



The Chandra X-ray Observatory

Vital Statistics

- <0.5" spatial res.
- 600cm² area @1.5keV
- 16'*16' FoV
- $F_x \sim 4e-16$ in 10⁵ secs
- >1000 E/ Δ E (50-160Å)



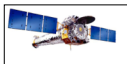
Chandra Status

- Currently observing Cycle 7 targets
- Cycle 8 Peer Review in June, results 7 July 2006
- Satellite and instruments performing well
- No major changes anticipated
- Scheduling restricted by need to moderate on-board temperatures, change in limits Dec 2005 eased this somewhat
- Oversubscription continues at ~6.5 (on time)
- Science, papers, citations continue at high levels
- No lifetime issues, determined by funding only



Orion Nebula

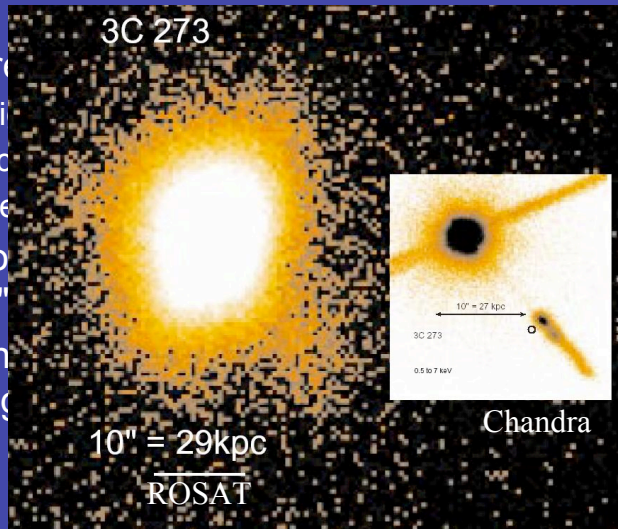
ROSAT (10'')
vs
Chandra (0.5'')



Chandra "Must Do" Science

Jets

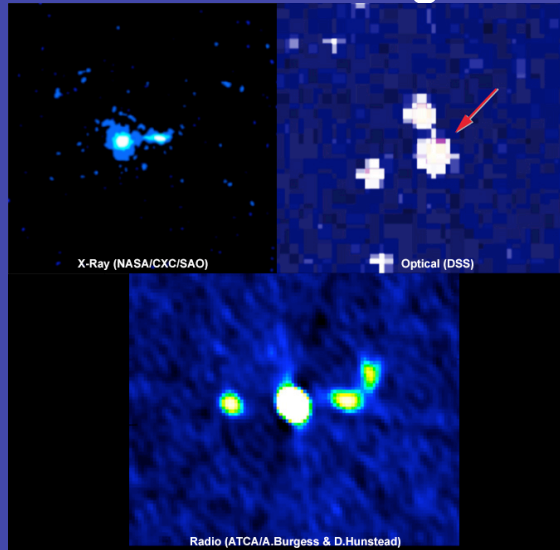
- High spatial-resolution
 - QSO Jets: high resolution
 - Central Structures
 - Surveys: Deep
- Will not be possible with other observatories (Con-X: 5-15'')
- Multi-wavelength observations (e.g. HST images)





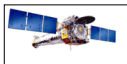
Actual Chandra First Light

- Point Source to focus: Quasar PKS0637-75, $z=0.5$
- X-ray Jet visible: 5" long, 200,000 lyrs
- New "industry"! (20% of AGN/Survey proposals)
- Compton scattering: internal/CMB



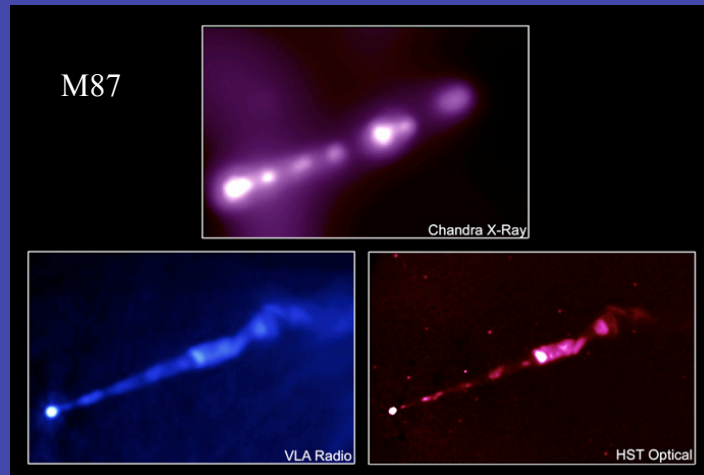
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X-ray/Radio Jets in Quasars

