# DIOS MISSION

## - DIFFUSE INTERGALACTIC OXYGEN SURVEYOR -

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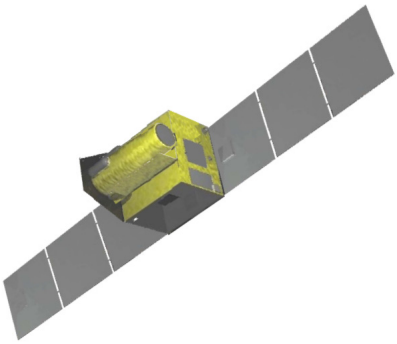
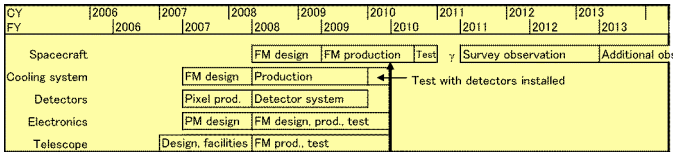
A Small Satellite Mission for Dark Baryon Mapping by Fine-Spectroscopy of Oxygen Emission Lines

- 4-stage mirror of 70 cm focul length gives $S\Omega$ > 100 cm$^2$deg$^2$
- 16x16 TES microcalorimeter array of an energy resolution of 2eV
  →suitable for small satellite, and sensitivity for diffse lines will exceed observatory missions
- No cryogen dewer utilizing mechanical cooler assures long mission life

## - SPACECRAFT -

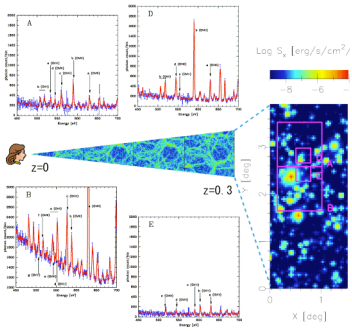


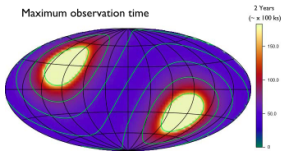
| | | |
|---|---|---|
| Weight | Total | ~ 400 kg |
| | Payload | ~ 200 kg |
| Size | Launch | 1.2×1.5×1.5 m$^3$ |
| | In orbit | 6×1.5×1.5 m$^3$ |
| Attitute | Control | 3-axis bias-momentum method |
| | Accuracy | ≦30 arcsec |
| Power | Total | 550 W |
| | Payload | 280 W |
| Orbit | | LEO ~550 km |



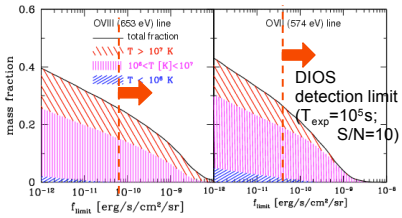

## - OBSERVATION PLAN-

- Survey of the large-scale structure of 100 degree$^2$ in one year by 100 ksec/point mapping
- Mapping of Galactic hot ISM of 1/4 sky in one year by shallow (1 ks/point) observations
- Deep observations to study evolution of the large scale structures and clusters of galaxies




Exposure time in 2 years

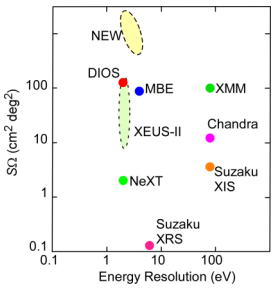



DIOS will detect 20% of dark baryons in WHIM

## - PAYLOAD -

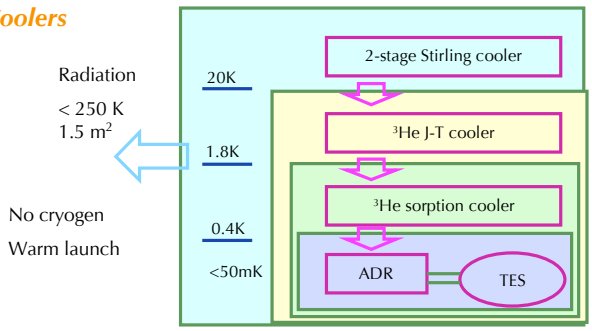
### *Overview*

| | |
|---|---|
| Effective Area | > 100 cm$^2$ |
| FOV | 50' diameter |
| SΩ | ~100 cm$^2$deg$^2$ |
| Spatial resolution | 3' (16 x 16 pix) |
| Energy resolution | 2 eV (FWHM) |
| Energy Band | 0.1 - 1.5 keV |
| Mission Life | ·> 5 yr |




Comparison of SΩ and energy resolution

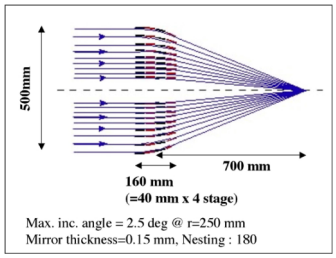
### *Coolers*



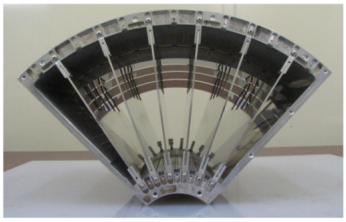

### *FXT*

*Four-reflection X-ray Telescope*

- 4-stage reflection optics by light (~ 20kg) replica mirrors
- FOV of 40 arcmin. (FWHM) and angular resolution of 2 arcmin.




A mirror design with 70cm F.L. and 50 cm in diameter

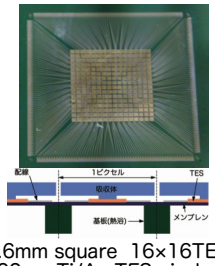


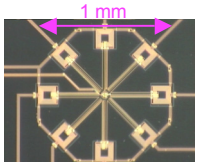
Demonstration model of housing (quadrant), alignment plate, and one set of four-stage replica foil mirrors.

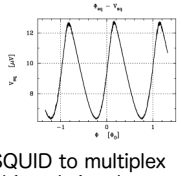
### *XSA*

*X-ray Spectrometer Array*

- 16x 16 TES (Transition Edge Sensor) array covers 50 arcmin.
- Goal of energy resolution :2eV



9.6mm square 16×16TES array: 500μm Ti/Au TES pixels with mushroom-shape absorbers. Efficiency is 83 %.

Multi-input SQUID to multiplex 8 pixels. AC-biased signals are de-multiplexed by FFT.