The near-IR shape of the big blue bump: under the hot dust emission

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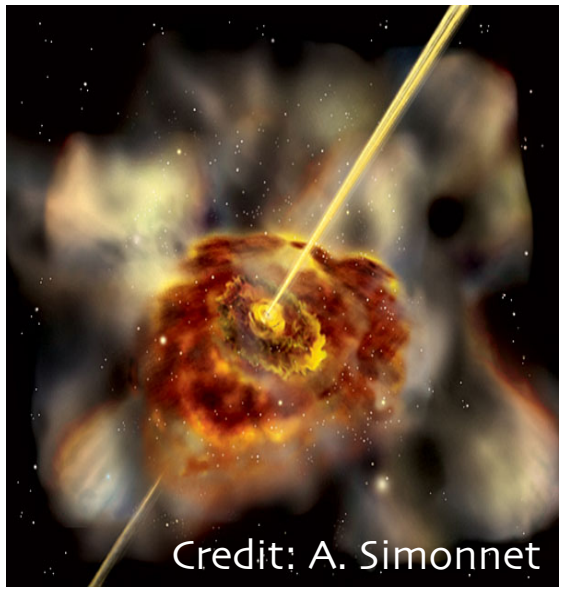
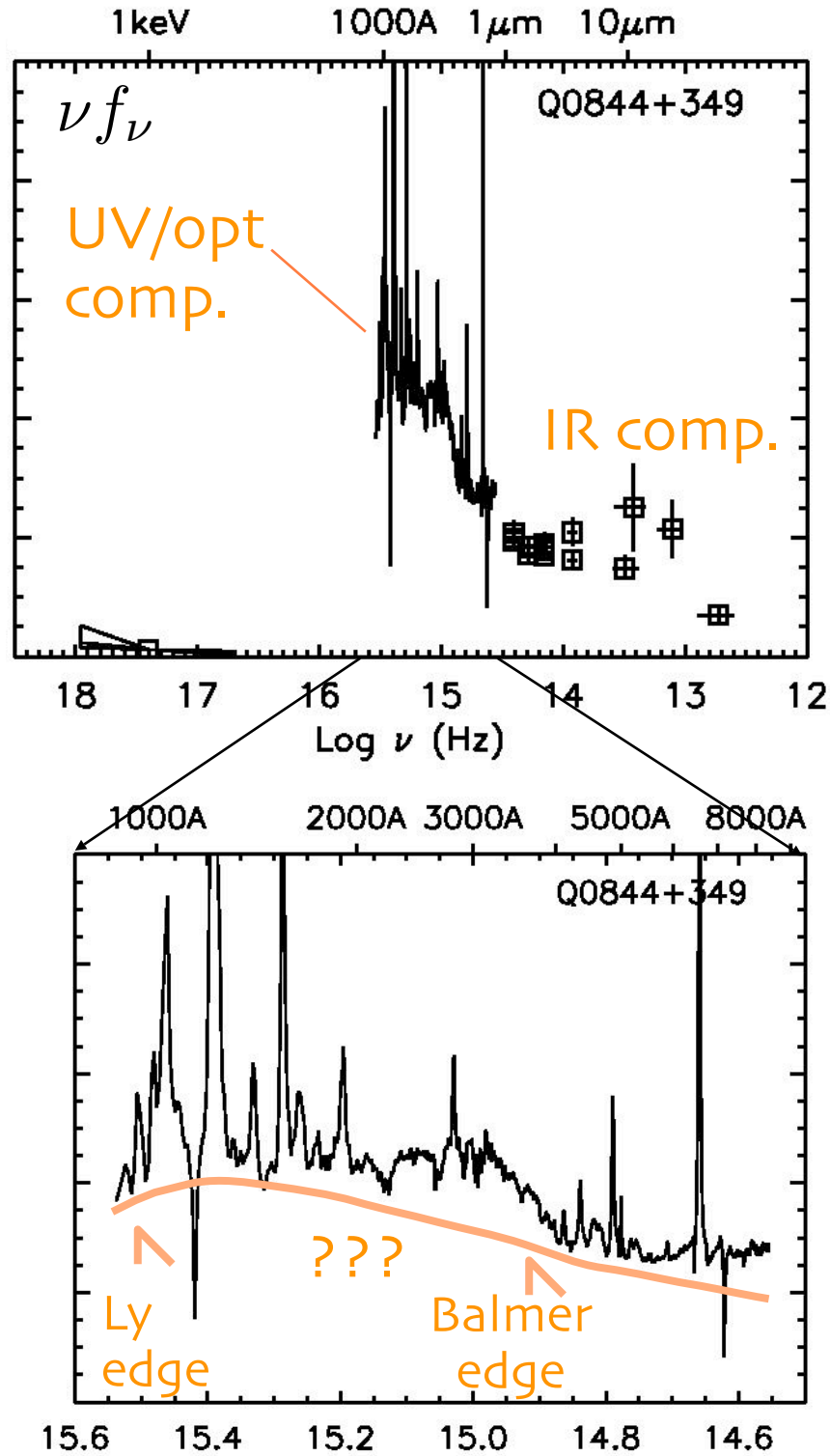
Intrinsic, 'naked' spectra of the central engine...