(Marshall et al)



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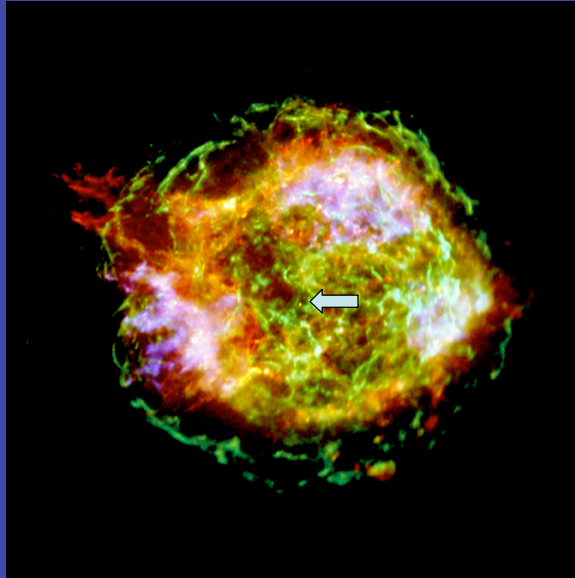


Supernova Remnants

- Detect shocks, sharp B/ ρ /P/T changes
- Finding central stellar remnant

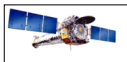
Hwang et al

Cas A : First Light



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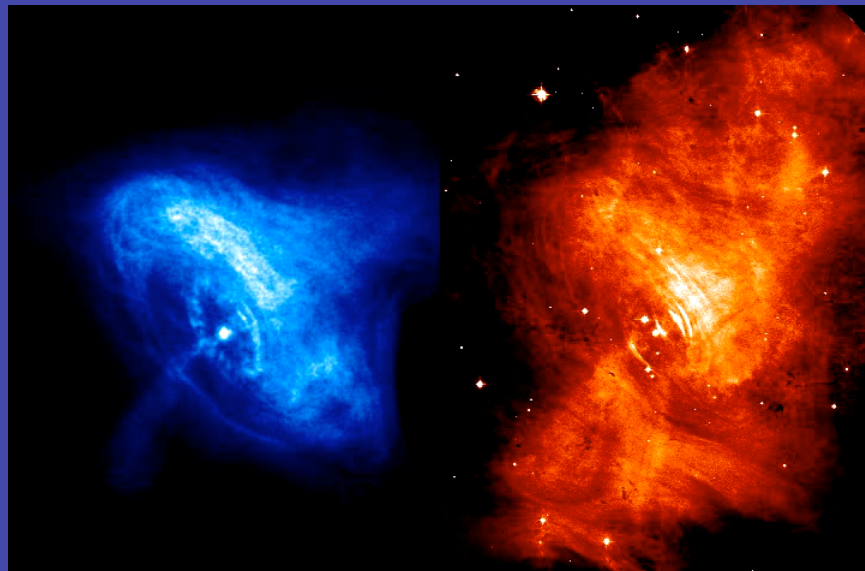


Crab Nebula

(Hester et al.)

CHANDRA

HST



CSG



Galactic Center

400*900 ly region



Wang et al.

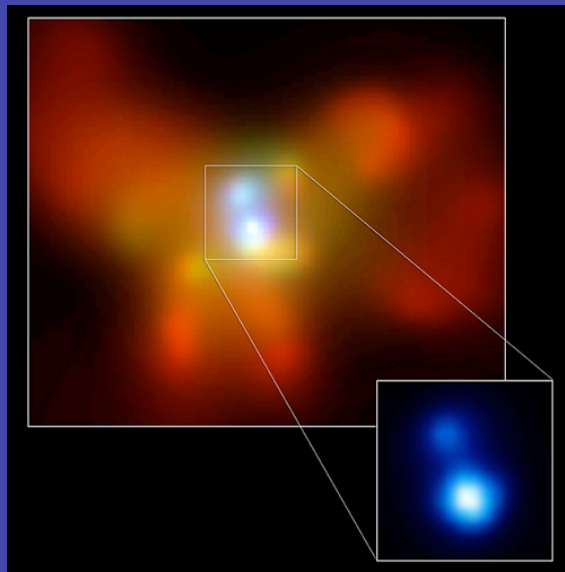
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Galaxy: NGC 6240

