

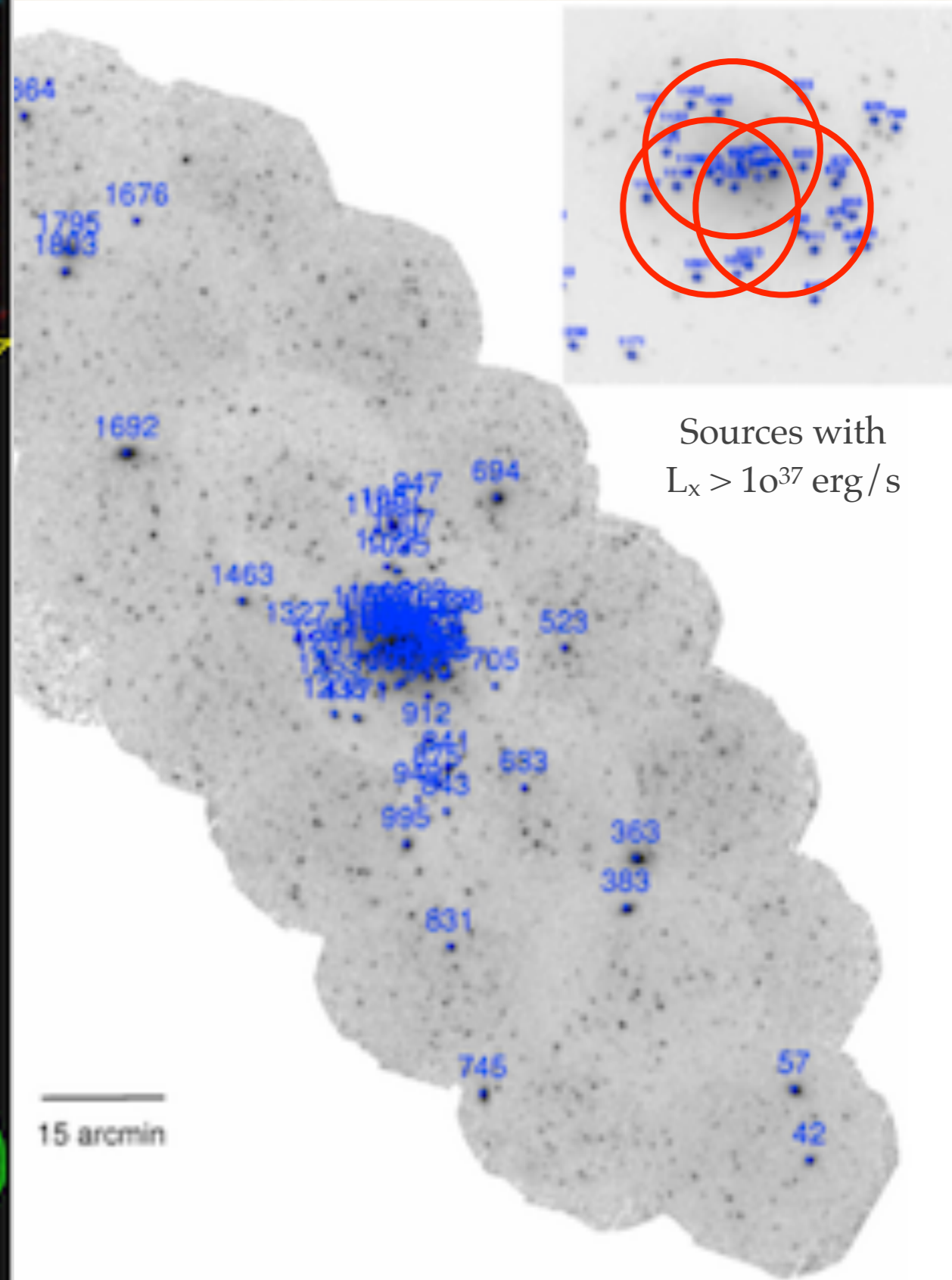
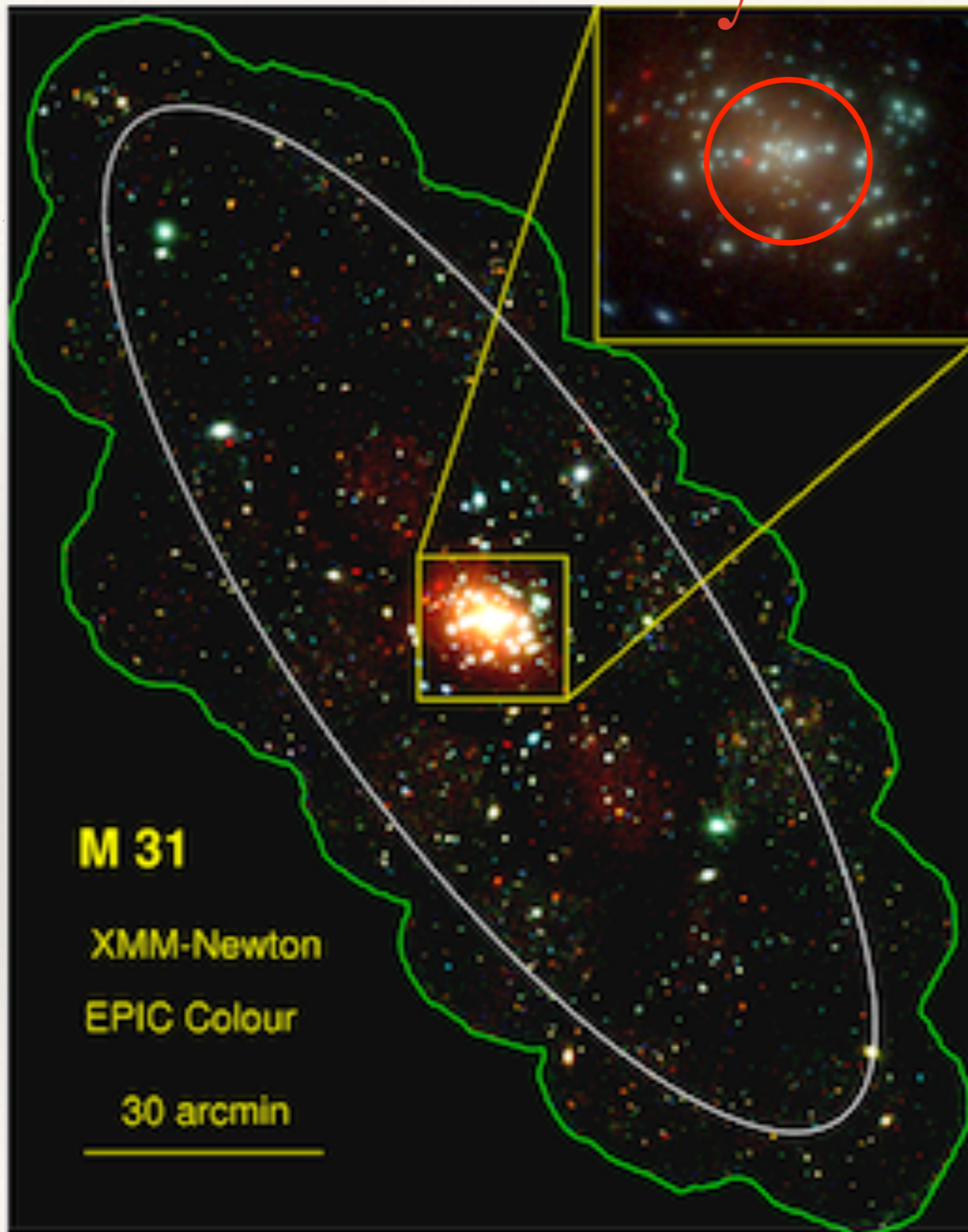
# Grating Spectroscopy of the M31 Bulge



