A *Suzaku* Observation of MCG−2-58-22

Constraining the Geometry of the Circumnuclear Material

Elizabeth Rivers
UCSD-CASS PhD Candidate
Advisors: Richard Rothschild
Alex Markowitz

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Outline

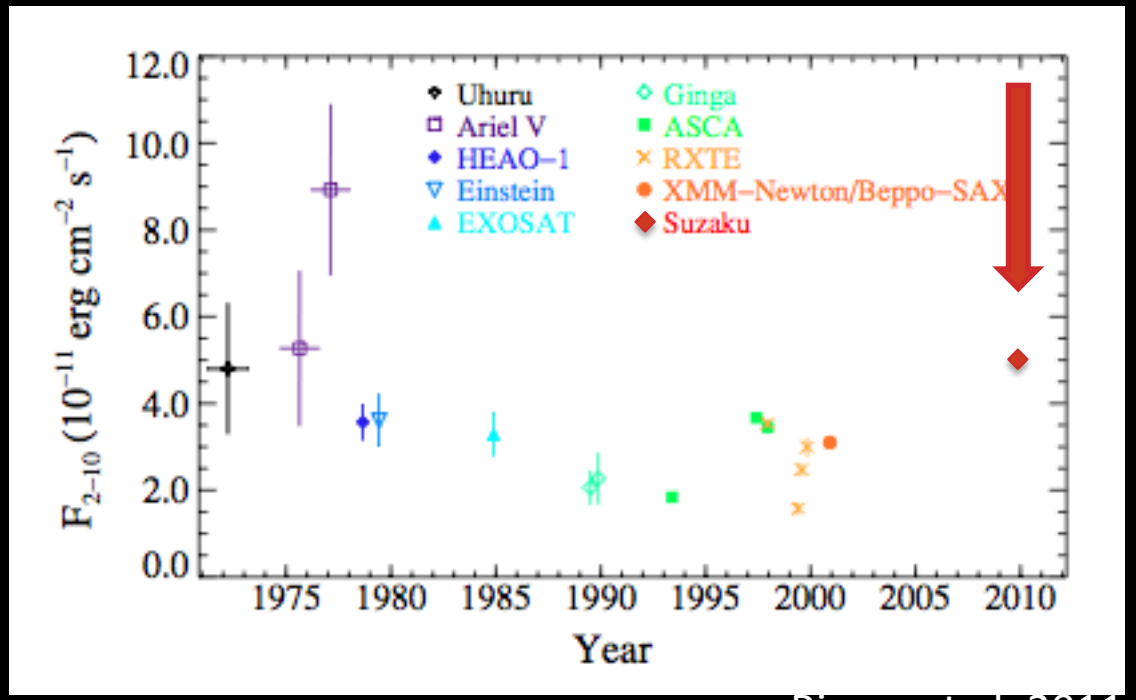
- MCG−2-58-22 Background
- The Fe K Complex
- Reflection Models
  - Compton Reflection from the Accretion Disk
  - The MYTorus Model
- Summary

MCG−2-58-22

- AGN Type: Seyfert 1.5
- X-Ray Components:
  - Unabsorbed
  - Fe K Lines
  - Soft Excess
  - Compton

