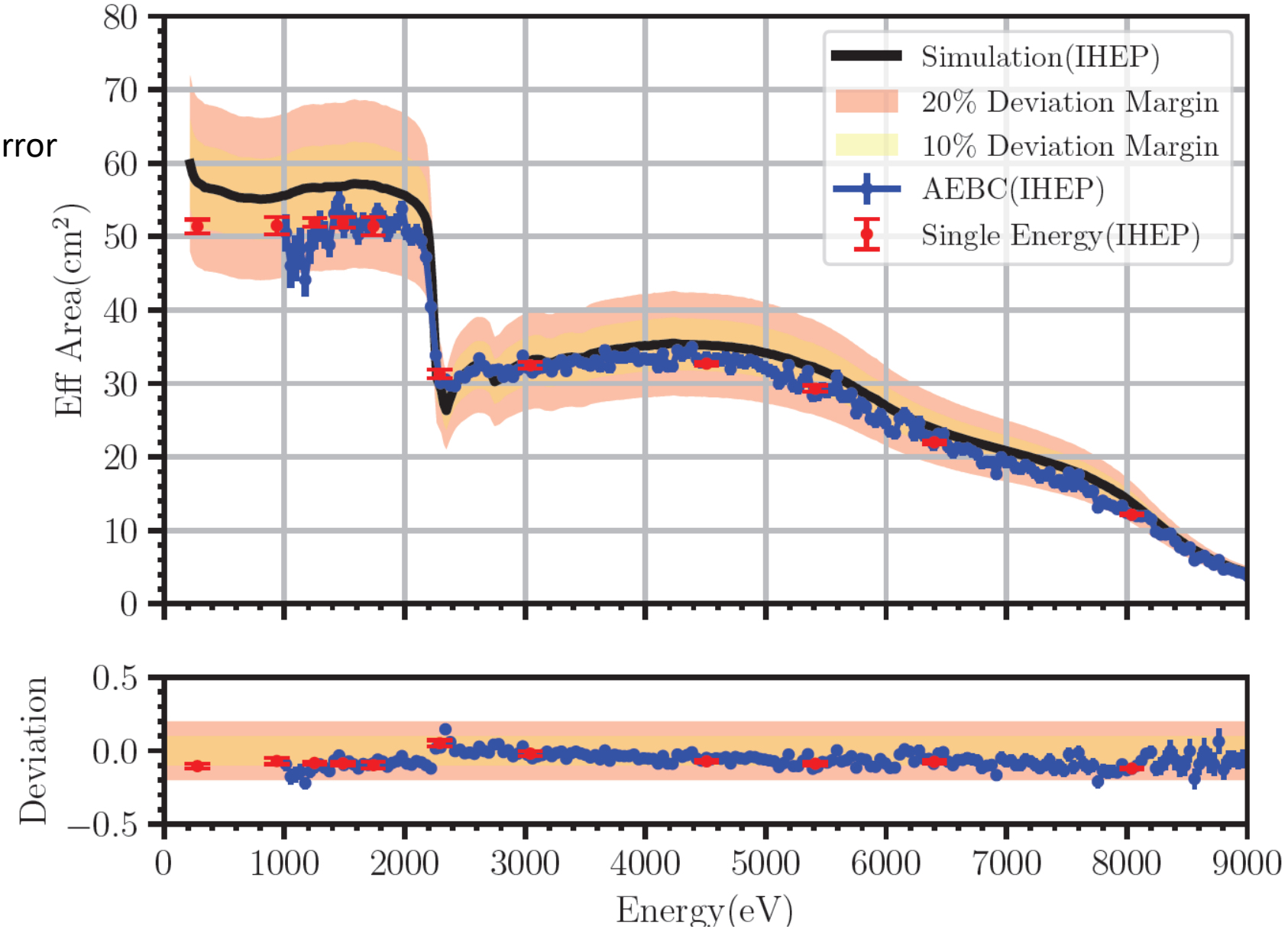
eXTP MM3 prototype

Distance
Source - Mirror
100-m



Effective Area PANTER (MPE)