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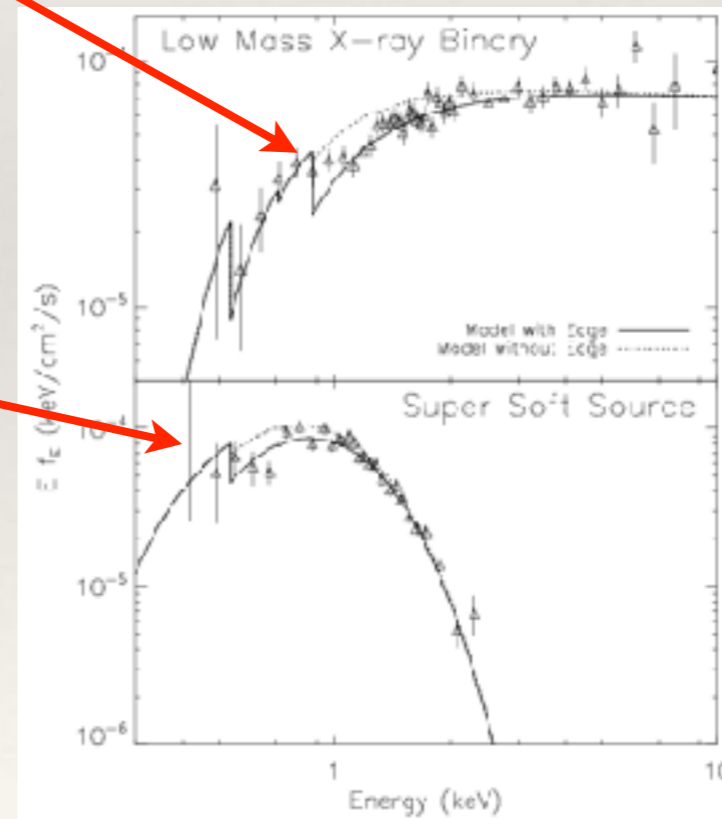
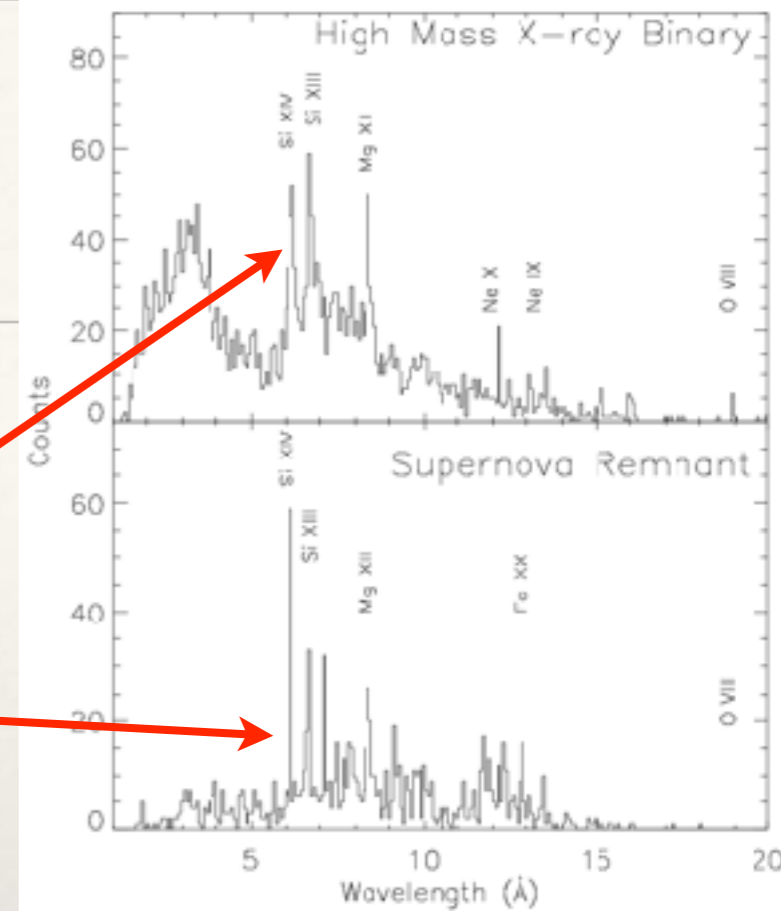