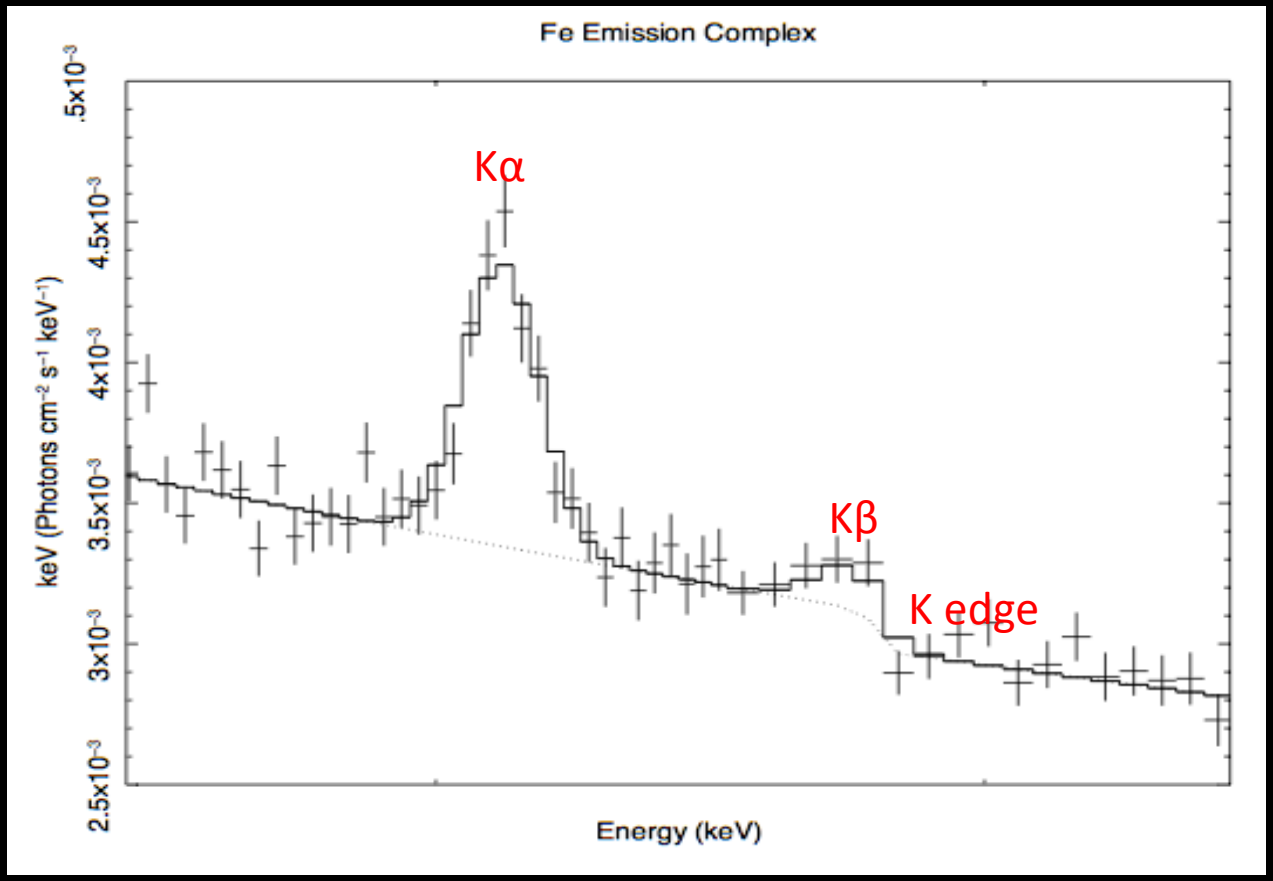
  Reflection Hump

140 ks observation
November 2009



Rivers et al. 2011

The Fe K Complex



- No broad line, Narrow Kα line
- Strong K edge, Fe Kβ/Fe XXVI line

The Fe K Complex

- Weak narrow Kα line: EW = 50 ± 10 eV

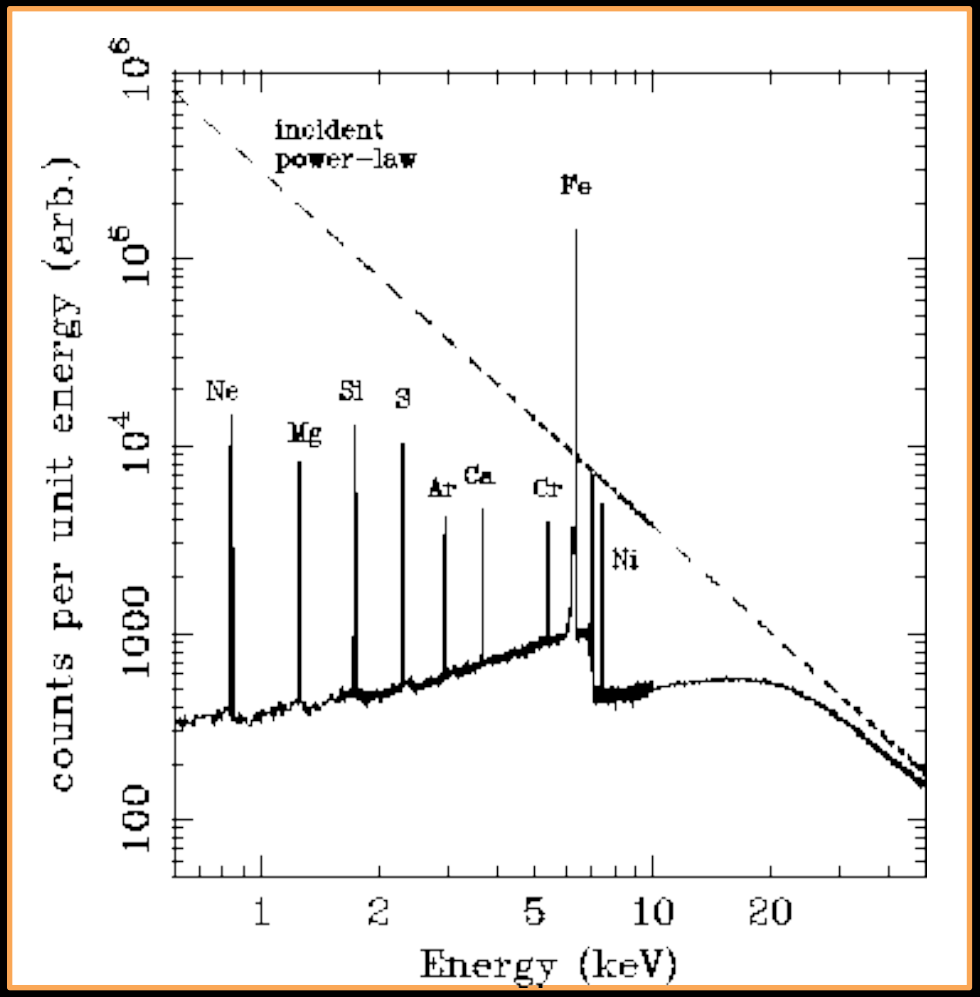
- Width: $v_{FWHM} \leq 7100$ km s^{-1}

  $M_{BH} = 10^{8.4} M_{\odot}$

  → $R \geq 45$ lt days ($\approx 1200\ R_S$)

- BLR: Hβ $v_{FWHM} \approx 6400 - 8600$ km s^{-1}

Compton Reflection off a Disk



Reynolds & Nowak 2003

Compton scattering off of Compton-thick material ($N_H \sim 10^{24}$ cm^{-2})