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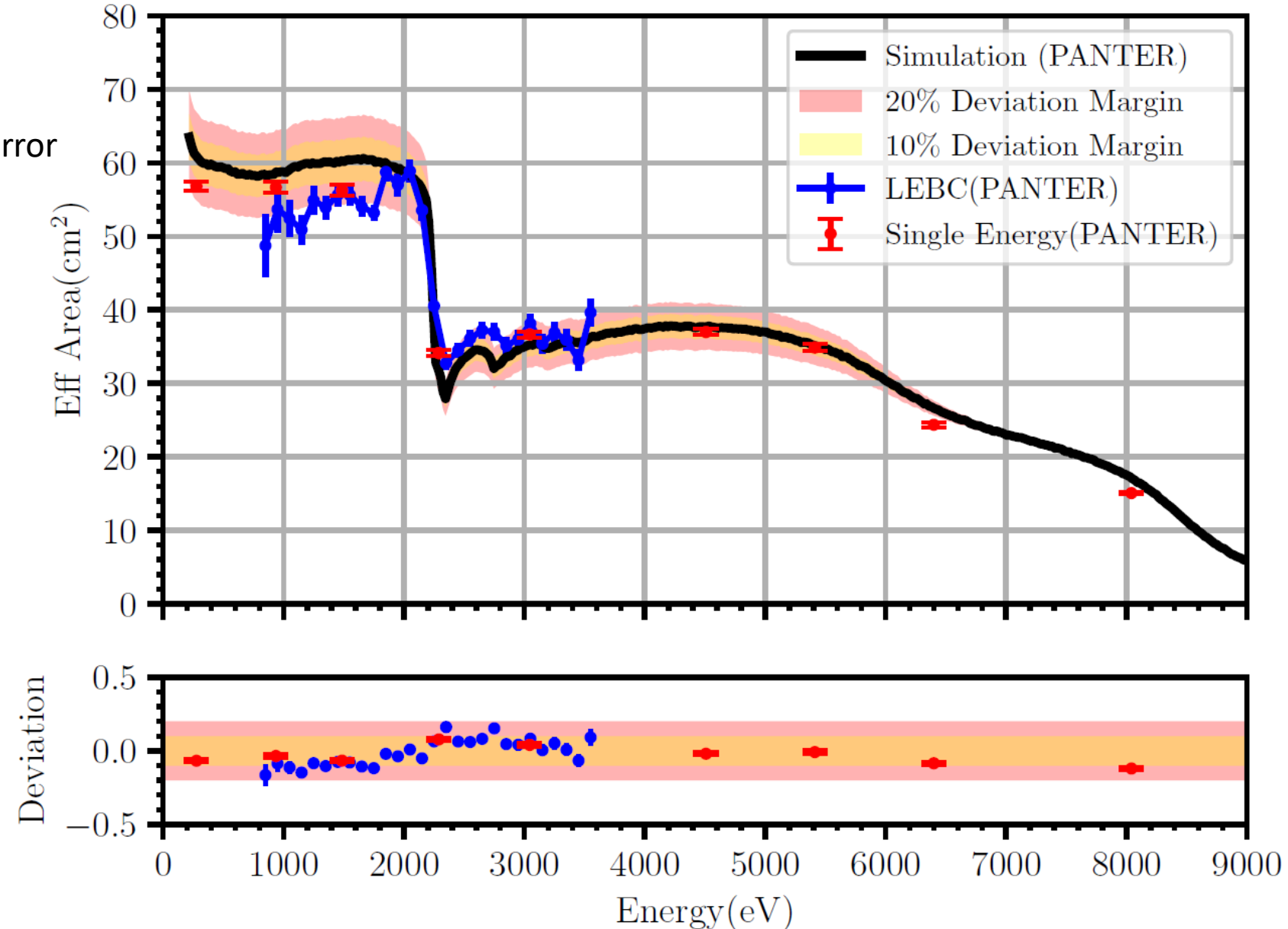
eXTP MM3 prototype

Distance
Source - Mirror
124-m



Summary

We propose to create a new working Group

→ “X-ray test facility cross-calibration”

Reasoning

- Get the calibration starting point right
  → accurate prediction of in-orbit performance
- Independent verification of the ground measurements
- If needed, spread the calibration load between facilities.