'naked' engine

- exclude emis'n from:
  - torus
  - BLR

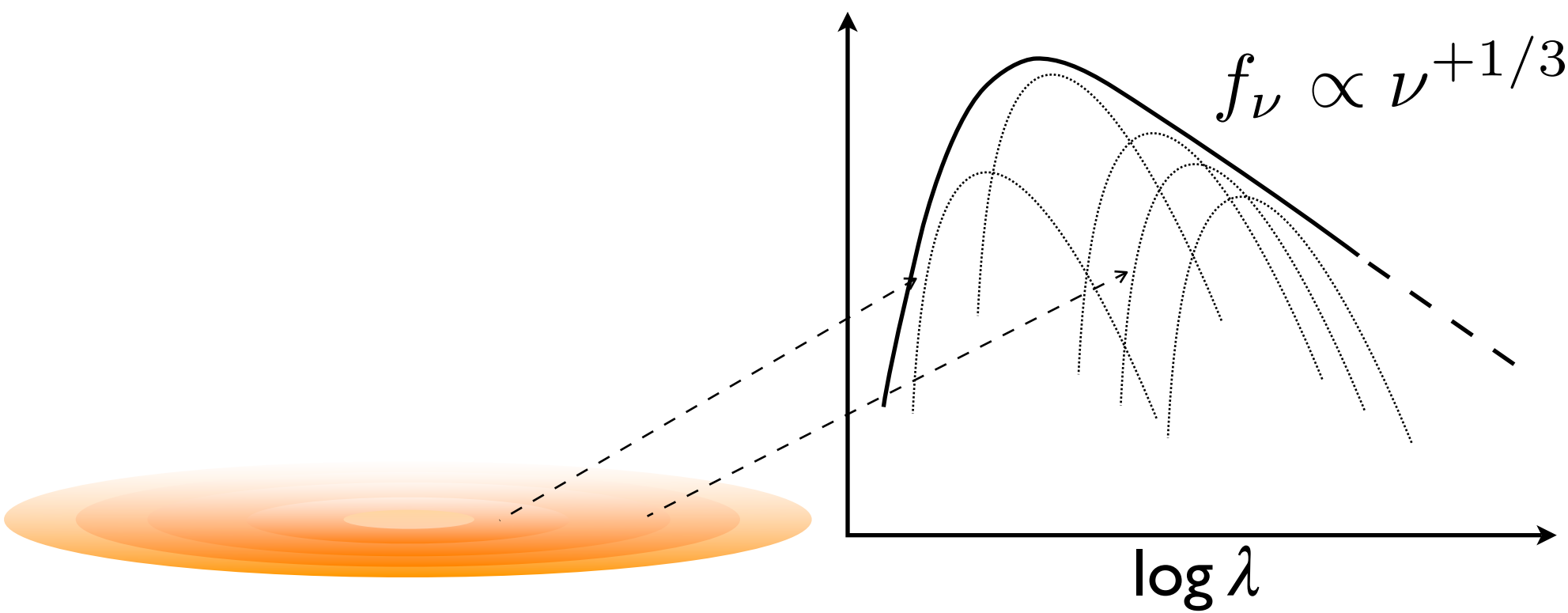


- 'engine-only' spectra
  - IR shape
  - cont. edge



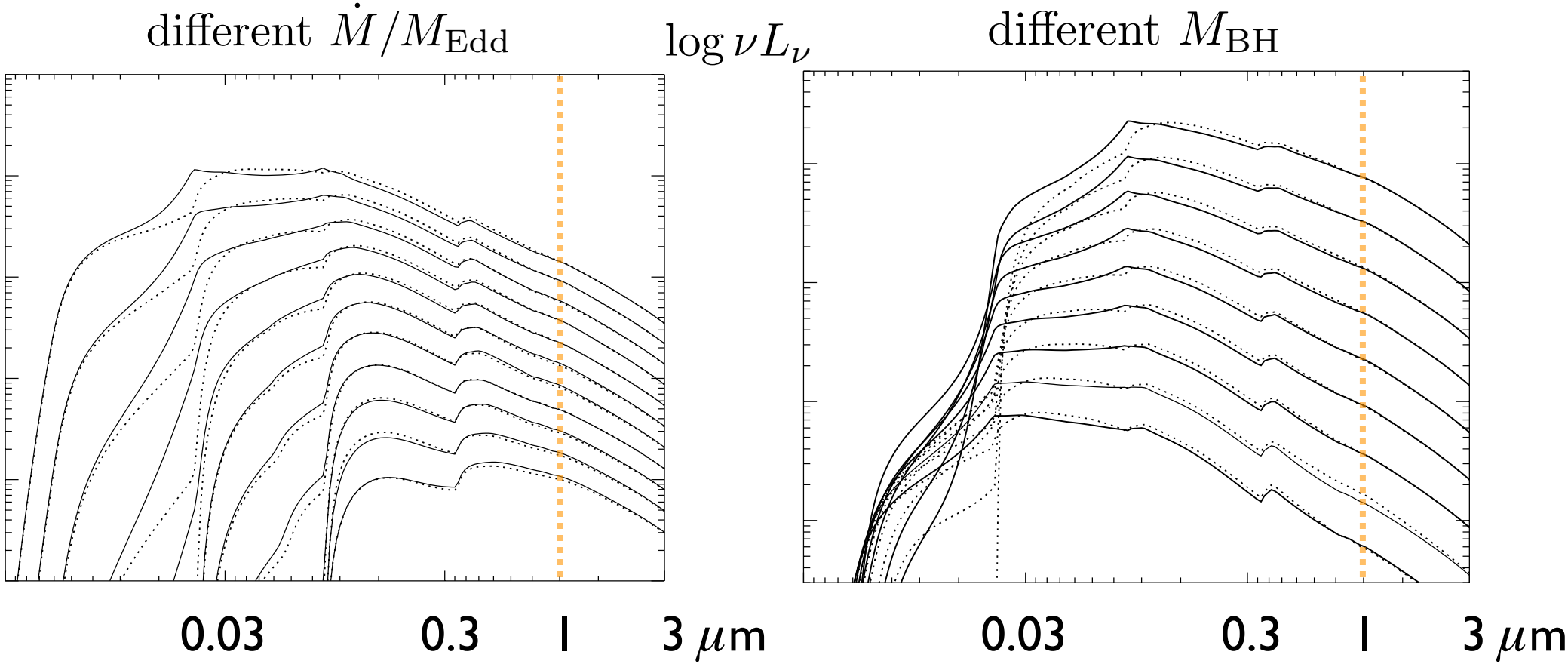
IR shape --- in simple disk

- opt. thick, thermal emis'n from each annulus
- T determined by grad. of grav. potential
  - unique spectral shape at long λ



More sophisticated model...

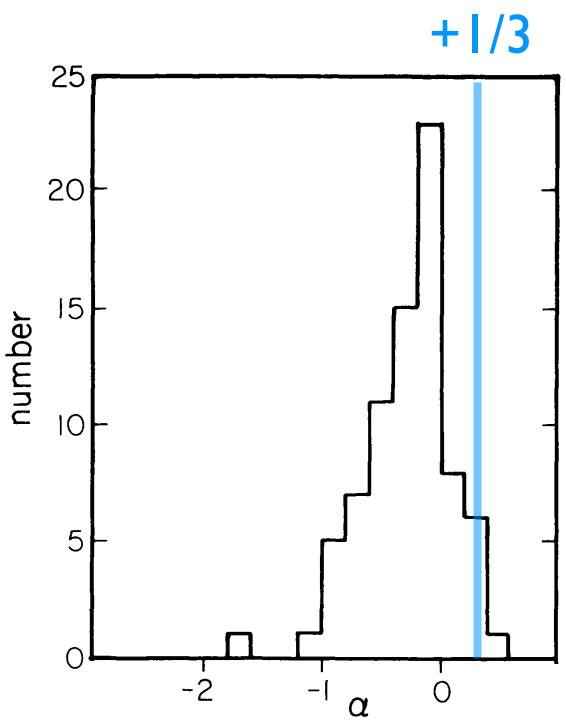
- the same long λ limit, independent of various parameters



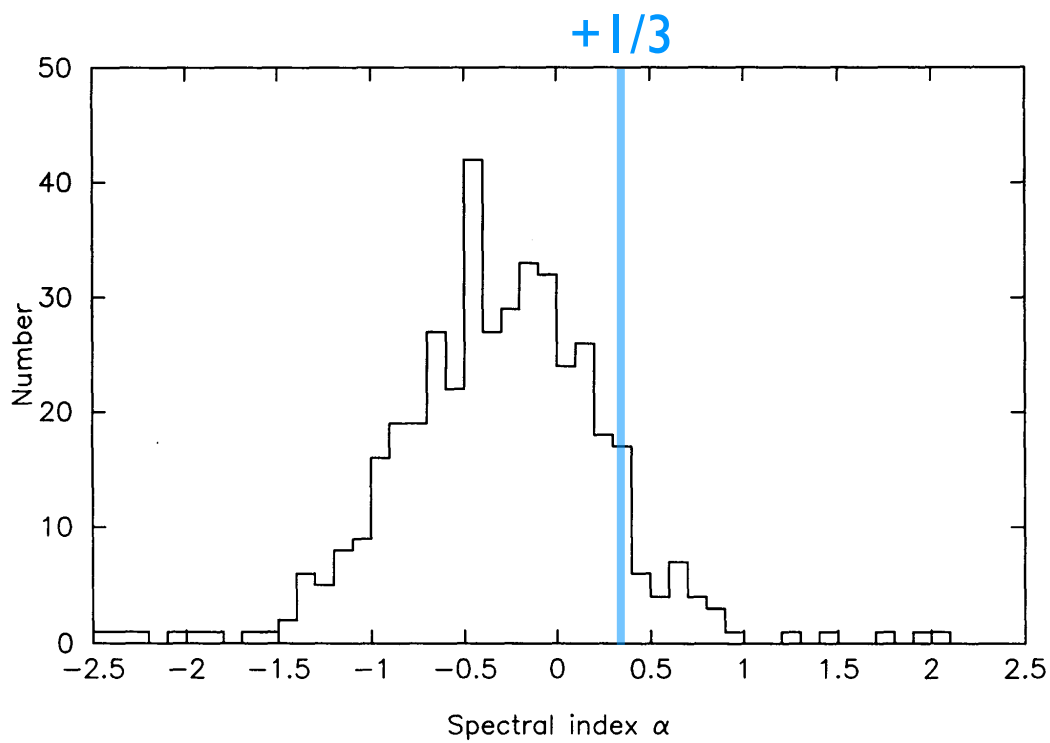
Hubeny et al. 2000

UV/optical shape ?

