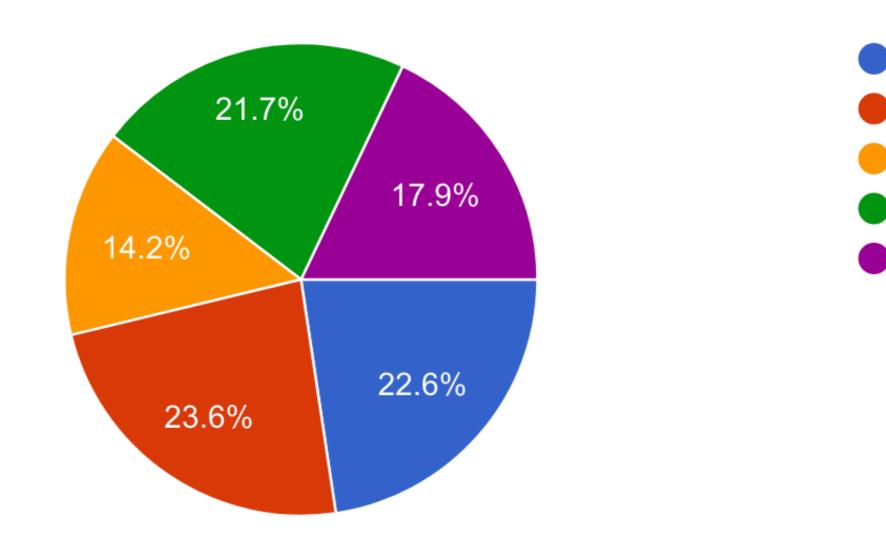
BASIC STATS

*) Number of years spent working on AGN/tori

106 responses



0-3

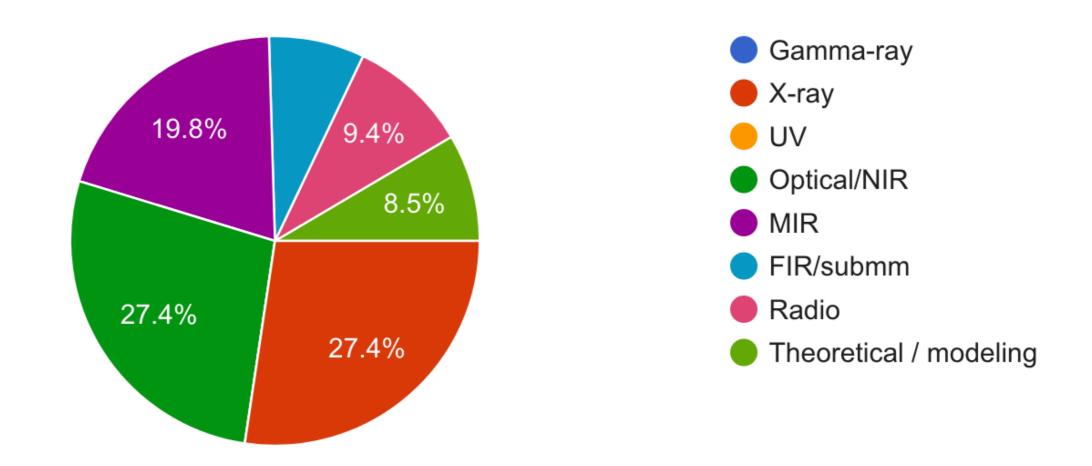
3-6

6-10

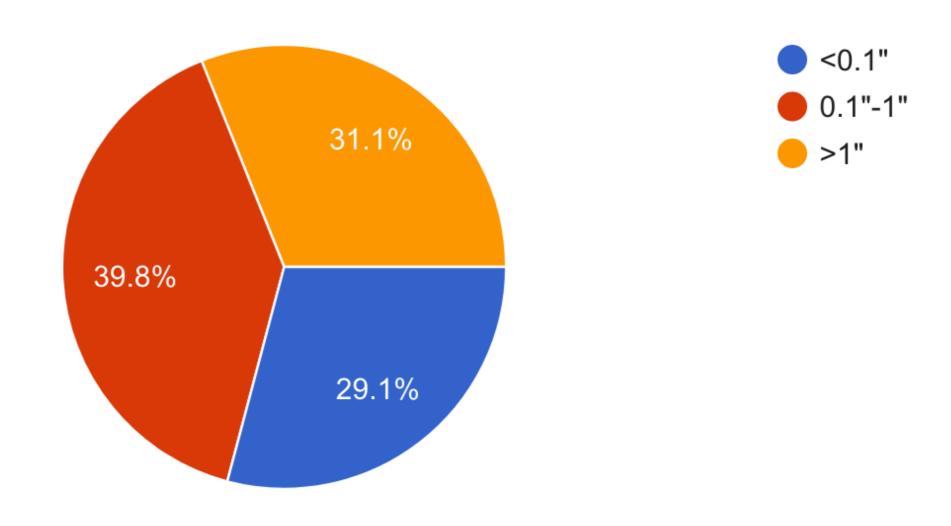
10-20

20+

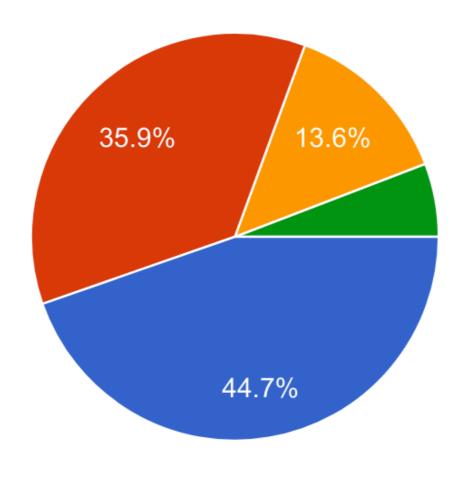
*) Preferred waveband (what you primarily work in or think about; yes, you have to pick one)



*) What is the most typical spatial resolution you work with?



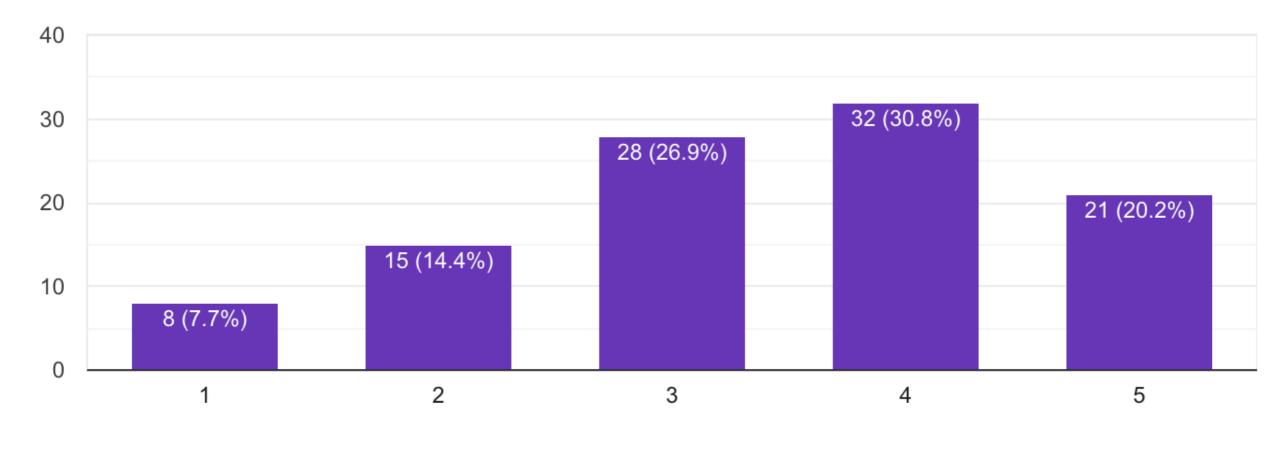
*) What is the most typical redshift / distance you work with?