Komossa et al

Double Nucleus:
Galaxy merger



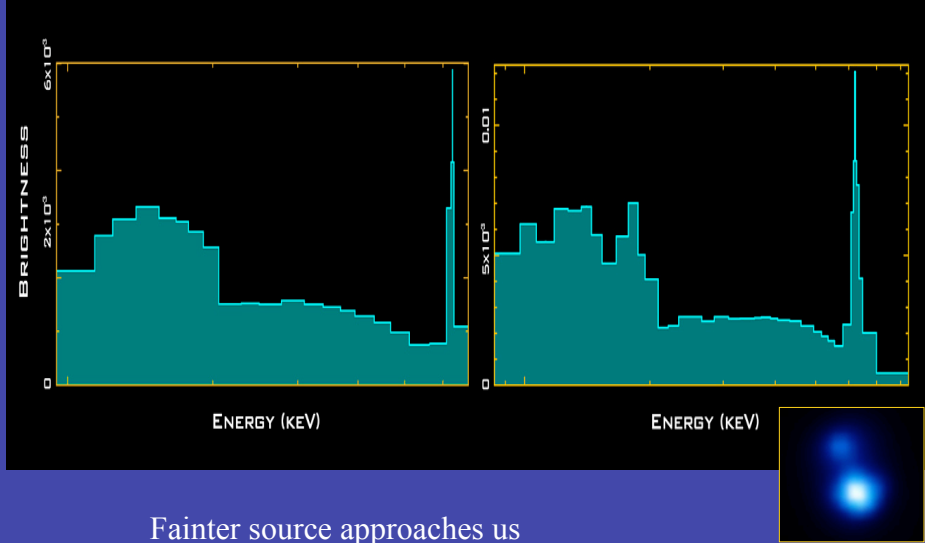
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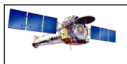
NGC 6240



Fainter source approaches us

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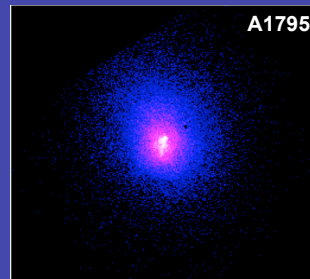
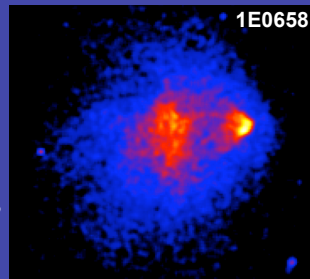
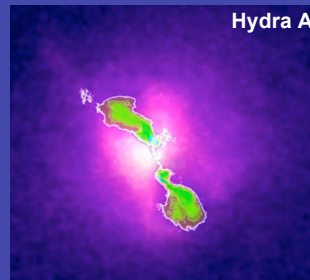
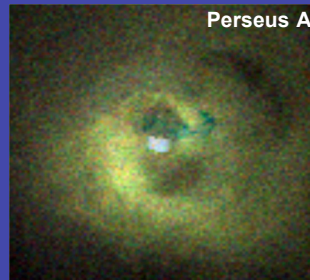
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Clusters of Galaxies

Complex:
 AGN outbursts,
 shock waves,
 cold fronts,
 bubbles,
 feedback

Need well-defined samples



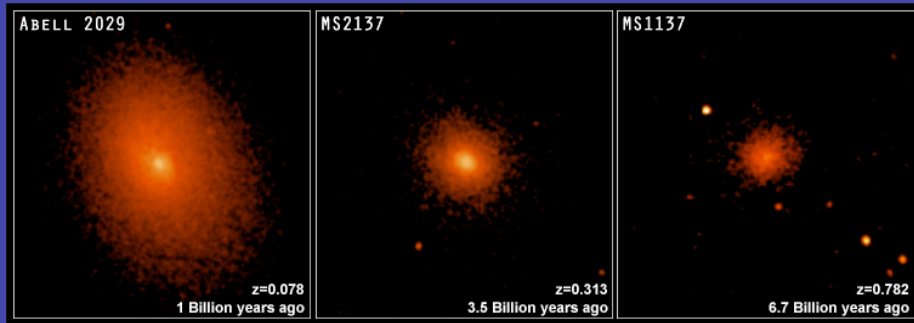
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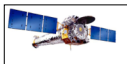




Investigating Dark Energy with Chandra Observations of Clusters (Allen et al)



