**Proposal for an ALMA Community Day in Tucson**

Organization, Logistics, and Audience:

The meeting would be jointly organized by NOAO (contact: Joan Najita, head of Office of Science) and Steward Observatory (contact: Professor Xiaohui Fan).  We would invite participation from other Tucson astronomy organizations such as the Lunar Planetary Lab and the Planetary Science Institute.

Based on an informal doodle poll, we estimate approximately 30 participants from among the NOAO and Steward Observatory staffs.  NOAO and Steward both have access to meeting rooms that can accommodate ~40 participants for plenary sessions.  If needed, smaller meeting rooms are also available for breakout sessions featuring hands-on software demonstrations.

Expected level of NAASC staff support:

Based on discussions with you, a 1.5-day meeting would allow for an overview of the ALMA ES capabilities and NAASC community support programs and brief demonstrations and/or tutorials on the ALMA ES user tools, including the ALMA Observing Tool for proposal generation and SIMdata in CASA for simulating observations.

Possible dates:

A brief poll of the organizers of this meeting and the ALMA discussion

group organizers suggests the following possibilities.

April 11-15

April 18-22

May 11-13

Science:

Respondents to our doodle poll represent a wide range of scientific interests, including galaxy and AGN evolution, stellar populations, evolved stars, stellar remnants, molecular clouds, star formation, and

circumstellar disks.  They include faculty, staff, postdocs, and students.  Strong interest in ALMA is likely to be sparked by the bi-weekly discussion group on ALMA that is being held this semester at Steward/NOAO, which is organized by Desika Narayanan, Ran Wang, Xiaohui Fan, and Yancy Shirley.  To provide more specificity, we describe below two example science programs that would be enabled by

ALMA.

Galaxy Evolution (Desika Narayanan)

The resolution afforded by ALMA will allow us to make substantive headway in studies of both local and higher-redshift systems. Locally, we will be able to better understand the formation and evolution of Giant Molecular Clouds in a variety of galactic environments.  For example, while we know that Galactic GMCs share relatively similar physical properties, it is unknown whether or not this is true when subject to the extreme pressures at the centers of ULIRGs.  This will have profound consequences for our understanding of the potential evolution of the CO-H2 conversion factor with mass surface density in galaxies (e.g. Downes and Solomon, 1998).  ALMA will afford us, for the first time, the ability to directly image GMCs

in local galaxy mergers.  We will be able to measure their sizes, masses and temperatures and ascertain how they may vary from those seen in the Milky Way.

At z~2, we will be able to use the high spatial resolution of ALMA to understand formation mechanisms of some of the most extreme galaxies in the Universe.   A variety of novel selection techniques with

Spitzer, Herschel and the JCMT are uncovering  galaxies with vigorous star formation rates (>1000 Msun/yr).  The origin of these sources is still a topic of contentious debate.  It is not clear as to whether

these are merger-driven, or if there are too few mergers in the high-z Universe to constitute the the populations of 24 micron and submillimeter-selected sources. With ALMA, we will be able to directly

resolve these systems and search for potential merger signatures (e.g. multiple counterparts) versus ordered disk-like rotation.

AGN evolution and BH/galaxy connection (Xiaohui Fan)

Supermassive black holes (BHs) in the center of massive galaxies obtain most of their mass through Eddington-limited accretion during quasar/AGN phase. Active BHs, in turn, are thought to have played a

crucial role in galaxy assembly through feedback effects to their galactic environment. Understanding the coevolution of supermassive BHs and galaxies is one of the key goals of galaxy formation and

observational cosmology. ALMA observations will directly probe the dust and gas emission in quasar host galaxies while minimizing contaminations from quasar activity itself. We will study the relationship between supermassive BH growth and galaxy evolution at the high redshift frontier by carrying out detailed observations of the most distant quasars and their host galaxies, combining the power of ALMA with new optical/near-IR facilities.

We will obtain deep, high resolution submillimeter continuum and [CII]/CO line observations of a complete sample of SDSS quasars at z~6, covering a wide luminosity range, during ALMA early science

observation phase. These observations will reach an order magnitude deeper than current limits in submm wavelength. They will be used to measure star formation rate, size and gas kinematics of the host

galaxies, and provide estimates of the galaxy dynamical mass. Using these data, we will study the evolution of BH mass/galaxy mass (or M-sigma) relation and the feedback effects of rapid BH growth on

galaxy formation at the earliest epoch.