- z<0.01 (<45 Mpc)</p>
- 0.01<z<0.1 (~45-450 Mpc)
- 0.1<z<1 (~450-6600 Mpc)</p>
- **>** z>1 (>6600 Mpc)

This questionnaire was...

104 responses

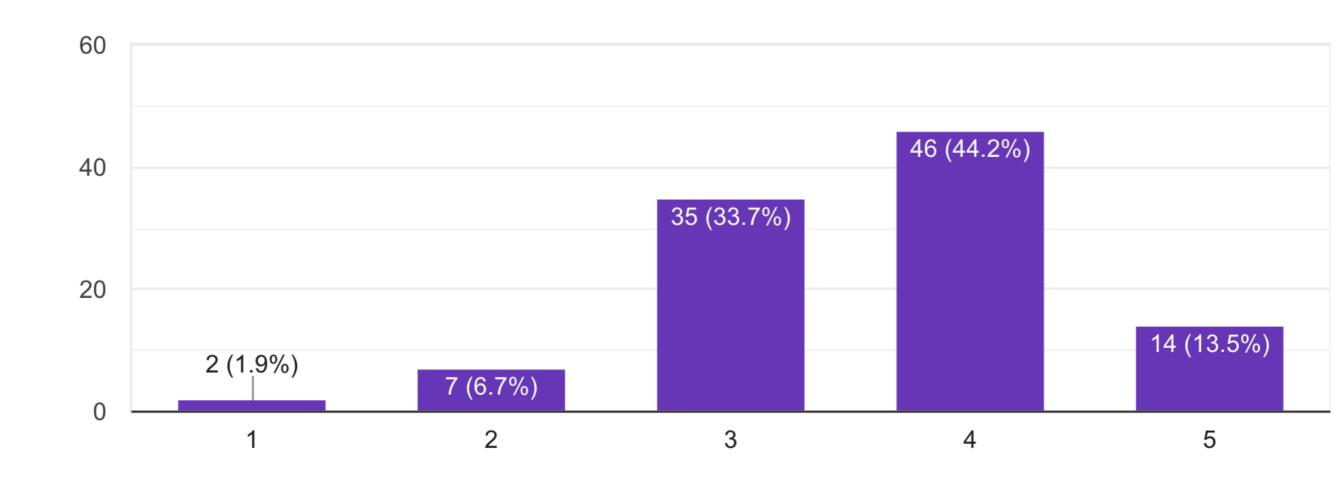


Tedious Enjoyable

Structure / Composition

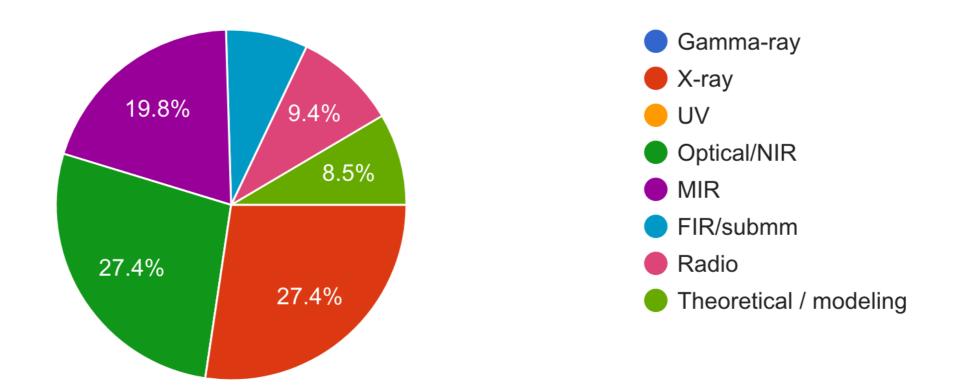
*) How much hard evidence do we actually have for clumpiness of the torus?

104 responses

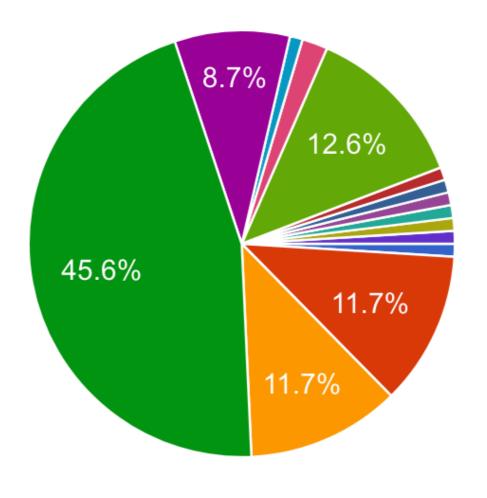


None at all Very Strong

*) Preferred waveband (what you primarily work in or think about; yes, you have to pick one)

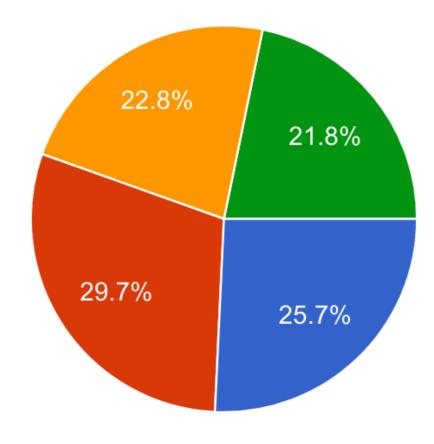


*) What do you think is the dominant substructure of the torus?



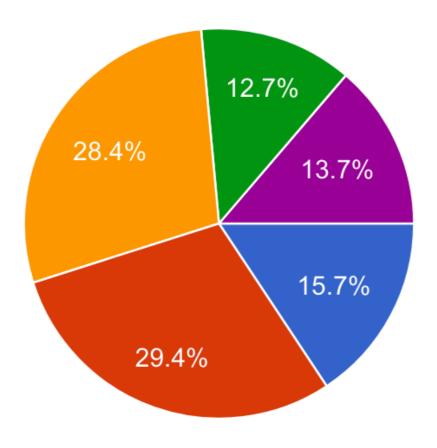
- smooth
- large clumps
- small clumps
- clumps + smooth
- filaments
- spiral arms
- warped disk
- unsure
- a few clumps + dense and smooth+ thin and hot + spiral arms beyond
 - a few parsecs
- warped disk + clumpy wind
- we don't even know enough to guess; all of the above (except a...
- clumps of different size
- shells? turublence?
- inflow—outflow

*) The polar dust structures seen in the mid-infrared ...



- are completely unrelated to the actual torus (e.g., merely some dust in the ionisation cone).
- are a small part of the (larger) torus, e.g. only its inner directly illuminated walls.
- delineate the actual obscuring structures in AGN which take a cone-like structure.
- are a complete enigma to me; I have no idea whatsoever.

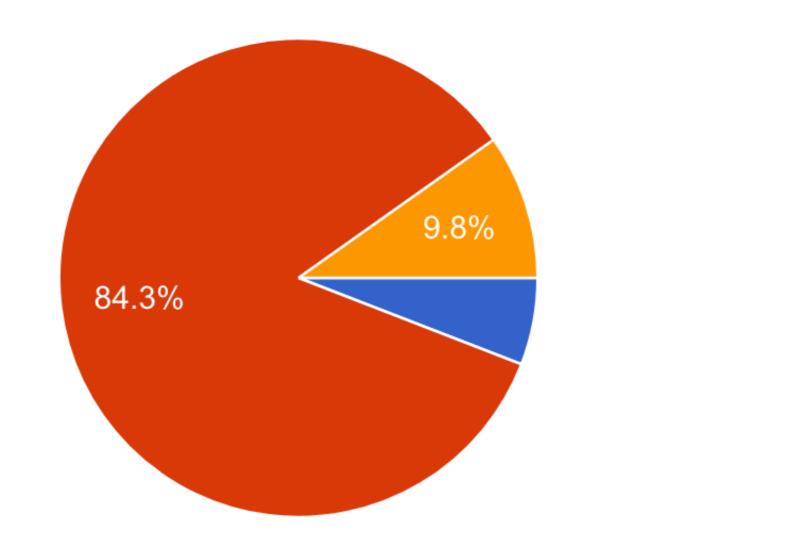
*) On what physical scales are the ionisation cones and winds from AGN collimated?