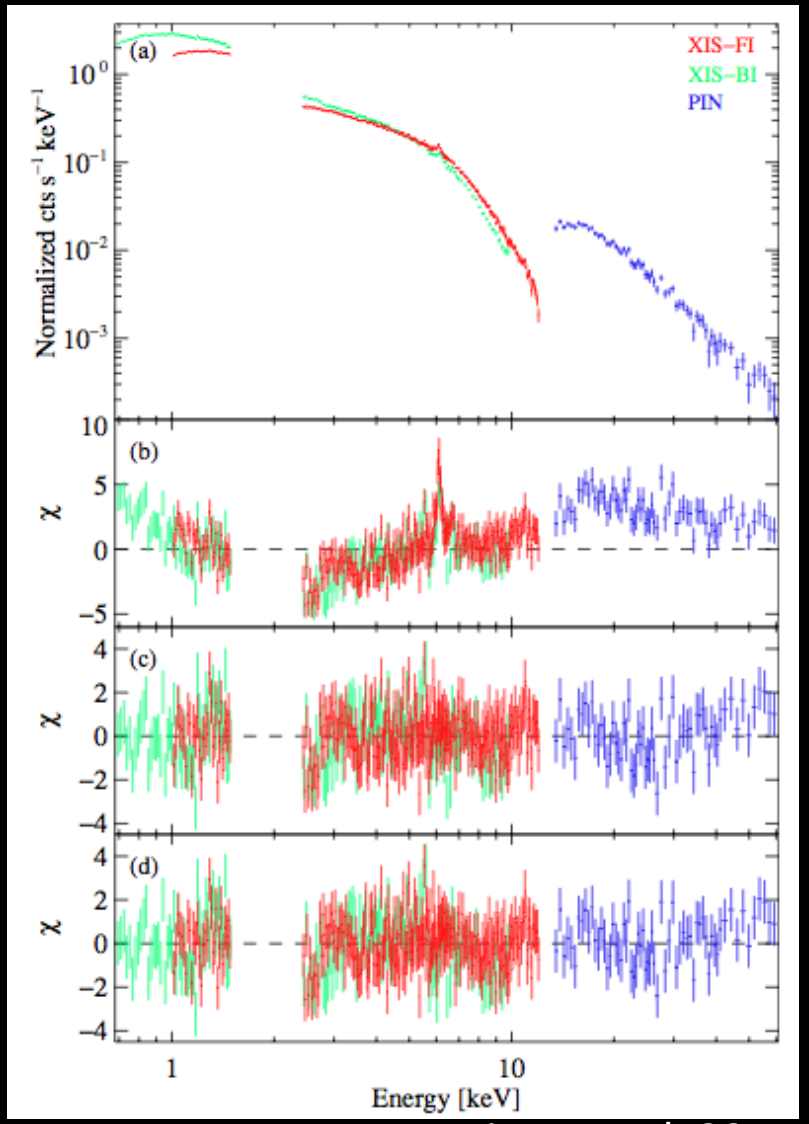
Produces emission lines and Compton Reflection Hump (CRH)

CRH Strength - R

Disk Modelling Results