- significantly redder, but
  - need to sample long-enough λ
  - but dust emission & host



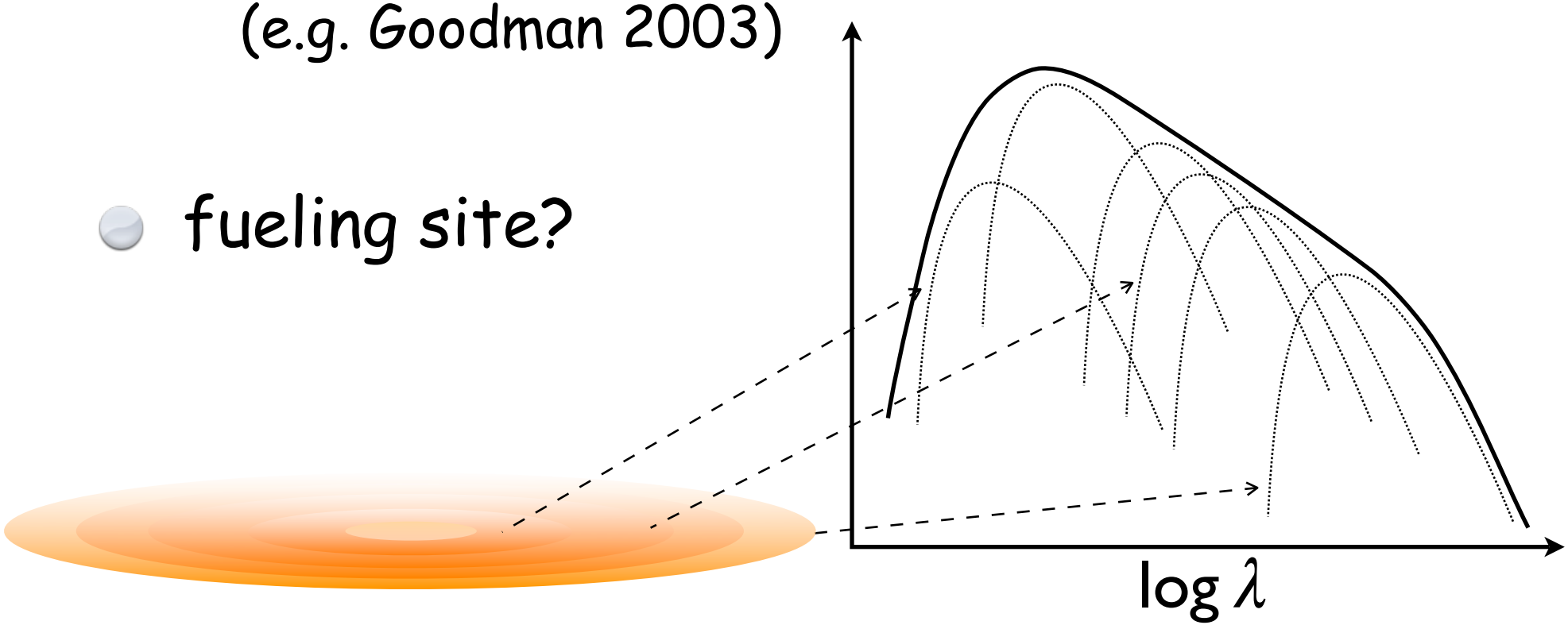
Neugebauer et al. 1987



Francis et al. 1991

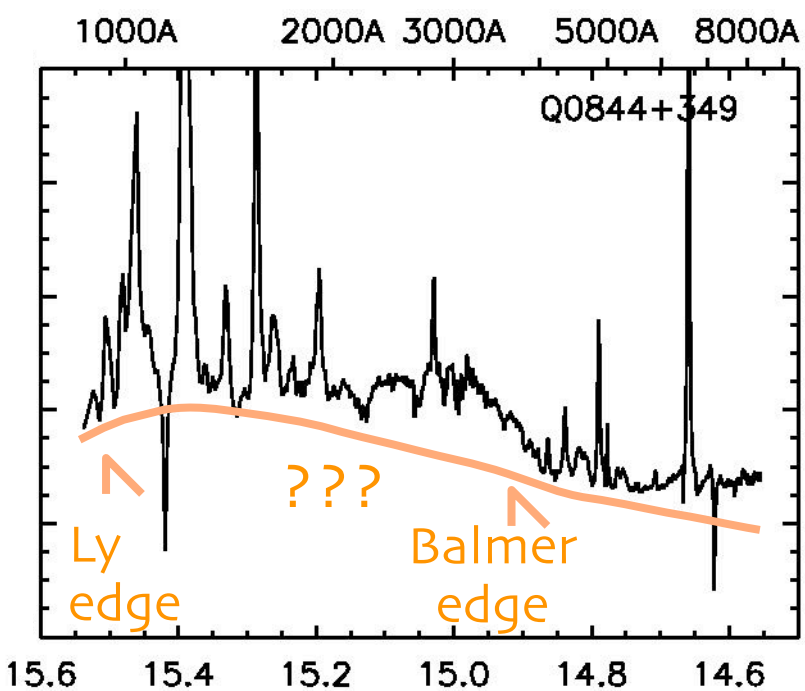
IR shape --- outermost region of disk

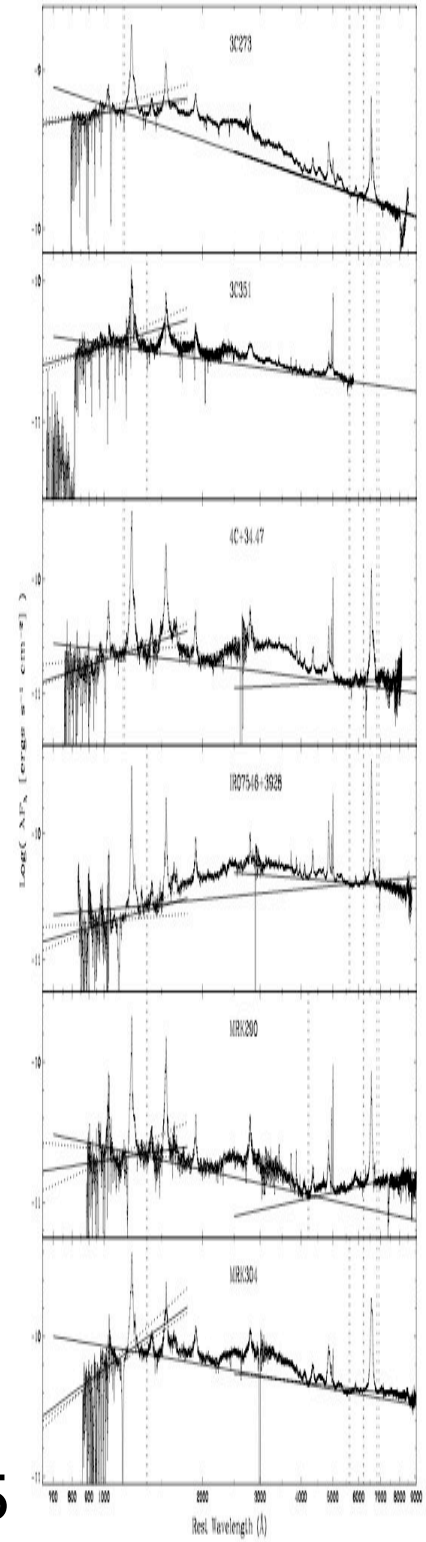
- self-gravity gets important (Toomre Q~1)
- disk truncated?
  - spec. deflection?
  - might happen at near-IR emitting radius (e.g. Goodman 2003)
- fueling site?