- directly on scales of the accretion disk and broad line region
- on scales of the dust sublimation radius (sub-parsec scales)
- on scales of the torus (parsec scales)
- on larger scales (tens to hundreds of parscs)
- I have no clue at all.

*) Are the obscurers at different wavelengths...

102 responses



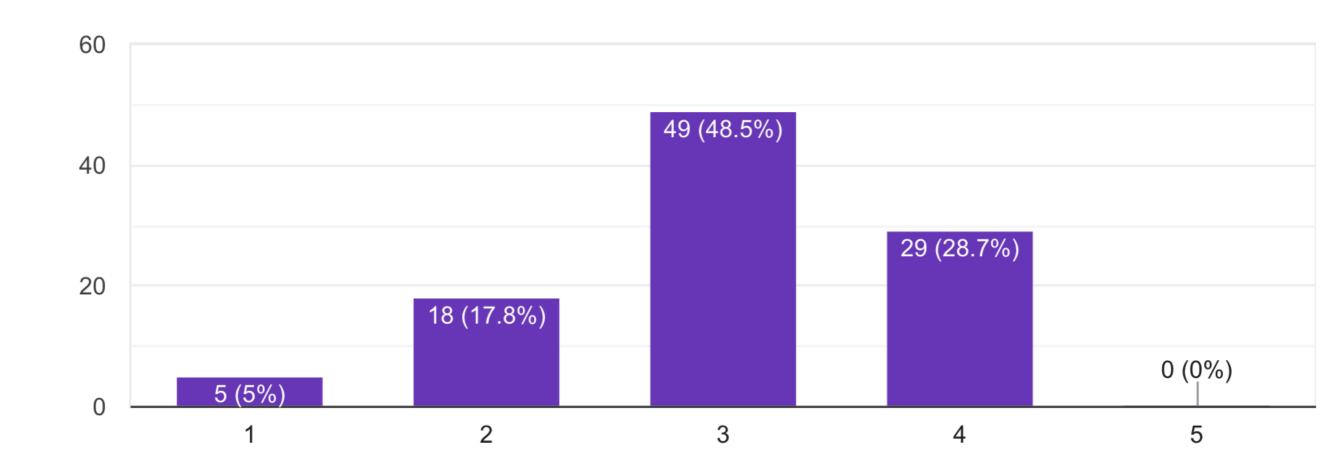
the same?

connected?

unrelated?

*) How generalizable are the results from observations of our favorite objects are (e.g., NGC 1068, NGC 4151, Circinus, ...)?

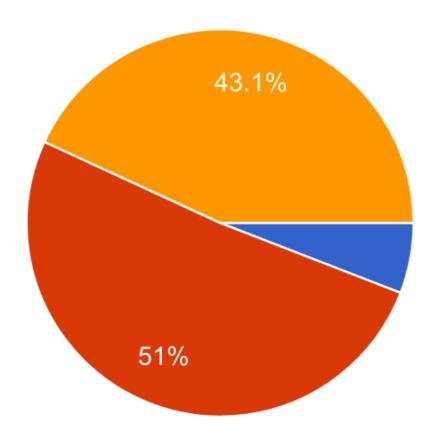
101 responses



Not at all Completely

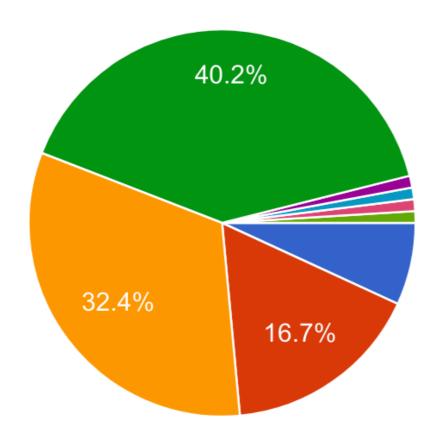
Dynamics

*) Can we get away with describing the "torus" as...



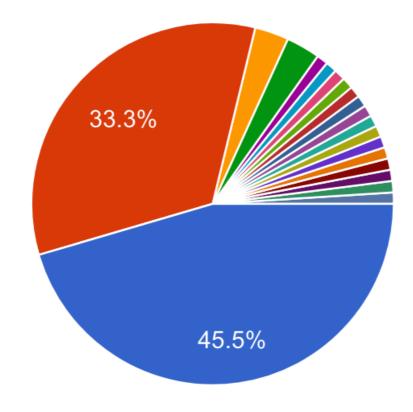
- A nearly hydrostatic object.
- Intrinsically dynamic, even if approximately steady-state.
- No, the "torus" is likely comprised of many structures, some static and some dynamic.

*) What is the dominant kinematic signature in the torus?



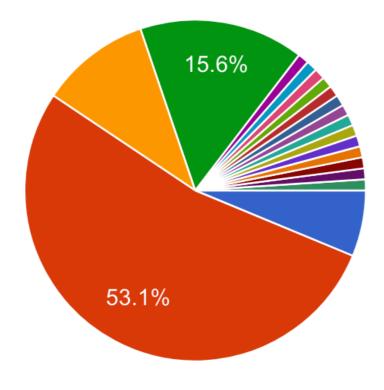
- accretion / inflow
- outflow / wind
- rotation + turbulence
- inflow in some directions, outflow in others
- rotation + outflow + inflow
- I am not entirely sure. It could be a combination of things.
- Don't know. All may have a role
- Rotation + outflow/wind

*) What is the primary cause of the kinematic signature in the torus environment?



- the supermassive black hole
- radiation pressure
- stellar winds
- supernovae
- SMBH for rotation, radiation pressur...
- the supermassive black hole for infl...
- SMBH+radiation pressure
- disk winds
- depends on what wavelengths/spati...
- all of the above?
- There is no single cause: gravity of...
- magneto-centrifugal wind + rotating...
- combination of the above
- the supermassive black hole + radia...
- Again, I am not entirely sure at this...
- combination of gravity and radiation...
- angular momentum conservation
- Unknown
- Angular momentum conservation

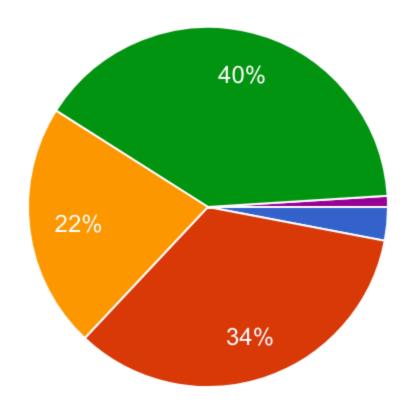
*) What is the best way to probe the kinematics of the torus?



- VLBI of water masers
- velocity mapping of molecular mate...
- velocity mapping of atomic material...
- monitoring variability in the obscurat...
- VLBI of molecular & atomic materials
- all of the above together
- Every density regime will require diff...
- masers and ALMA molecular gas
- need multiple
- everything
- UV absorption and emission lines
- Nothing. Best to give up now.
- all of the above (and any more that...
- I cannot give a objective response h...
- All of the above.
- interferometry
- All of the above
- depends on which scale size

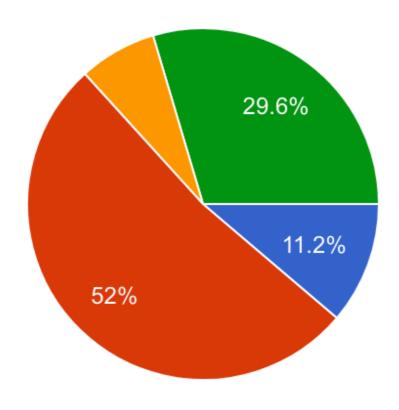
Reprocessing+Variability

*) Where does the high column density absorption material seen in the X-ray band primarily arise from?



