# The Hard X-ray Imager (HXI) for the **NeXT** mission



2 sets of mirror

and detector

The NeXT mission and the HXI

Hard X-ray Telescope: Focal length = 12 m

The NeXT/HXI team

The NeXT mission and the HXI

To explore the frontiers of non-thermal universe: what causes the non thermal phenomena, and why it breaks the energy equilibrium.

The first imaging spectroscopy with focusing optics above 10 keV to explore the high energy particles synthesized in the huge and powerful accelerators hidden in the universe. To resolve the spectra with unprecedented sensitivity and to identify their spatial distribution with highest positional resolution.

## Focal plane detector for the hard X-ray focusing optics

high efficiency at up to 80 keV positional resolution to over-sample the mirror resolution low detector background

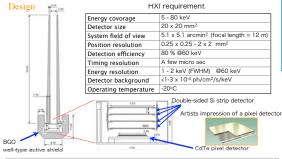
The Hard X-ray Imager on NeXT

### Basic Concepts

• Application of the CdTe pixel detector and the double-sided Si strip detector technology where our group is on lead

• Utilize the background rejection concept developed for and proven with the Suzaku HXD ("the Well-type active shield")

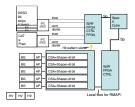
High commonality with the SGD system to secure high reliability



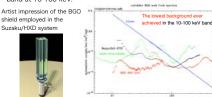
'03 design : An X-ray CCD to cover below 10 keV was mounted above the CdTe pixel detector (the Wide-band X-ray Imager (WXI) concept), and the active shield of the HXI is only located beneath the detector

'05 design: To secure the detector background as low as that in the Suzaku/HXD, the HXI base-line design has been changed to incorporate the "well-type active shielding". Only high timing resolution devices, such as the DSSD and the CdTe pixel are utilized for anti-coincidence. The X-ray CCD now has an independent mirror with focal length of 9 m, optimizing the FOV to the energy bandpass.

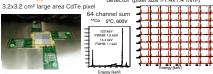
#### Data flow



Suzaku/HXD has proven the concept of well-type active shield. Even with an orbit passing through the SAA every day, the HXD has achieved the ever lowest background in the hard X-ray band at 10-100 keV.



Spectra from the 8x8=64 CdTe pixel



500 micron pitch CdTe pixel

2-dim VLSI for fine pitch CdTe pixel



- Development of large area APD, read out of large BGO crystal
- · 7.1%FWHM@662keV with BGO
- $\cdot$  Even in the low energy band, better than PMT
- · Compact design is enabled.