Disk atmosphere - continuum edge

- slope change near Lyman edge?
  - huge FUV deficit !?
  - foreground abs?
- Balmer edge?





Shang et al. 2005

'Wish list'

- optical/near-IR spectral shape
  - asymptotically $f_\nu \propto \nu^{+1/3}$?

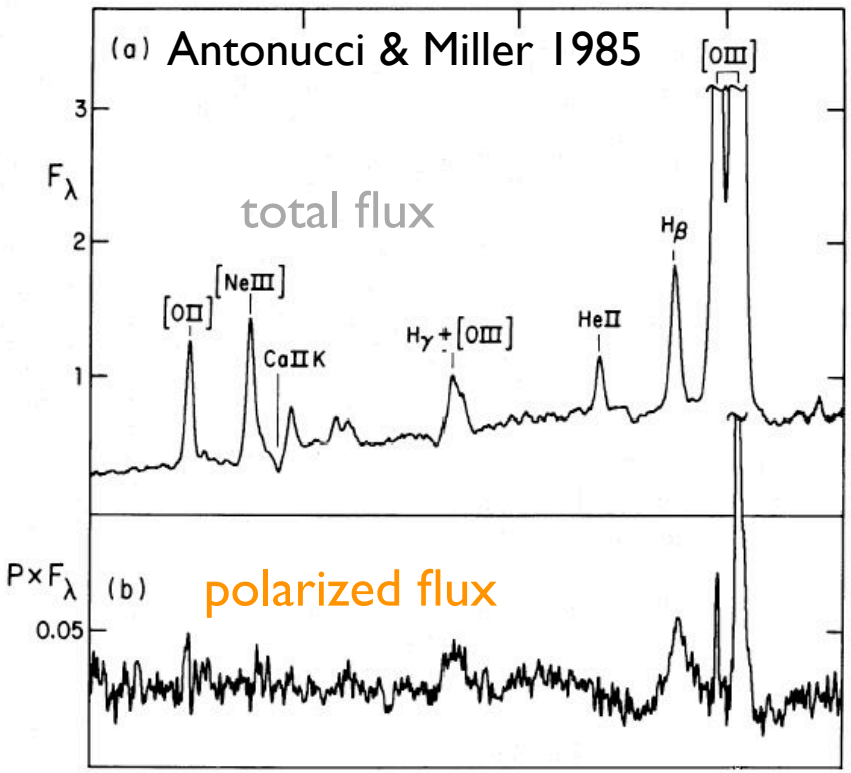
- outermost region of AD
  - signature for truncation?

- spectral edge features ?