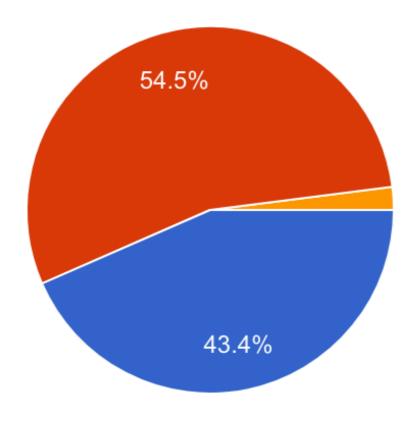
- kpc scales (host gas, dust lanes, etc.)
- pc scales ("torus")
- sub-pc scales (broad line region)
- more than one of the above
- none of the above

*) Where does the high extinction material seen in the optical/NIR band primarily arise from?



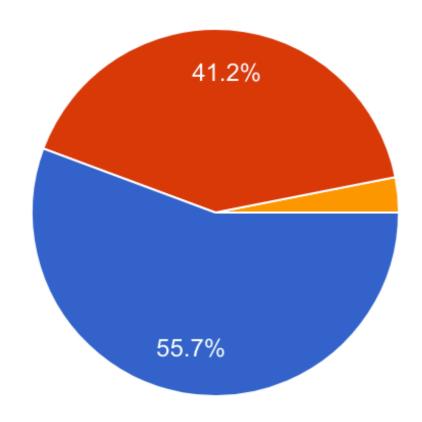
- kpc scales (host gas, dust lanes, etc.)
- pc scales ("torus")
- sub-pc scales (broad line region)
- more than one of the above
- none of the above

*) What is the main reason for X-ray changing-look AGN?



- Intrinsic variability of the AGN, i.e. changes of the accretion rate.
- Moving clouds in the torus or BLR.
- Disappearence or reappearence of the torus.

*) What is the main reason for optical changing-look AGN (e.g., broad to narrow lines and the other way around)?

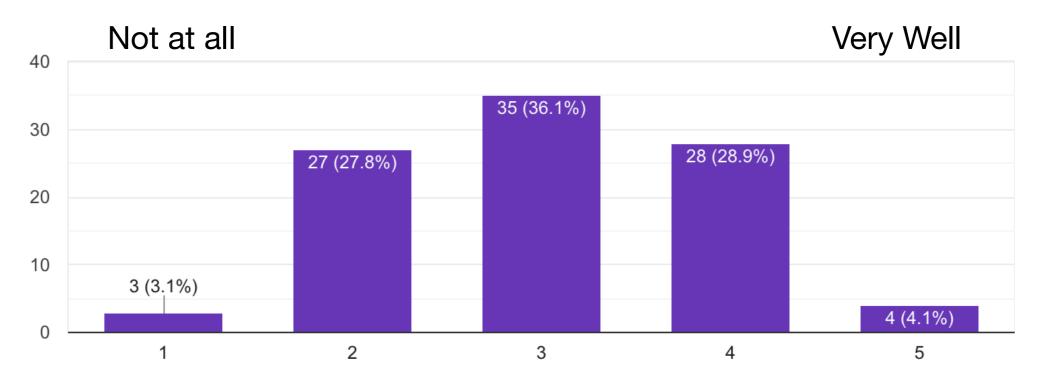


- Intrinsic variability of the AGN, i.e. changes of the accretion rate.
- Moving clouds in the torus or BLR.
- Disappearence or reappearence of the torus.

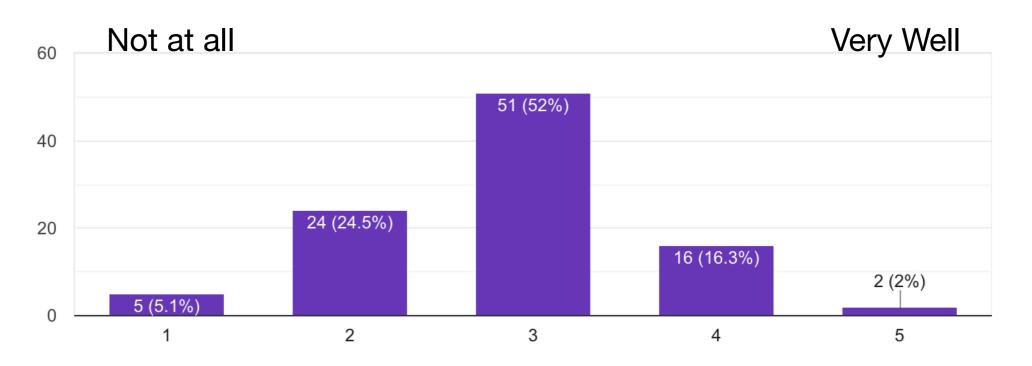
Evolution+Parameter Space

*) How well do you think we currently measure the distribution of inner radii of the torus?

97 responses

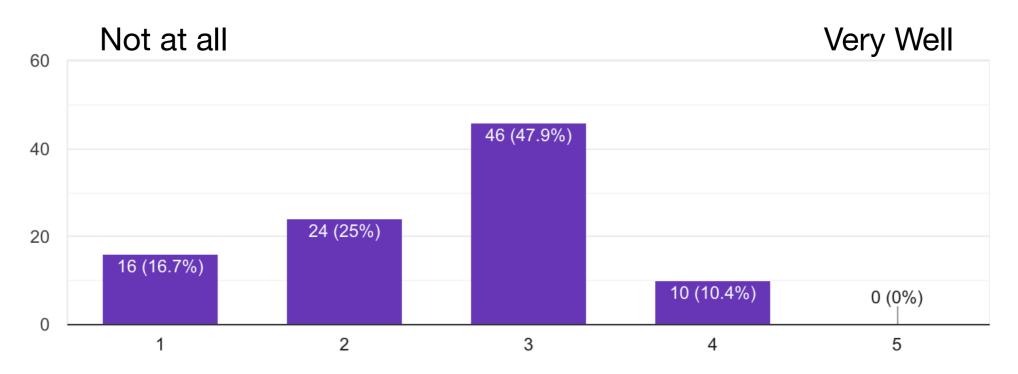


*) How well do you think we currently *model* the distribution of inner radii of the torus?

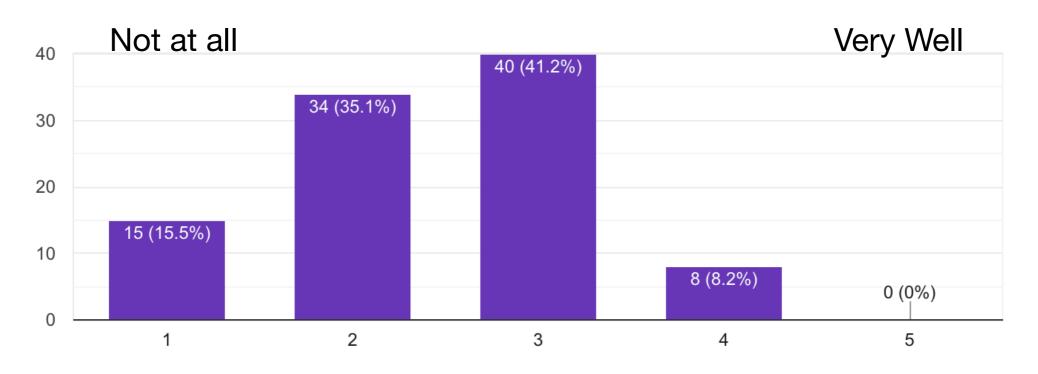


*) How well do you think we currently measure the distribution of outer radii of the torus?