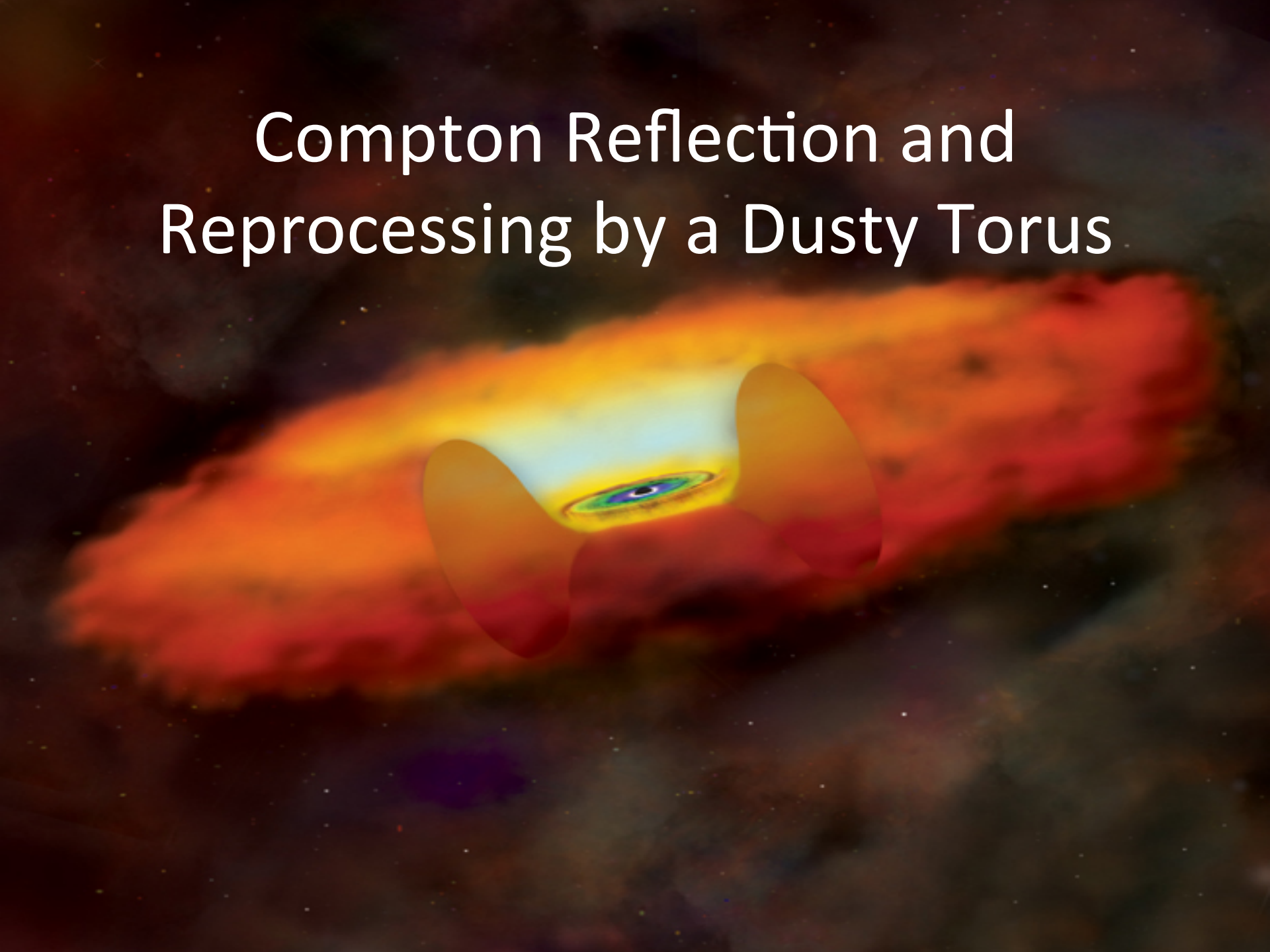
- $\Gamma = 1.80 \pm 0.02$
- $\Gamma_{SX} = 3.0 \pm 0.6$
- $R = 0.69 \pm 0.05$