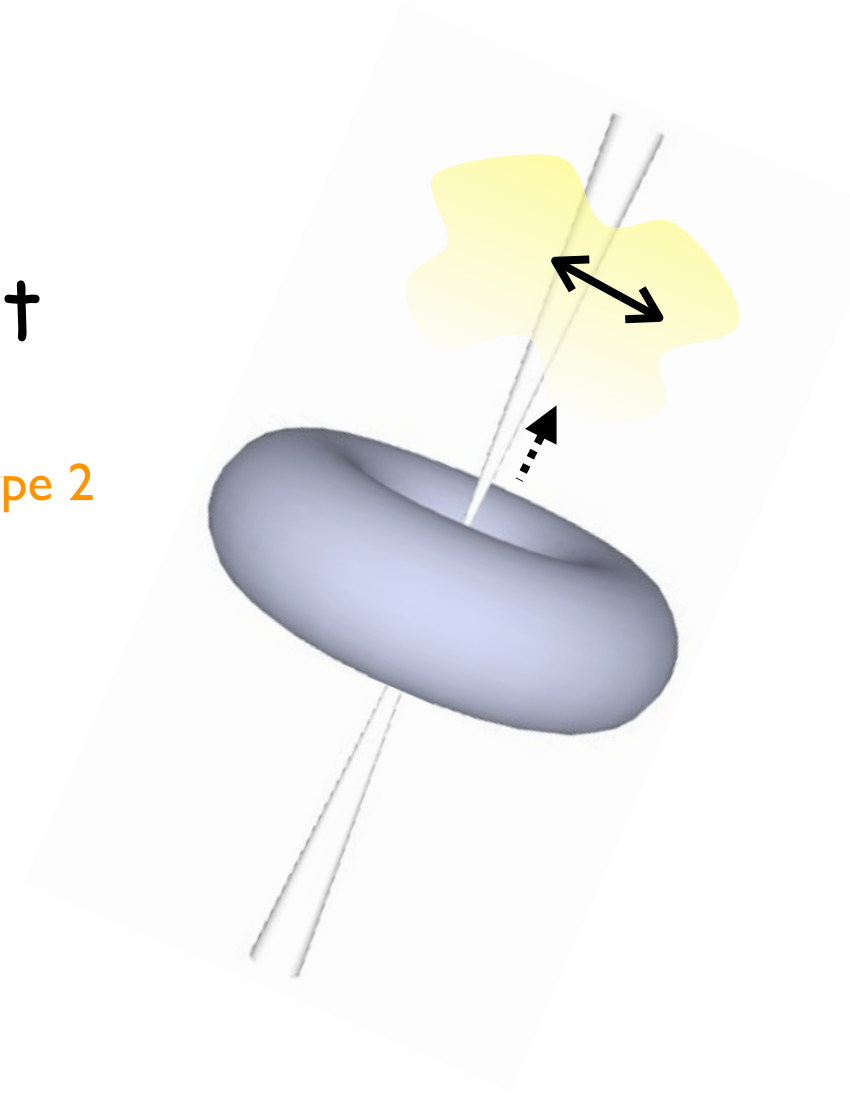
Excluding
torus and BLR emissions

Optical polarization

- Type 2s: BLR in scat. light



Type 2

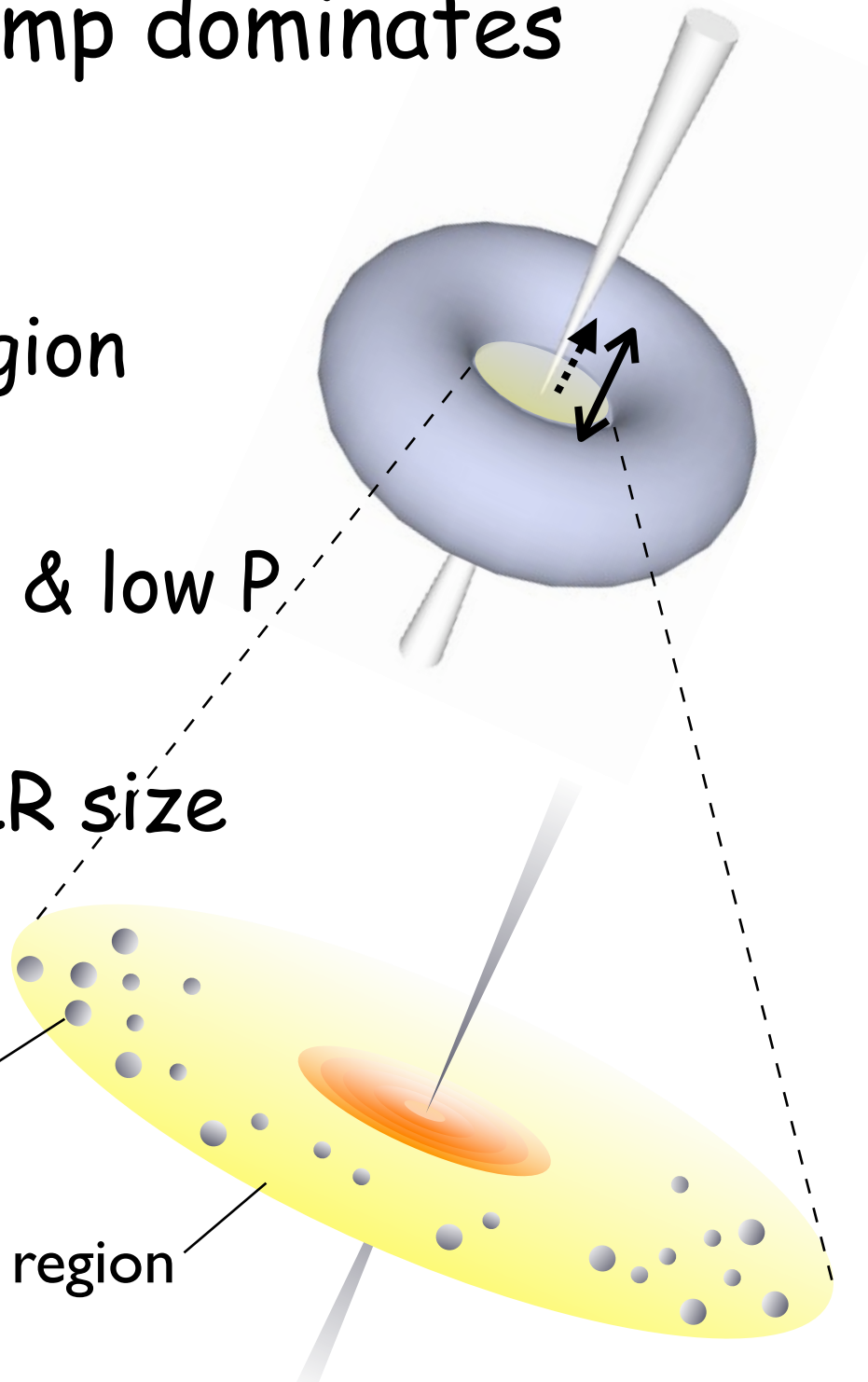


- Pol PA --- perpendicular to jet axis
  - scattering outside BLR

Type 1s: different pol comp dominates

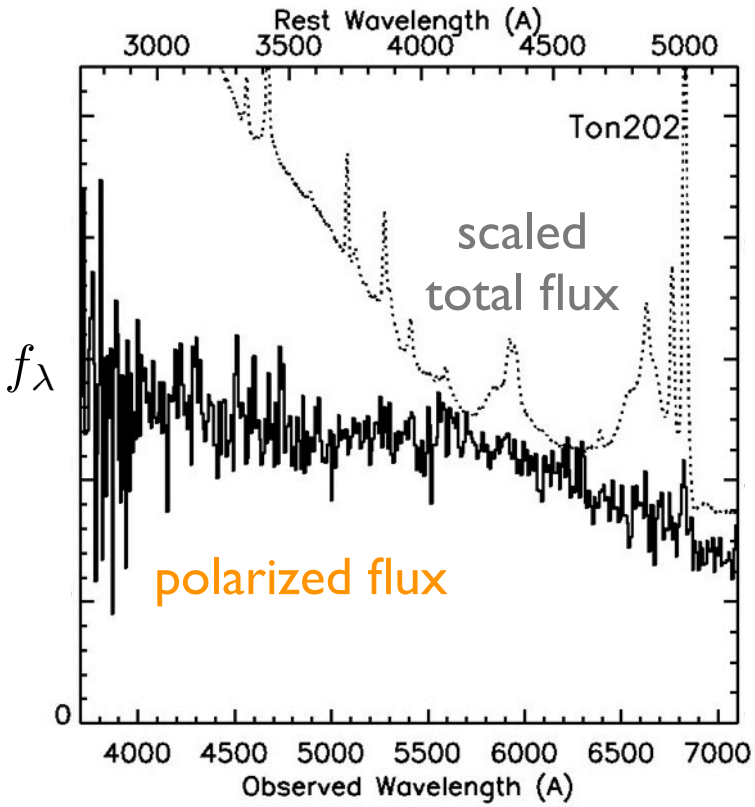
- Pol PA --- // jet
  - scat. in equatorial region

- Sy 1s: lines --- diff. PA & low P
  - e.g. Smith et al. 02/04
  - scat. region size ~ BLR size
  - see Lira et al. poster