96 responses

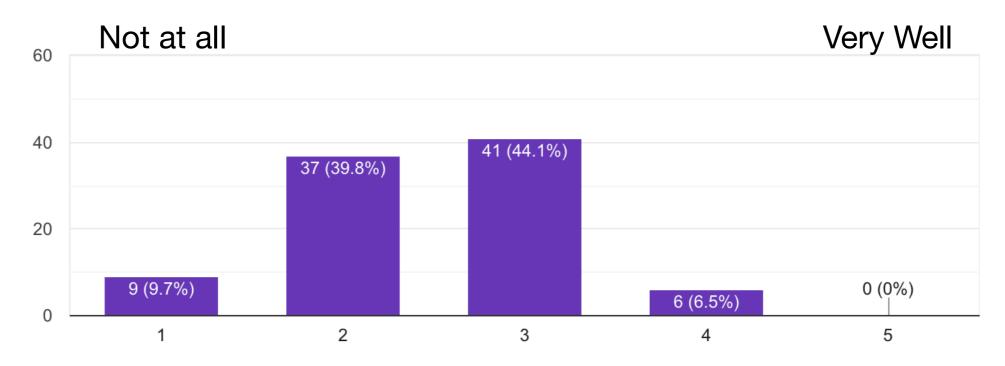


*) How well do you think we currently *model* the distribution of outer radii of the torus?

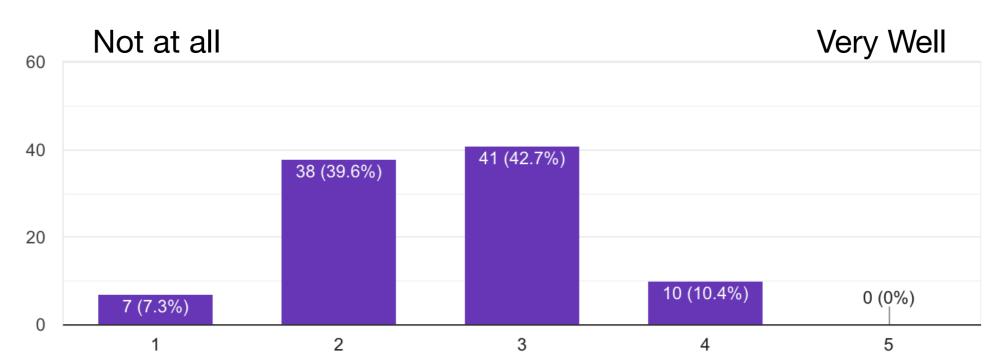


*) How well do you think we currently measure the distribution of torus shapes [H(R)]?

93 responses

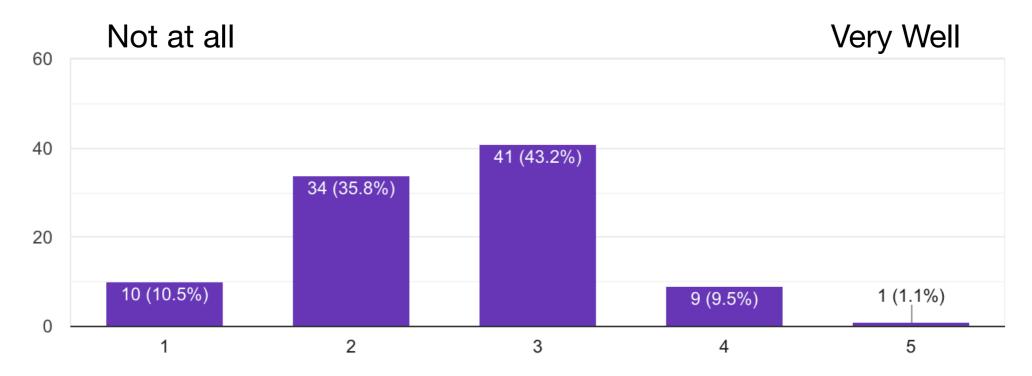


*) How well do you think we currently *model* the distribution of torus shapes [H(R)]?

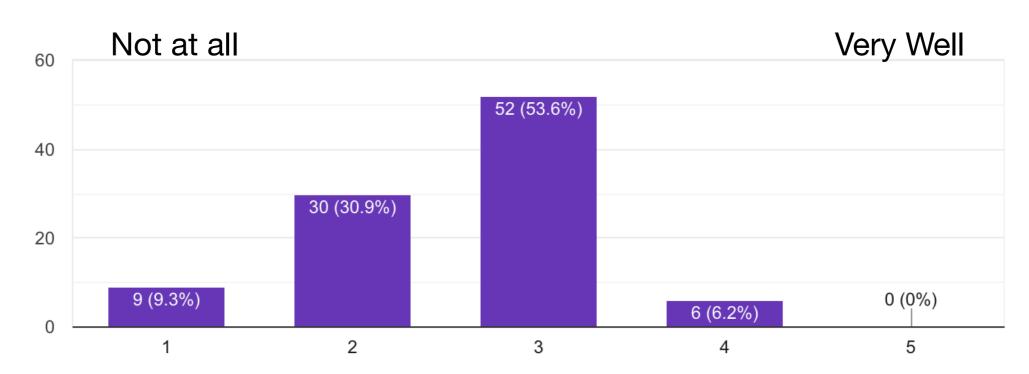


*) How well do you think we currently measure the distribution of torus total mass?

95 responses

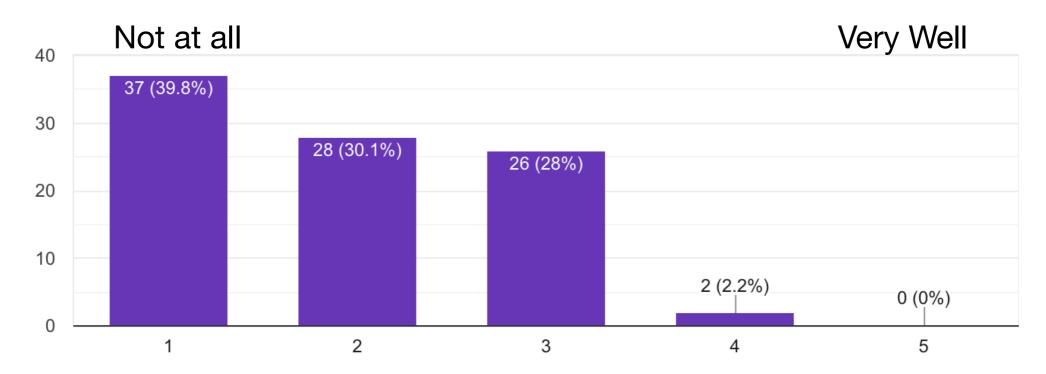


*) How well do you think we currently *model* the distribution of torus total mass?

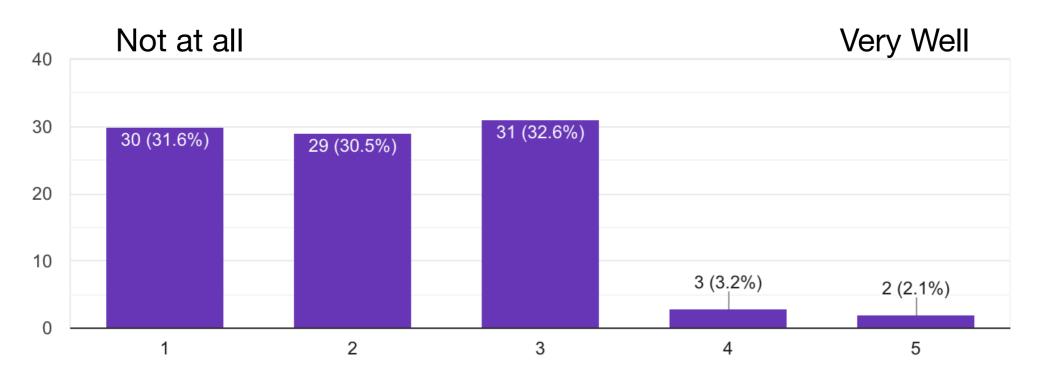


*) How well do you think we currently measure the distribution of torus large scale magnetic field?

