

AGN & Quasars

A search for 3-5 points for
Making the Most of the
Great Observatories

AGN/Quasars: 3 (4?) Areas

1. AGN in themselves
2. Black Hole Growth
3. Feedback to Galaxy evolution
4. [Background light source]

1. AGN & Quasars in themselves

1. Accurate **Black hole masses**: σ * Sy2s, radio gals? Inclination effects?
2. **Bolometric L** HST(host)/Spitzer/Chandra, *well-defined* samples - 3C, bright Seyfers, SDSS quasars, obscuration selection biases? IR-selected?; GOODS, COSMOS.
 1. **Accretion rates, efficiency, spin?**
3. Origin of **continuum SEDs** HST/Spitzer/Chandra
4. Acceleration of **jets**. Origin of power; matter content; GRB μ -quasar connections HST/Spitzer/Chandra more! Higher z
5. **accretion disks**: use microlensing MRI? RIAF
6. Origin, acceleration of **Winds** - is HiBELR part of wind? HST COS 200d
7. Nature of **Obscuring tori** - disk wind, or larger scale? (or both?)
8. activity **Lifetime/duty cycle** ?
9. Does anything happen in quiescence? Tidal disruption events
10. Abundances (host galaxy connection; 1st stars)
11. Y
12. Z
13. ...

2. Black Hole growth

1. How much **hidden BH growth**?
 - a. Starburst/ULIRGs, AGN connection: IR, X-ray, mm
 - b. Unification: What is Obscuring Torus? High resolution imaging nearby bright AGN - type1 & 2 with some kind of mass estimate (what M range?): 'AGN SINGS'; IRS Si em. - NH(X) relation - variability; Obscuration vs. L,z; Swift BAT Integral >10keV sources.
2. **Fueling Mechanisms** \dot{M} vs. z
3. Physical cause of **evolution**: what controls **BH-bulge co-evolution**?
Evolution of $M_{BH}-\sigma^*$ relation? BH Fundamental plane: M, \dot{M}, R_L
4. **Accretion luminosity of the Universe**? 5%-25% $L_{Universe}$ due to AGN, L_{Acc}
 - a. Needs SED predicability at all (L, z): faint, pan- λ coverage IR, X-ray, Opt., UV
5. **Mechanical luminosity**? (jets + winds) X-ray, UV
 - a. Impact on host galaxy, environment, IGM? Opt, near-IR, radio, X-ray
6. **Quiescent BH: Why?**
 - a. Starved? Local warm, cold ISM? Opt., X-ray, mm/sub-mm
 - b. Non-radiative accretion? Well above Bondi rate?
7. **Z>7 quasars** (UKIDDS?) Space-based follow-up.
8. **Demographics**: where do quasars like to live?
9. Z

3: Feedback

AGN 'feedback' invoked for:

1. *BH-bulge co-evolution? ($M_{BH}-\sigma^*$ relation)*
 2. *Dry mergers (no star formation in low z massive galaxies)*
 3. *Suppression of cooling flows*
 4. *Maximum mass of galaxies*
 5. *Enrichment of IGM*
 6. *Dust creation at $z=6$*
1. **Feedback in Action:** use type 2 quasars (SDSS Zakamska, $z\sim.5$)- is host ISM affected? Hosts are 'train wrecks'. Radio quiet AGNs in clusters? Blueshifted neutral lines from ISM? BALs - X-ray BALs: em.line imaging $z\sim 0.1$?
Molecules in post-starburst quasars?
CenA
 1. **Accretion luminosity of the Universe?** 5%-25% L_{Universe} due to AGN, L_{Acc}
Needs SED predictability at all (L, z): faint, pan- λ coverage IR, X-ray, Opt., UV
 2. **Mechanical luminosity?** (jets + winds) X-ray, UV
 3. **Quiescent BH:** Non-radiative accretion? Well above Bondi rate?
 4. **Clusters:** 'cooling flow' well-defined sample ~ 20 @ 100ksec w. Chandra

(4: Background light source)

1. **Intergalactic medium (IGM):**
 1. Lyman α forest
 2. WHIM
2. **ISM** of intervening galaxies/haloes
 1. MgII
 2. Damped Lyman α systems
 3. Milky Way ISM, halo
 4. Host galaxy ISM?
3. **ICM?** (Krolik, Raymond)
4. **Lensing**
5. X
6. Y
7. Z
8. ...

AGN & Quasars: *What is to be done?*

Figure of merit for success of observations? (David Weinberg)

1. **BH masses, accretion rates**
2. **Hidden BH growth**
 - a. ULIRG-AGN connection: IR, X-ray, mm
 - b. Obscuring Torus= ?
3. **What controls BH-bulge co-evolution?**
4. **Accretion luminosity of the Universe?**
 - a. SED(L, z) IR, X-ray, Opt., UV
 - b. Mechanical luminosity? X-ray, UV
 - c. Environmental Impact? Opt, near-IR, radio, X-ray
5. **Quiescent BH**
6. **What accelerates jets (& winds)?**
7. **How do accretion disks work?**
8. **IGM/ISM**
9. X
10. Y
11. Z
12. ...