Fe line EW slightly lower than expected from CRH



Rivers et al. 2011

Compton Reflection and Reprocessing by a Dusty Torus



The MYTorus Model
(Murphy & Yaqoob 2009)

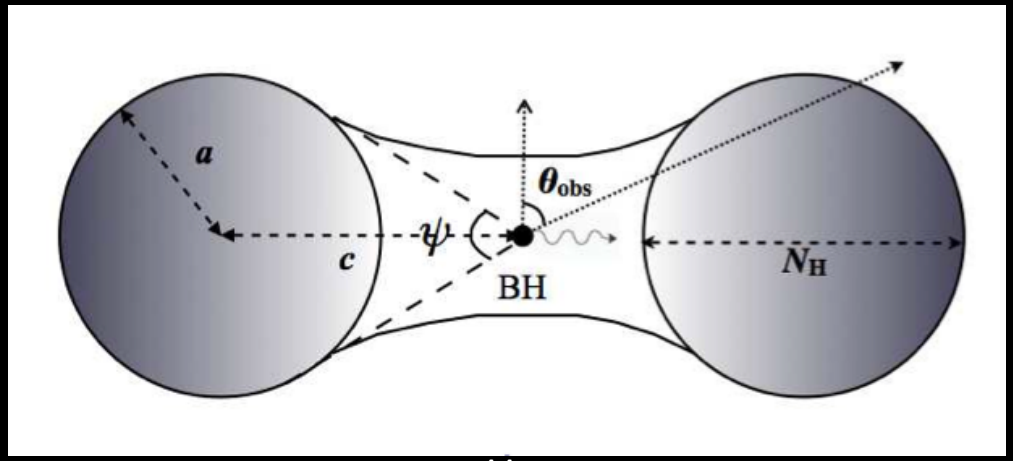


Image from http://www.mytorus.com

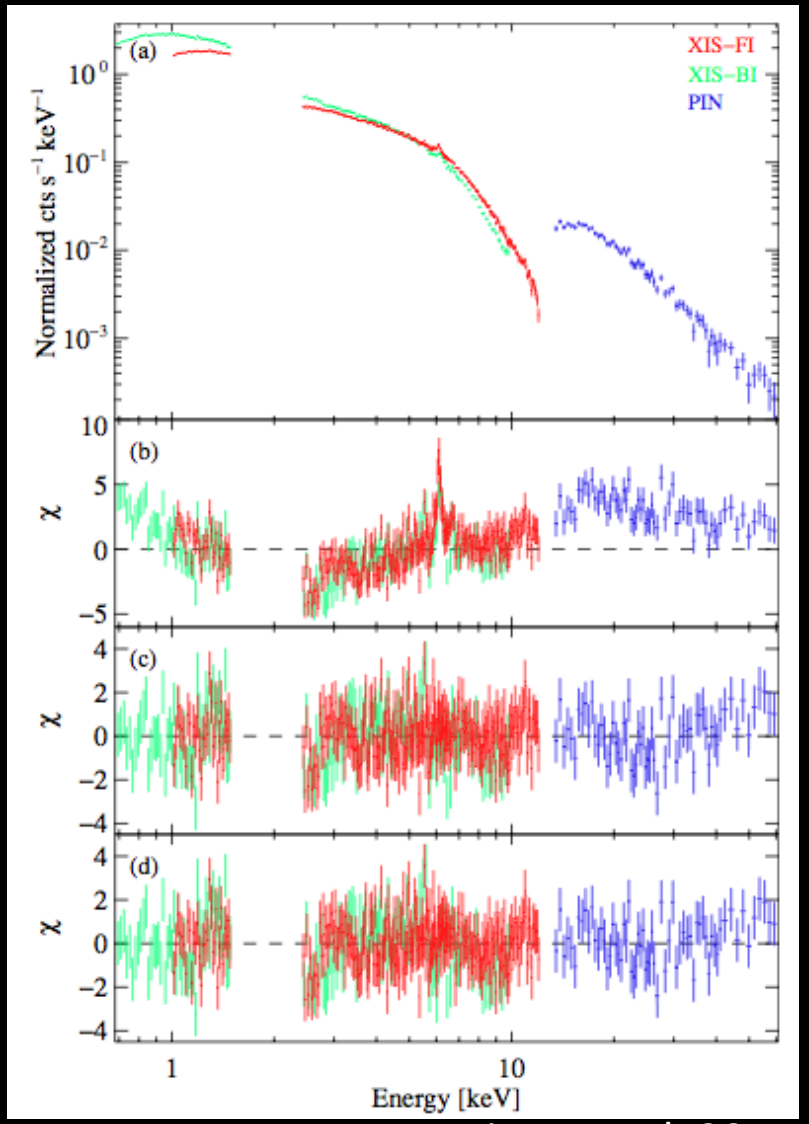
MYTorus model: torus of uniform density with half-opening angle of 60°. Self-consistently models:

- Fe line emission
- Compton reflection hump
- Absorption

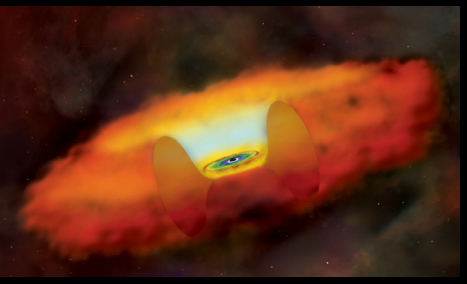
MYTorus Results

- $\Gamma = 1.70 \pm 0.01$
- $A_{Fe} = 0.75 \pm 0.14$
- $N_{H,Tor} = 3.6\ ^{+1.3}_{-0.8} \times 10^{24}\ cm^{-2}$

Compton thick torus out of the line of sight



Rivers et al. 2011



Summary

- MCG−2-58-22 has no significant broad Fe line; narrow line is commensurate with the BLR
- Strong reflection component can be adequately modeled by the new MYTorus model
- Fe line EW is consistent with the amount of Compton-thick material
- For details see Rivers et al. 2011 ApJ 732, 36