93 responses

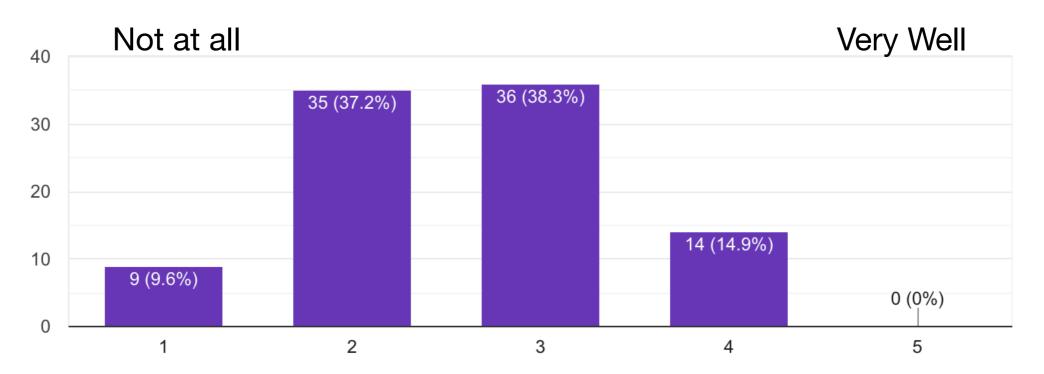


*) How well do you think we currently *model* the distribution of torus large scale magnetic field?

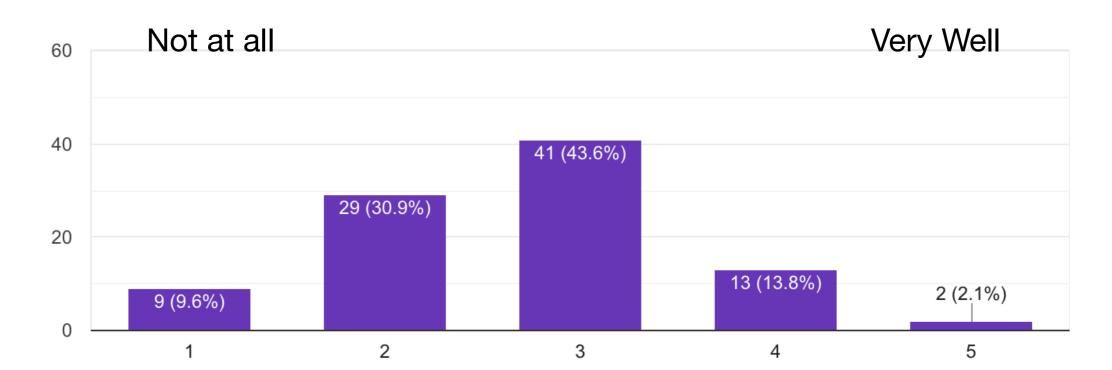


*) How well do you think we currently measure the distribution of torus dust composition?

94 responses

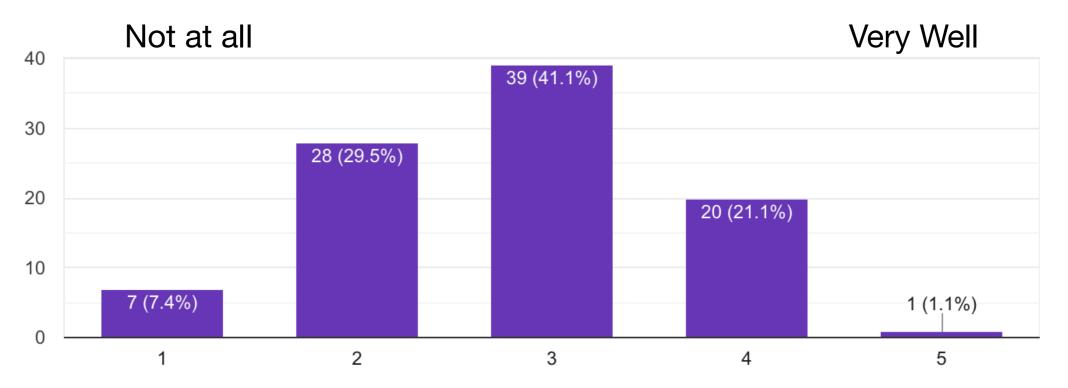


*) How well do you think we currently *model* the distribution of torus dust composition?

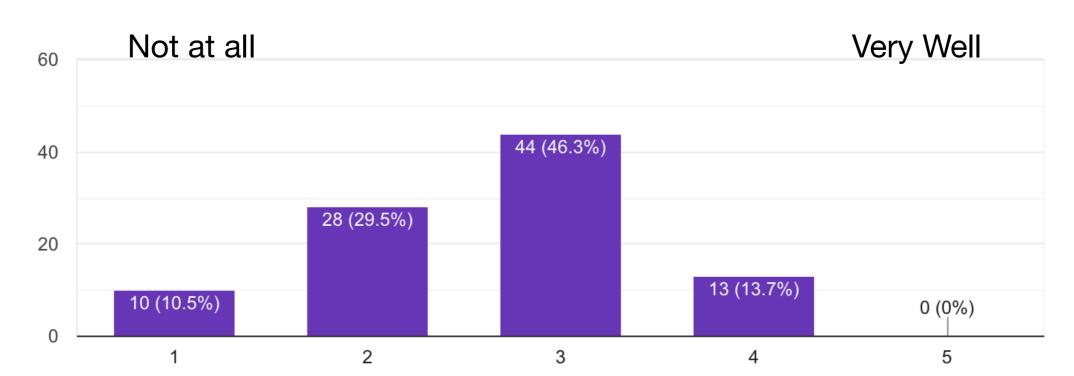


*) How well do you think we currently measure the distribution of torus molecular composition?