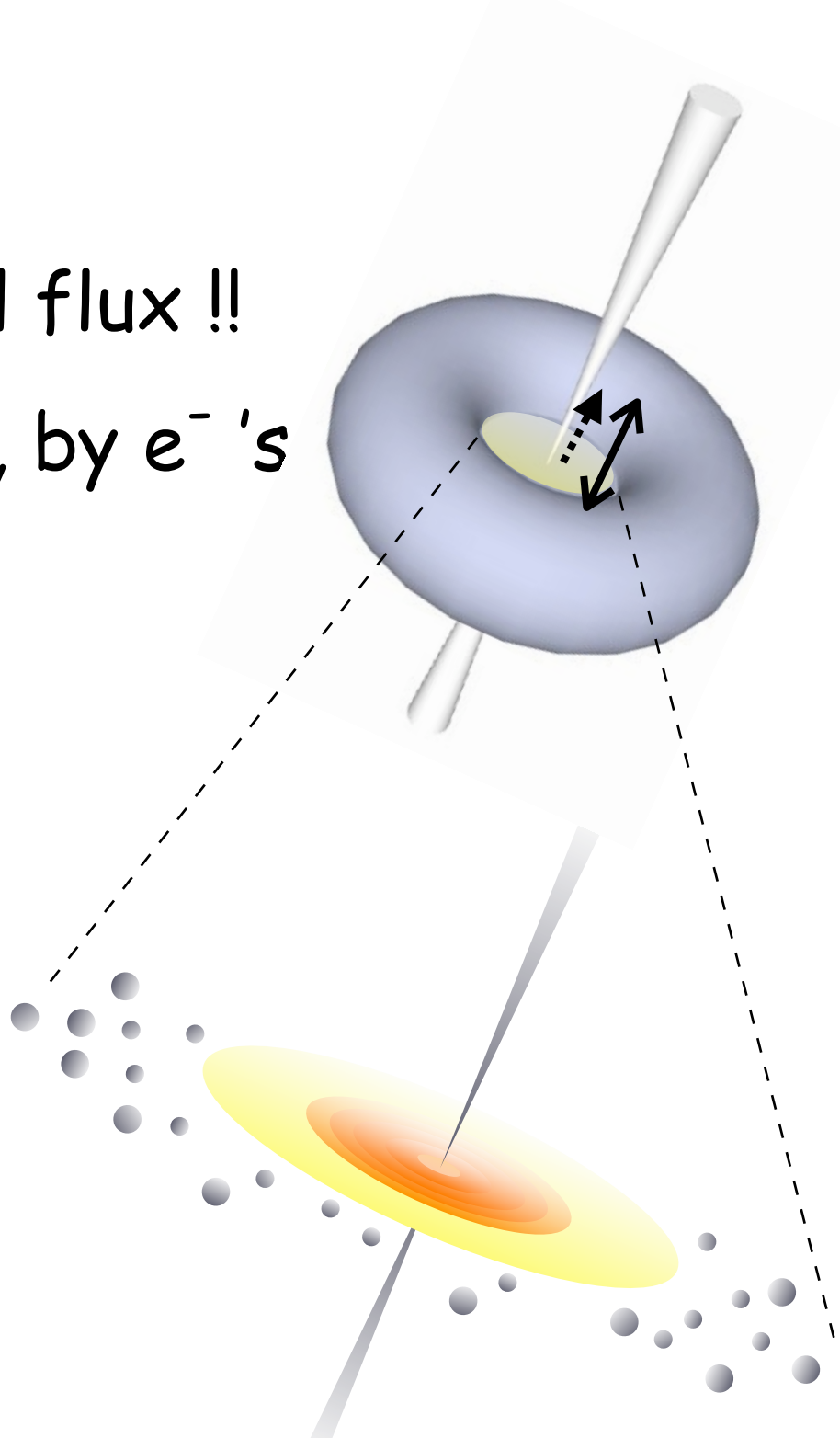


Type 1s: in some quasars

- No emission lines in pol flux !!
  - scat. interior to BLR, by e^-'s

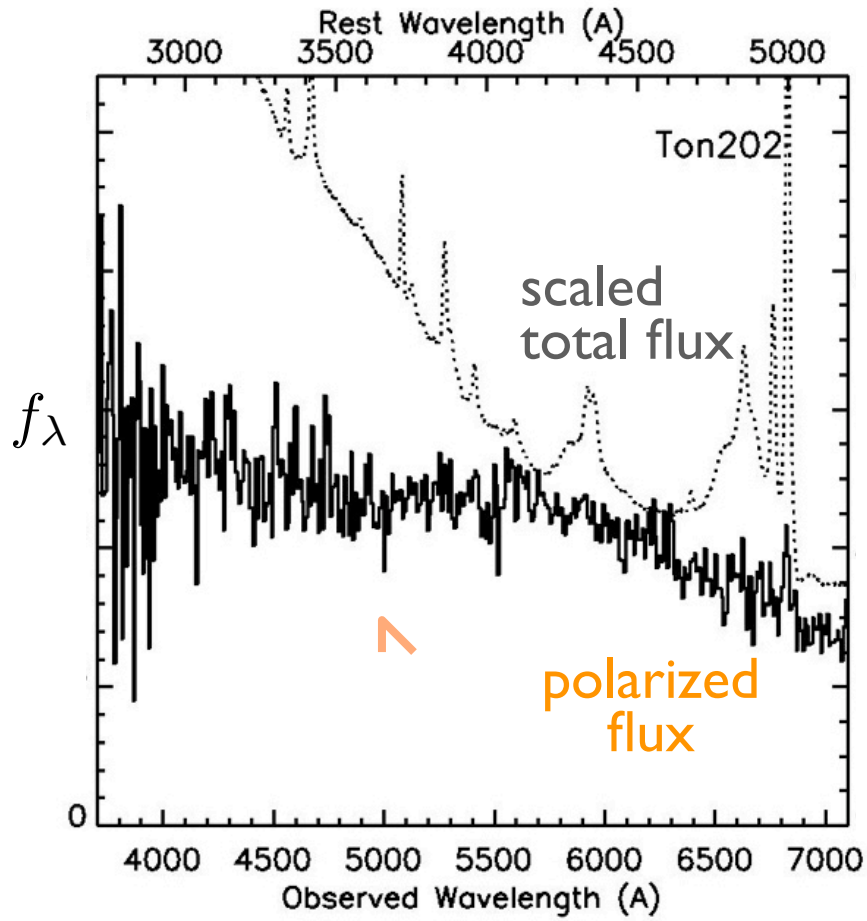


Type I



In this case,

- Pol flux --- mirrors central engine spec, excluding BLR and torus !

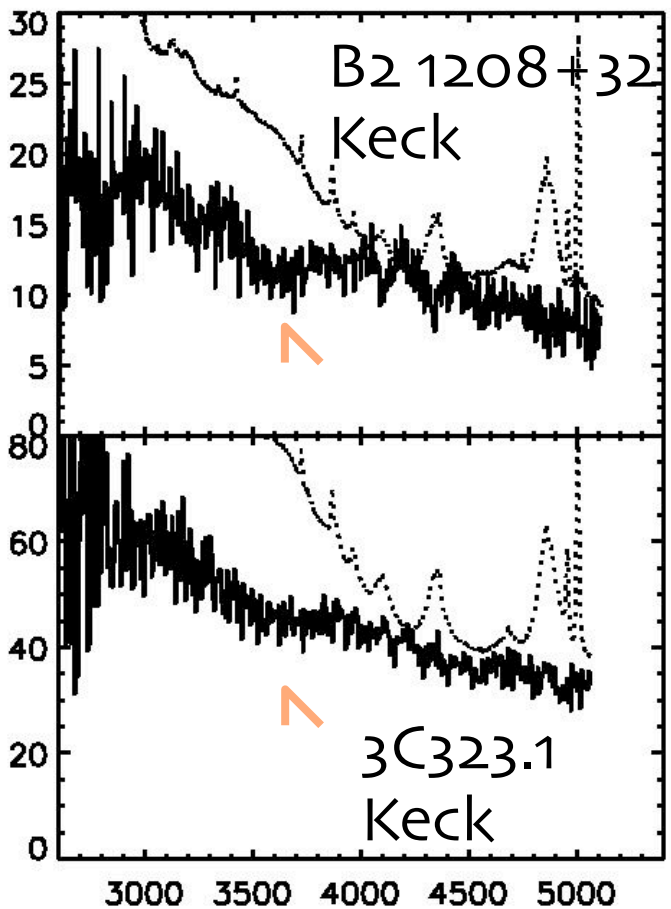


- Balmer edge in abs. seen

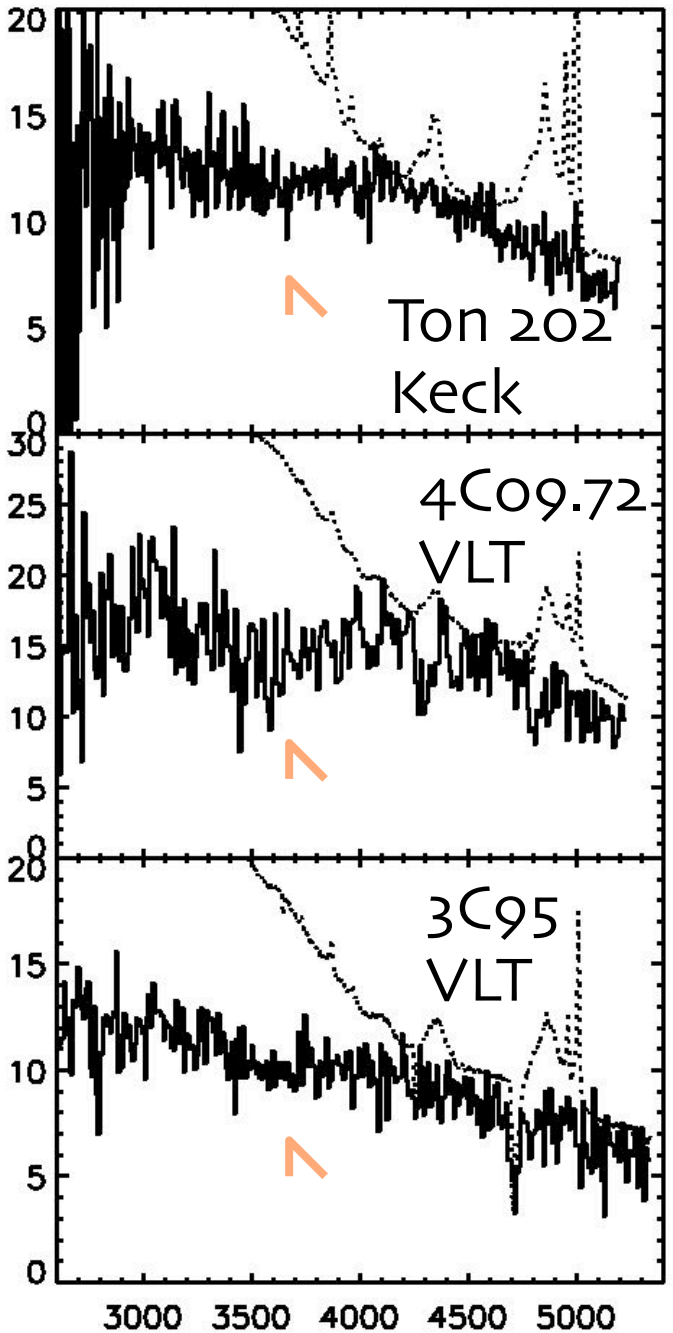
Kishimoto et al. 2003

More objects...