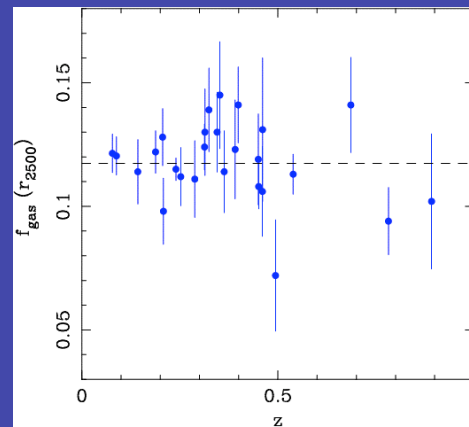
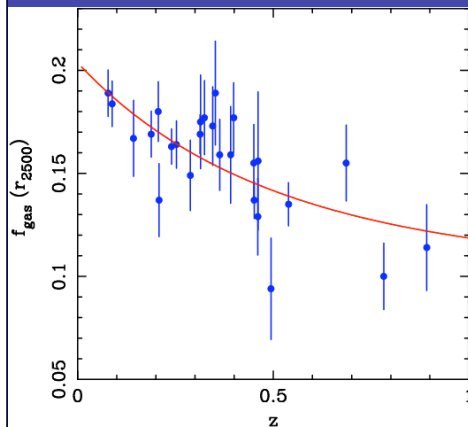
Calibrate distance scale via
assumption of constant gas fraction



Ratio of Ordinary to Dark Matter for Clusters vs. Distance Low-z clusters too bright → smaller distance

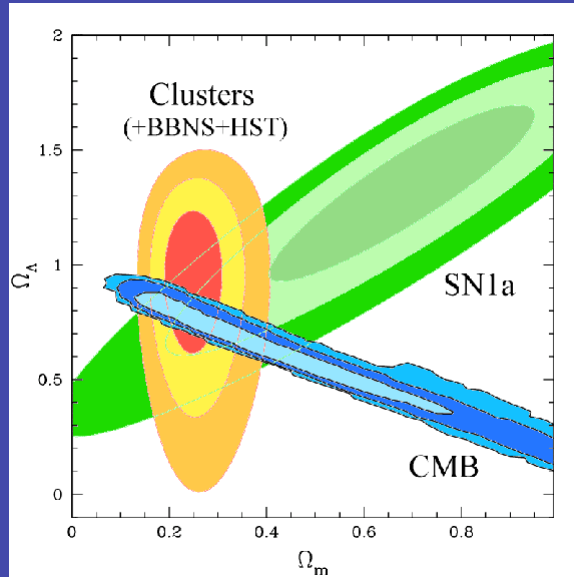
SCDM Cosmology

Λ CDM Cosmology



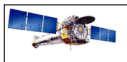


Cosmological Parameters



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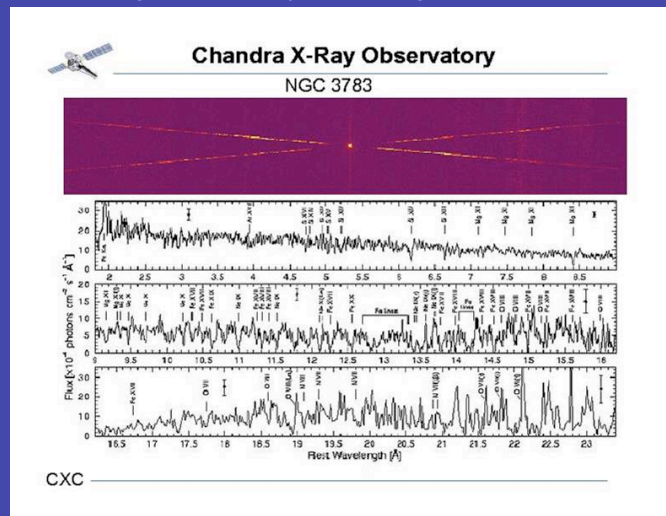
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HETG Spectrum: NGC3783

George, Netzer, Kaspi et al.; Krongold, Elvis et al.

Absorption:
3 components



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Surveys

- Complementary:
 - Deep, narrow: CDFS, CDFN (Brandt, Hasinger et al)
 - Medium wide: SWIRE, ChaMP (Lonsdale, Wilkes, Green et al)
 - Shallow, wide: Bootes (Murray, Forman et al)
- Aim: to find large enough samples of rare objects for detailed study by Con-X
- Are we doing enough?
*X-ray Surveys Workshop,
Nov 6-8, Cambridge MA*