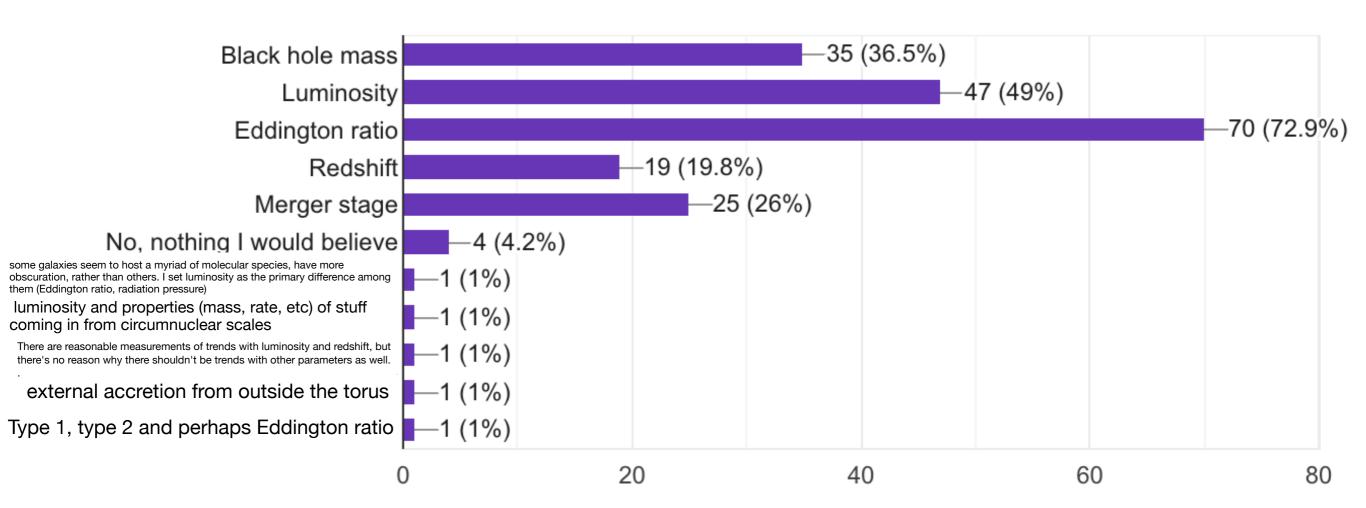
95 responses



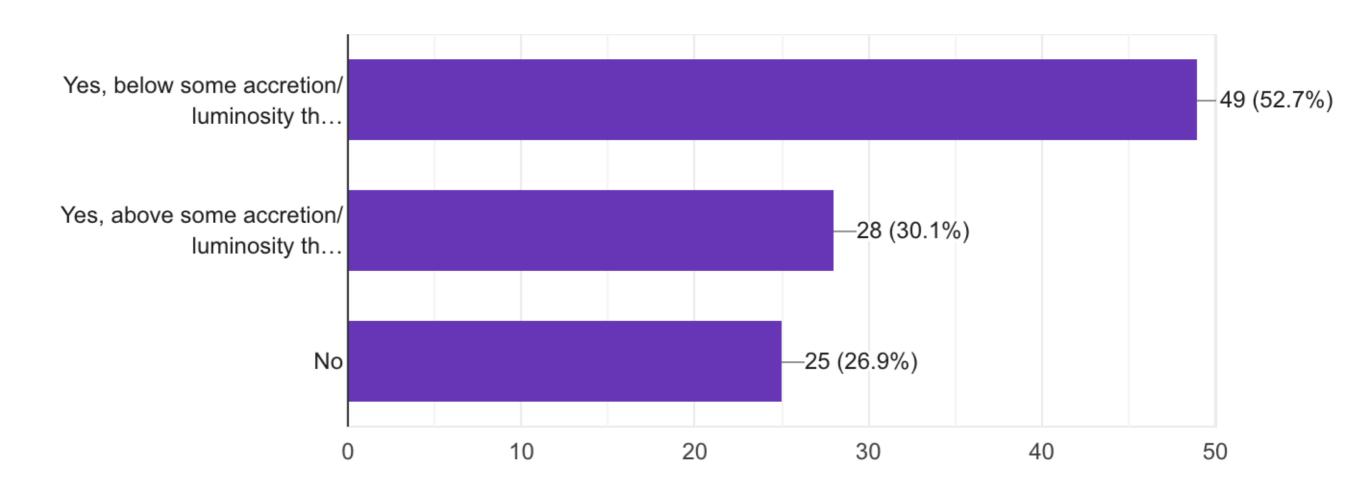
*) How well do you think we currently *model* the distribution of torus molecular composition?



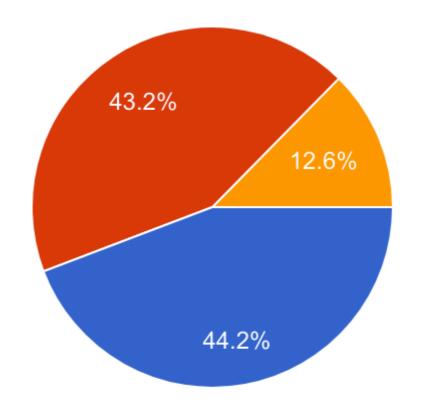
*) Do you believe that the distribution functions of the torus properties have systematic trends or evolution with...



*) Are there any AGN where the torus does not exist?



*) Are there any AGN where the broad line region does not exist ("true type 2s")?

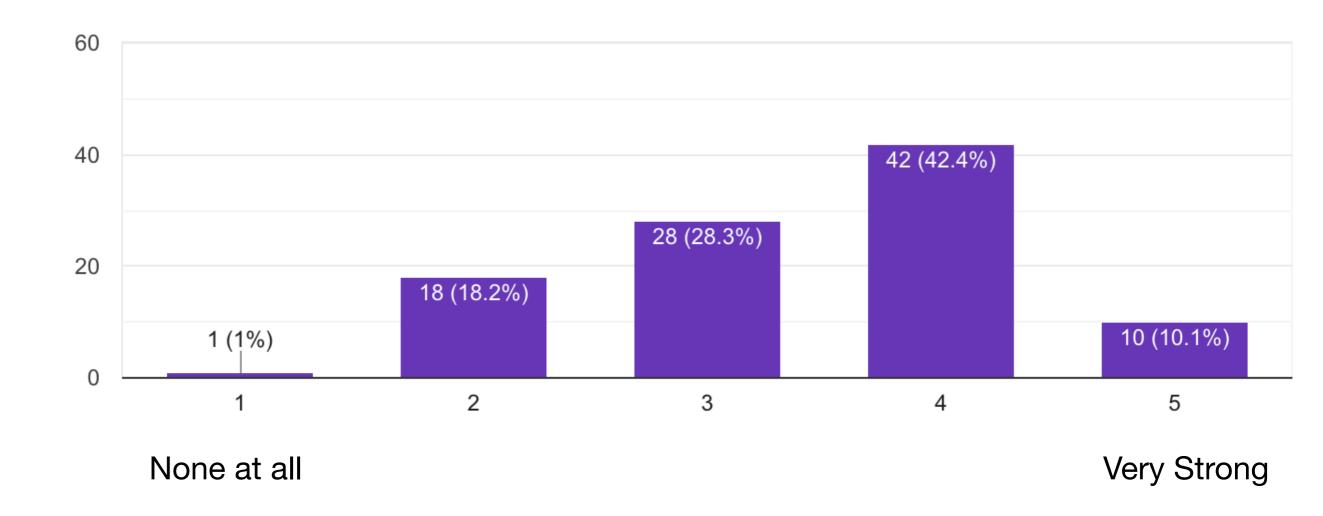




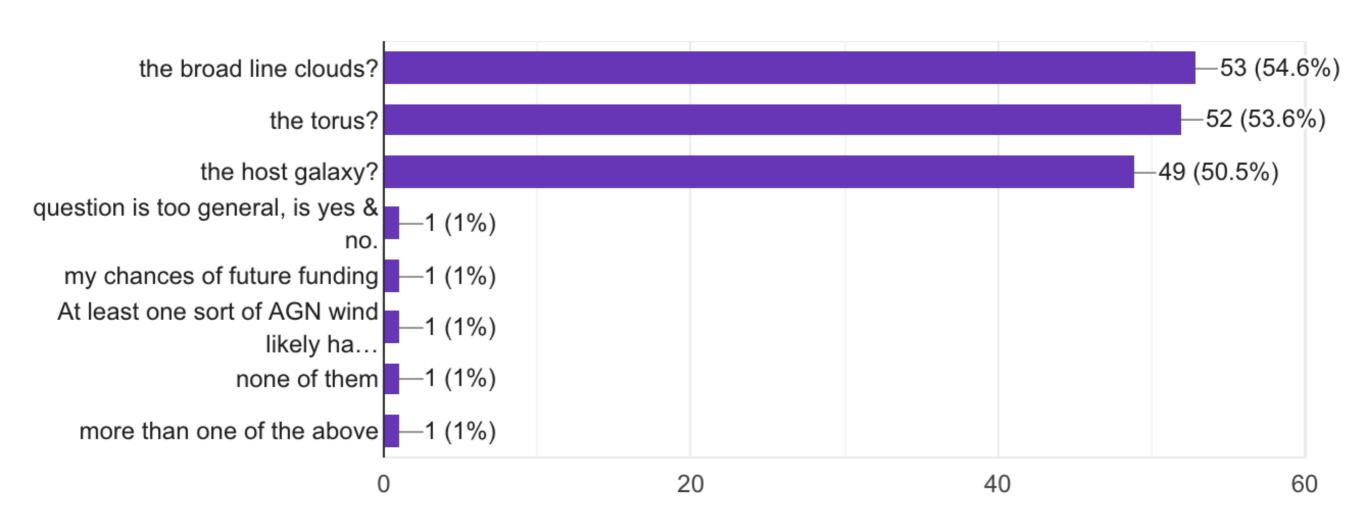
- No, at least above some accretion threshold
- No