- similar Balmer edge



Kishimoto et al. 2004

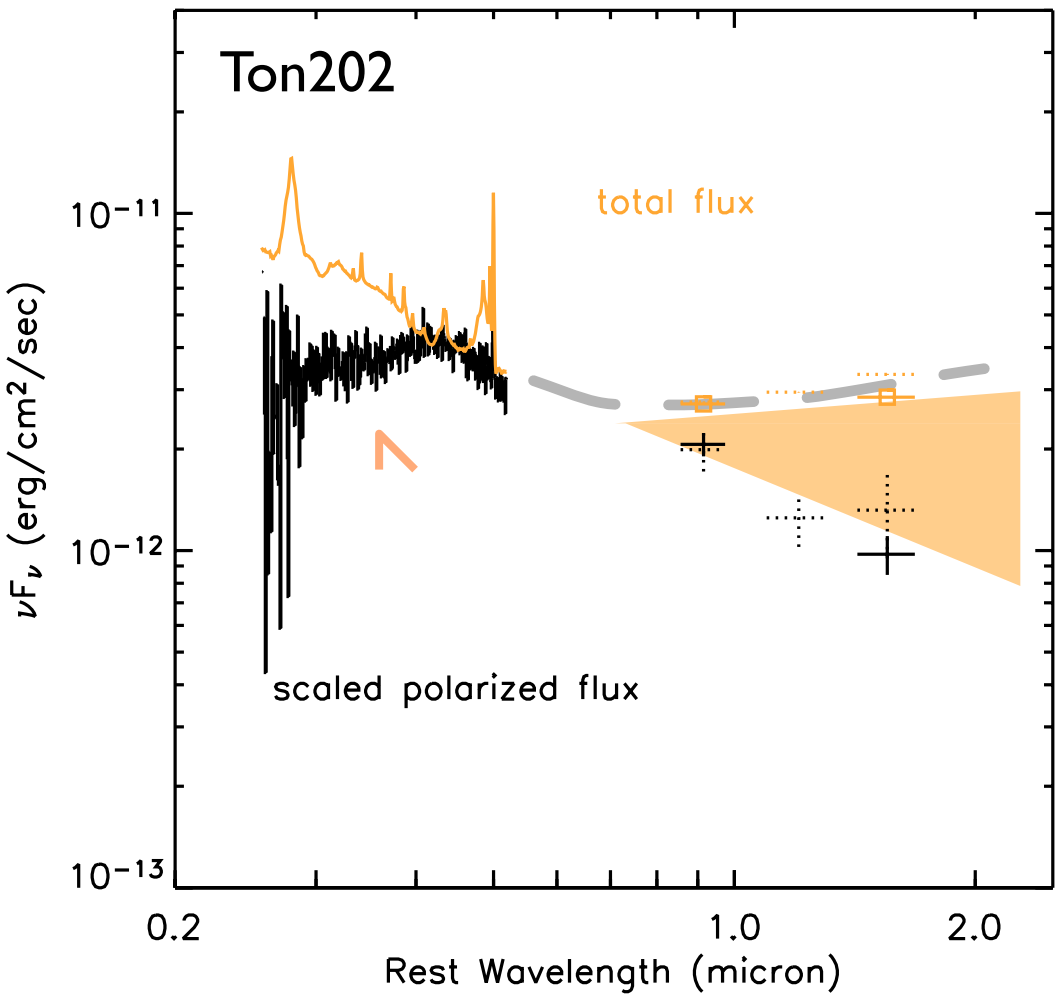


Rest Wavelength (A)

Under the torus emission...

Accurate near-IR polarimetry

- IR polarized flux seems to exclude torus !



Kishimoto et al. 2005

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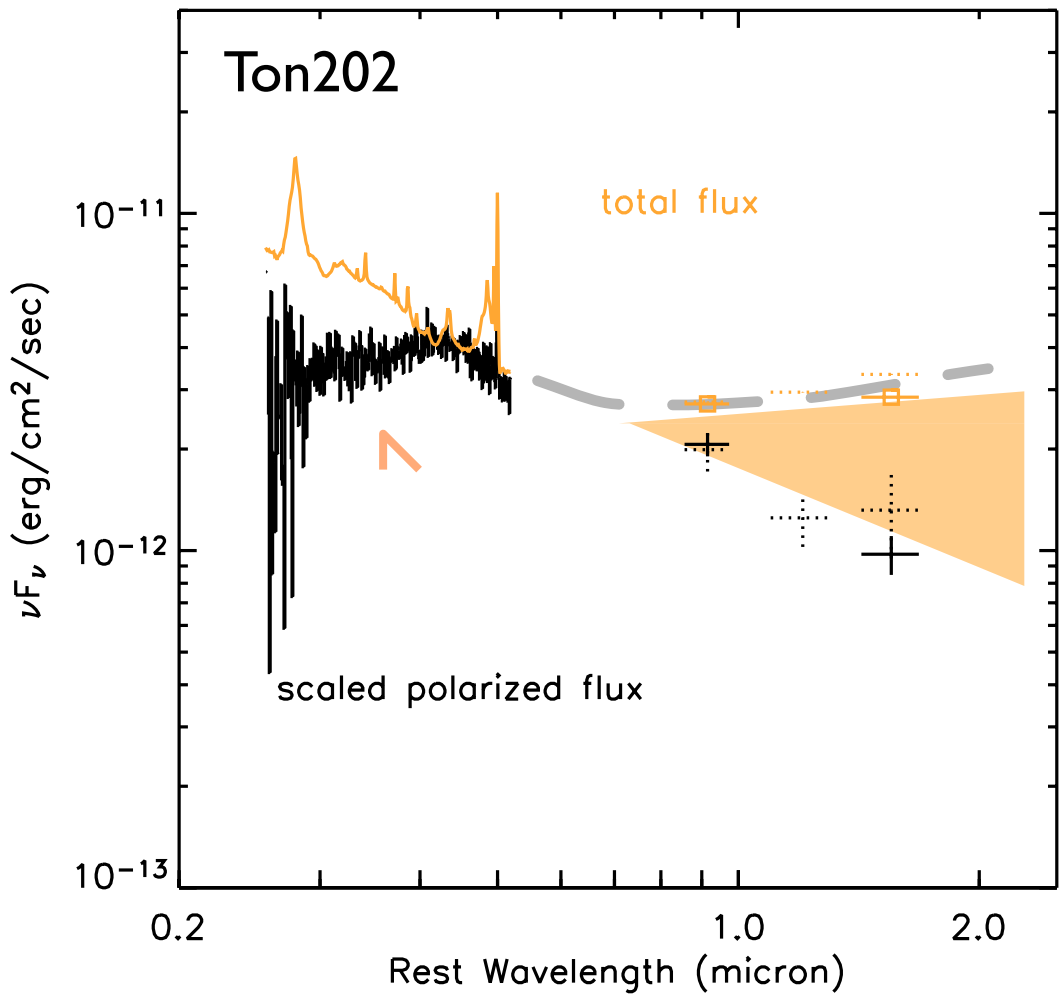


