

## **Making the most of the Great Observatories**

*For everything there is a season*

Over the last three years the astronomical community has had the privilege of access to three superb space observatories: Chandra, Hubble and Spitzer. Those circumstances will change in the near future; while Chandra faces no immediate lifetime issues, Spitzer has only two complete cryogenic cycles (4 & 5) remaining, and, without a servicing mission, Hubble's batteries are likely to fail in mid-2009. With those concerns in mind, the three Great Observatories organized a joint workshop, supported by ~90 attendees and held between May 22 and 24<sup>th</sup> in Pasadena.

The goal of the meeting was to identify key science areas that need to be tackled by the Great Observatories, particularly those that rely on synergistic observations between at least two Observatories and those that lay the foundation for science programs with future ground- or space-based observatories. Tom Soifer provided a more succinct summary: what projects would make us look like idiots if they weren't completed before the Observatories die?

The meeting included ten wide-ranging review talks. Eight covered broad science areas: planets and planetary systems (Drake Deming, Goddard), stellar astrophysics (Jim Liebert, U. Arizona), star formation (Ed Churchwell, Wisconsin), nearby galaxies (Rob Kennicutt, Cambridge), AGN and QSOs (Niel Brandt, Penn. State), galaxy formation (Michael Strauss, Princeton), galaxy clusters (Megan Donahue, Michigan State) and cosmology and large-scale structure (David Weinberg, Ohio State). These reviews were complemented by breakout discussion sessions and by two panel sessions. The first panel discussed synergy with future ground-based programs, with contributions from Jeremy Mould (NOAO0, Dale Frail (NRAO) and Chris Carilli (NRAO). The second panel discussion combined summaries of the current performance of Spitzer (Lisa Storrie-Lombardi, SSC), Chandra (Belinda Wilkes, CXO) and HST (Harry Ferguson, HST) with anticipations of JWST (Jon Gardner, Goddard), Herschel (Bill Latter, NHSC) and Con-X (Ann Hornschemeier, Goddard). Finally, Meg Urry (Yale) and Richard Ellis (Caltech) presented complementary uber-reviews.

We asked each speaker and each discussion session to identify three or four high-priority science topics where the Great Observatories could (and should) make key contributions. With the aid of several participants (notably David Weinberg), we have compiled a summary of those suggestions, available at the workshop web site, <http://ssc.spitzer.caltech.edu/mtgs/greatobs/>

This does not imply a formal endorsement of any of those projects by any of the Great Observatories; nonetheless, the community may wish to pay due attention to these recommendations in answering future calls for proposals.

Besides the overall science summary, the workshop web site provides links to copies of the review presentations, together with summaries of the discussion and panel sessions. There are also documents compiled for the workshop that describe the currently available

means of applying to time on multiple Great Observatories, catalogue large programs that have already been undertaken on the Great Observatories, and summarize the capabilities of current and future ground- and space-based facilities.

Setting aside the recommendations for specific observational projects, the workshop reached consensus on four broader issues:

First, there are no obvious key scientific questions that are currently ignored by the Great Observatories. All of the projects highlighted during the workshop build on past contributions; as one speaker commented, this either reflects the resourcefulness of the astronomical community or the lack of imagination of the workshop participants.

Second, archival research will acquire increased importance in the near future. It is imperative that the Great Observatories provide efficient cross-linking between their individual data archives.

Third, all time assignment committees (ground and space-based) should bear in mind the limited cryogenic lifetime of Spitzer. There was strong (but not unanimous) sentiment for examining means of streamlining the proposal process for projects that require medium to large allocations on two or more Great Observatories. We are currently exploring the available options.

Fourth, while several projects were proposed that are comparable in scale to the initial HST Key Projects, Spitzer's schedule does not allow sufficient time for large, multicycle programs. The onus is on the astronomical community to devise successful co-operative strategies for proposing important science.

Neill Reid (STScI) for the Scientific Organizing Committee: Lisa Storrie-Lombardi (Spitzer Science Center), who was also the chair of the LOC; Paul Green (Chandra X-ray Observatory); Martin Elvis (Smithsonian Center for Astrophysics); Julia Lee (Smithsonian Center for Astrophysics); Pat McCarthy (Observatories of the Carnegie Institution of Washington); Leisa Townsley (Penn. State University); Mike Werner (Jet Propulsion Laboratory); Brad Whitmore (STScI).