Evolution+Parameter Space

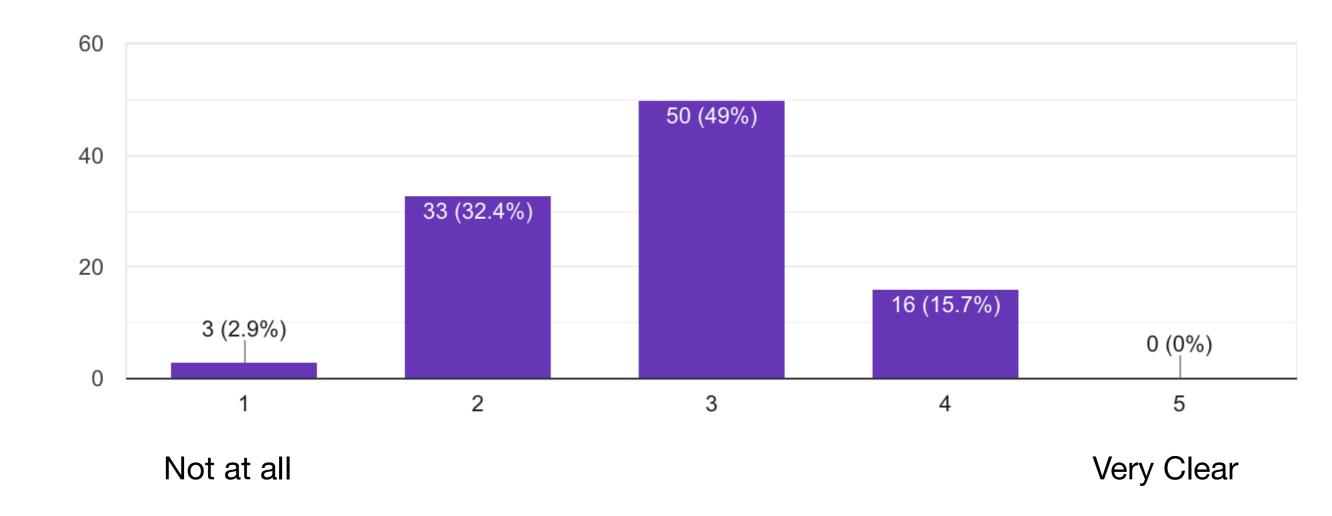
*) How closely related are the AGN activity, torus, and host properties?



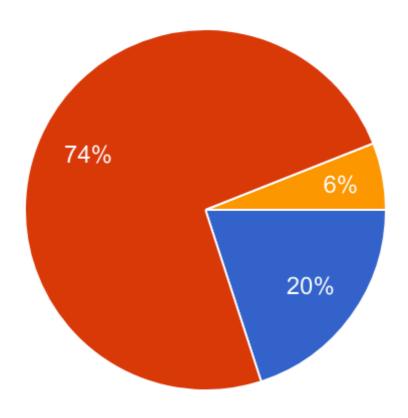
*) Do AGN winds strongly impact...



*) How clear is it to you what the torus is and what it is not?



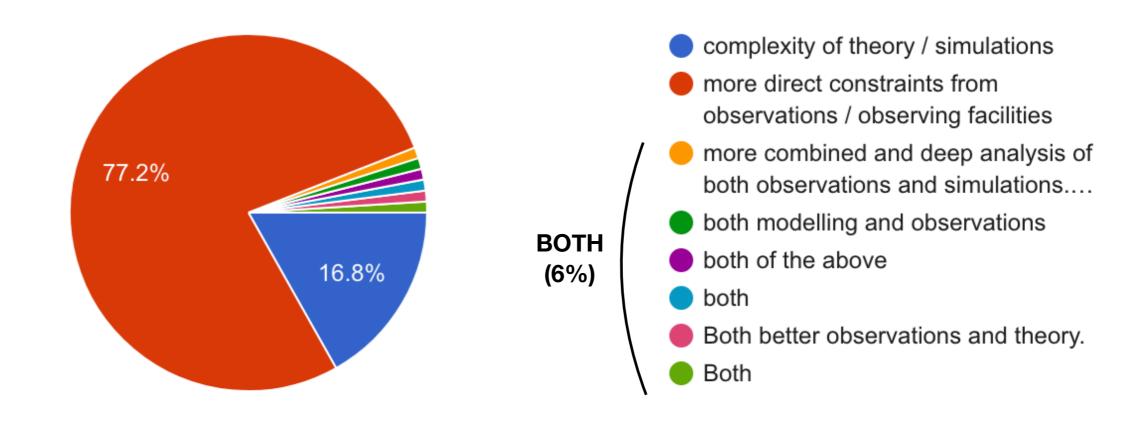
*) The torus (aka the molecular & dusty obscurer on parsec scales) ...



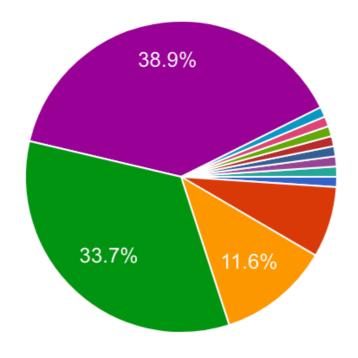
- ... is a rather well defined and distinct physical structure.
- ... forms in a crude region of space between the broad line region and the inner galaxy.
- ... is not really a tangible structure within an AGN.

Torus of the Future

*) What are we most fundamentally lacking to advance our understanding of the torus?

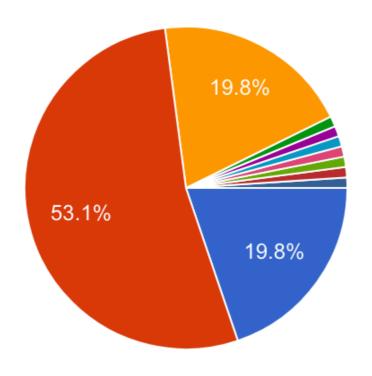


*) What do you think is the single most fundamental missing current (~3 yr window) observation that would help us better understand the torus and its environment?



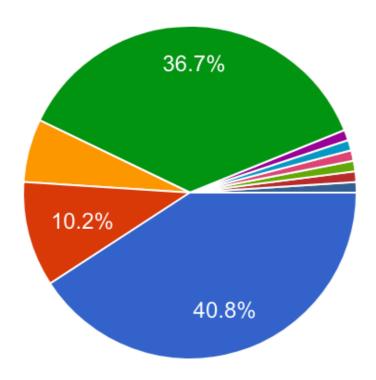
- High sensitivity X-ray imaging on >50 pc scales
- High spectral resolution X-ray instruments
- High sensitivity IFU observations of ionisation cone structure and energetics on >1 pc scales
- High sensitivity MIR imaging on ~1 pc scales
- High sensitivity, spatially resolved molecular line kinematics on ~1 pc scales
- Simultaneous observations at different wavelengths
- near-IR VLTI measurements with GRAVITY combined with molecular kinematics on ~1pc scales
- MIR interferometry imaging on sub-pc scales
- All of the above. We need a complete picture.
- both MIR and molecular lines
- No single observation, many: IFU observations, MIR imaging, spatially resolved cold dust and molecular gas kinematics
- Near-IR imaging on 0.1-0.01 pc scales

*) What do you think is the single most fundamental missing future (~30 yr window) observation that would help us better understand the torus and its environment?



- High sensitivity X-ray imaging on sub-pc scales
- High sensitivity MIR IFU obs on sub-pc scales
- High sensitivity, spatially resolved molecular line kinematics on sub-pc scales
- near-IR interferometry
- near-IR interferometry (GRAVITY)
- I am pessimistic until we have something to falsify
- Multi-wavelength concurrent observations.
- High sensitivity NIR imaging on ~1 pc scales
- all of the above
- N/A

*) In what direction should simulations/modeling push most? Where will the most fruitful efforts go?



- multiwavelength (X-ray to submm & molecules)
- higher resolution and dynamic range
- polarization
- more physically based (radiation pressure, magneticfields. SNe. star formation. ...)
- Monitoring of state changes, where we can probe the disappearance and reappearance of BLR and innermost torus
- higher resolution/dynamic range and a lot more physics
- Model diversity
- All options above are relevant
- more than one of the above
- identifying what mechanism truly makes the torus geometrically thick since none of the current candidates is completely satisfactory