at J - K' $f_\nu \propto \nu^{+0.42\pm0.29}$

cf opt $f_\nu \propto \nu^{-0.54\pm0.08}$

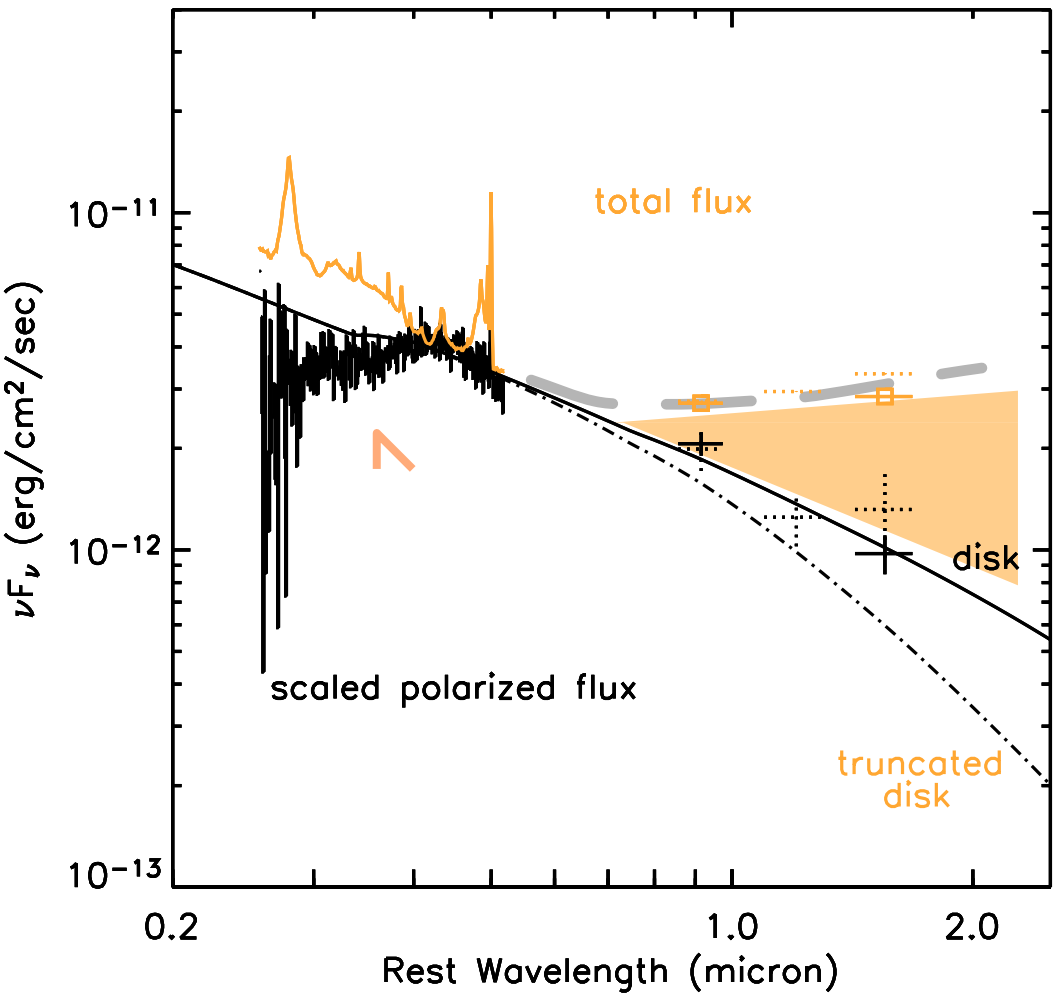
- quite blue, consistent with $f_\nu \propto \nu^{+1/3}$

Kishimoto et al. 2005

Comparison to disk model

- untruncated disk goes through opt. and IR points.
- no indication of disk truncation ?

Kishimoto et al. 2005



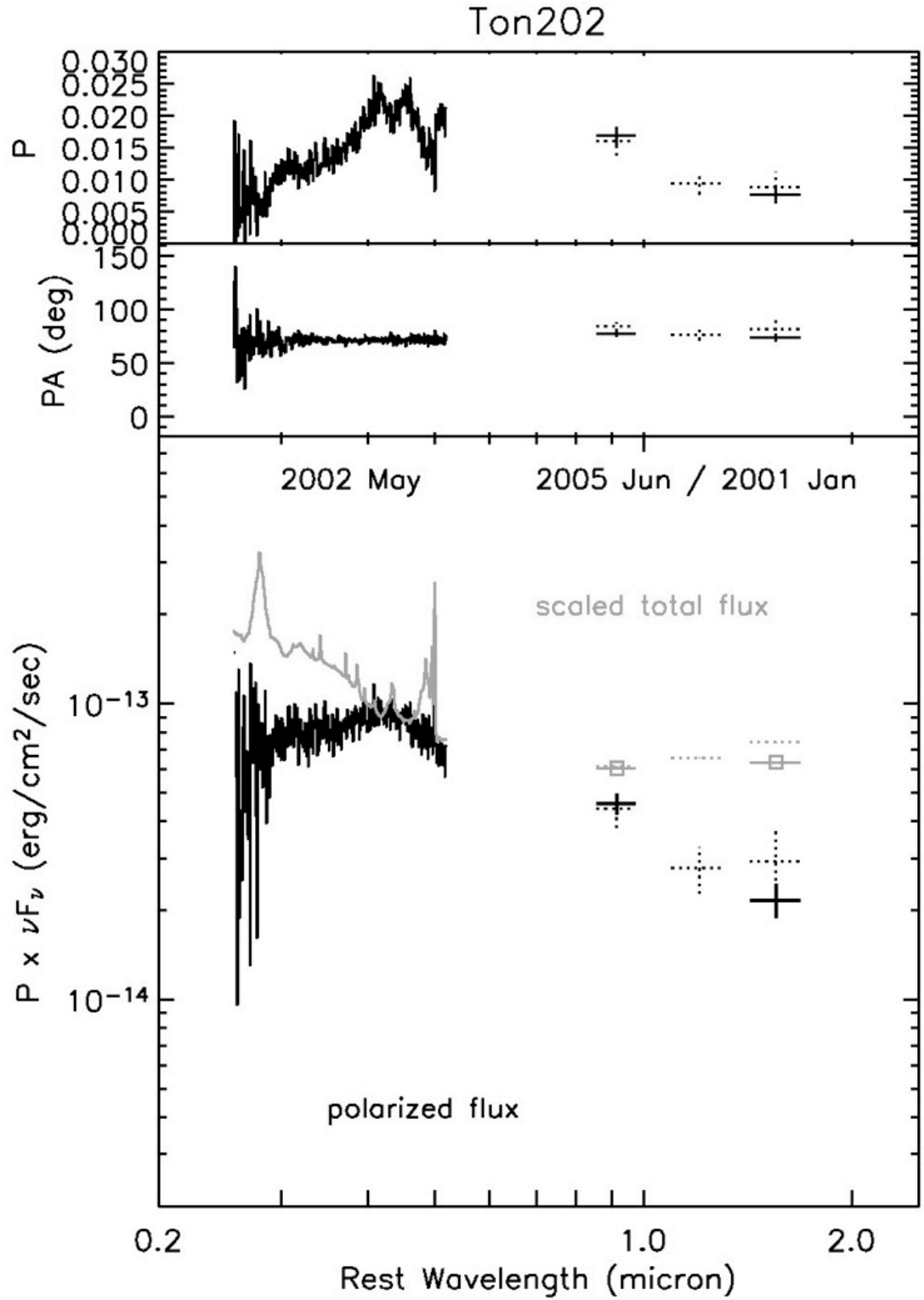
- 5 more obj being observed
  (Kishimoto et al. 2006 in prep)

Caveats

- near-IR
  - other pol component ?
  - more objects to see systematic behavior

- Ba edge
  - feature imprinted in scattering region?
  - BLR albedo calc. (Korista & Ferland 1998)

- no PA rotation



Conclusions

- 'Naked' engine spectra are being revealed:
  - Balmer edge seen in abs, indicating opt thick, thermal emis'n.
  - IR shape quite blue, as expected from a std disk.

- Something at least resembling a std disk seems to exist in the central engine.