# An X-ray View of M 31



# Science Goals

- ❖ Emission Lines from HMXRB winds
- ❖ Emission Lines in SNR
- ❖ ISM Edges in LMXRB
- ❖ Abundances in LMXRBs
- ❖ SuperSoft Sources
- ❖ 1000s of X-ray bursts
- ❖ Oddities: SS 433, Cir X-1



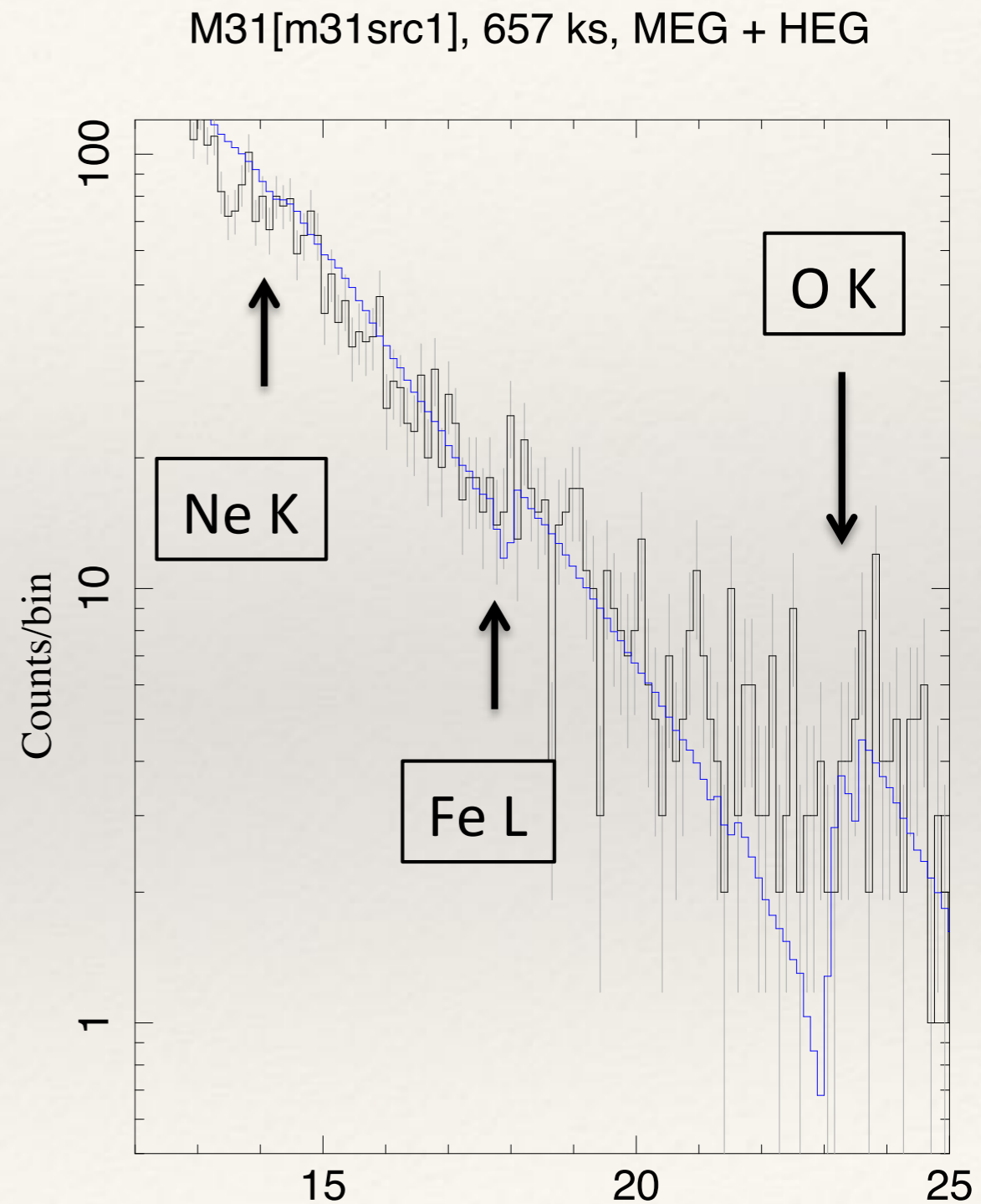






# ISM Probes

- ❖ Brightest Source in M31
  - ❖ 21 cm:  $N_{\text{H},21} = 1.6$
  - ❖ XMM:  $N_{\text{H},21} = 2.8 \pm 1.2$
  - ❖ HETGS:  $N_{\text{H},21} = 3.2 \pm 1.4$
- ❖ In progress:
  - ❖  $N_{\text{H}}$  for other XRBs
  - ❖ Compare Fe L (dust!) to O-K
  - ❖ Test against MW



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# Future of Chandra and You

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- ❖ How can YOU get involved (before Lynx)?
  - ❖ AGN?, then M 31\* spectra, variability
  - ❖ XRBs?, then
    - ❖ Transient spectroscopy w/o pileup
    - ❖ All bulge XRBs observed as a population
  - ❖ ISM?: Edges give elemental abundances, spatial variation
  - ❖ SNRs? (better line SNRs!)
    - ❖ Examine soft lines and ionization states
    - ❖ Add pointing to arm of M 31!
  - ❖ Challenging analysis? (timing, diffuse emission)
- ❖ Exposure time goal: consider 5% of Chandra's (remaining) lifetime!
  - ❖ >3 Ms for M 31? 5 Ms for M83, others?
- ❖ Get ready for Lynx!