

Notes on First Meeting of NGAO Extragalactic Subgroup, February 3, 2006 Claire Max, subgroup chair

(Notes on second meeting will follow)

Attendees: Aaron Barth (UCI), David Koo (UCSC), James Larkin (UCLA), Claire Max (UCSC), Tommaso Treu (UCSB).

Members who could not attend: Richard Dekany, Richard Ellis, Chuck Steidel (Caltech)

The group worked on a "short list" of significant topics for extragalactic science with Keck Next Generation AO. After much discussion, the following four areas were chosen for further study:

- 1) Stellar populations in nearby galaxies.
- 2) AGNs and supermassive black holes (specifically the M-sigma relation and co-evolution of host galaxies).
- 3) Field galaxies: imaging and kinematics.
- 4) Gravitational lensing of high-z galaxies.

For each, the subgroup wants to assess the science case for an AO system with a) narrow-field, high-Strehl (KPAO); b) wider field, uniform PSF across the field, somewhat lower average Strehl (MCAO), and c) a notional Multi-Object AO system. Notional instruments will be considered in parallel.

Resources available/needed, by topic (just the start of this discussion):

1) Try using analytic approach of Olsen, Blum, Rigaut (AJ 126, 452, 2003). Look closely at methods used in Gemini MCAO and GSMT Book chapters. Probably needs a simulation of a "fake" starfield as imaged by AO. Check out Esslinger and Edmunds (A&AS 129, 617, 1998) for photometric accuracy with AO. Consider bringing in someone who does resolved stellar populations for a living; for example perhaps, Mike Rich, Tammy Smecker-Hanes, Taft Armandroff, Judy Cohen.

2) (not discussed yet)

3) For range of "typical" morphologies in the IR, use data from CATS survey (Melbourne, Koo, Larkin, Max et al.). For range of "typical" visible data use HDF, GOODS, and related HST data. For modeling the performance of integral field spectroscopy on $z = 0.5 - 2.6$ galaxies, see recent paper by Law, Steidel, and Erb (AJ 131, 70, 2006).

4) Treu and a student are working on modeling of fake gravitational lenses. These could be used as input into a simulation of AO performance.

Preliminary thoughts on information to request from Technical and Science Instrument Subcommittee (TSIS): (these are VERY preliminary)

- A library of PSFs for each of the AO systems being considered. (different Strehl's, exposure times, observing wavelengths, seeing)
- Statistics of the various PSF characteristics for each AO system being considered
- Simulations of AO images of: 1) a crowded star-field with input point-sources specified by the extragalactic subcommittee, 2) a gravitationally lensed galaxy (+ cluster) with input specified by extragalactic subcommittee