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A 2x1.5 square degree mosaic of a portion of the Galactic Plane as seen in the Spitzer Legacy program GLIMPSE 3D data. 3.6 microns is shown as blue, 4.5 microns as green, and 8.0 microns as red. GLIMPSE data, along with this image preview, are available through the Infrared Science Archive at: http://irsa.ipac.caltech.edu/.

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• Launch of Herschel/Planck (scheduled)

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• September 14-18: Conference - Pathways Towards Habitable Planets, Barcelona, Spain

October

• Conference - Sagan/Michelson Fellows Symposium, Pasadena, CA

November

• November 1: Launch of WISE (scheduled)
• Annual Spitzer Science Conference, Pasadena, CA
The Decadal Survey season is upon us. The January AAS meeting will publicize the process and witness the first public sessions with the Survey committee. The next couple of years will provide an exceptional opportunity for our community to exercise its own unique brand of democracy in planning the direction of future investment.

IPAC has been participating in the preparatory activities, and will continue to support the process. We hosted a community workshop about the Future of Far-Infrared Astronomy from Space in Pasadena on May 28-30, 2008. The Workshop discussed strategies and plans in anticipation of the Survey, while also celebrating the 25th anniversary of IRAS. The Workshop reached some agreements, and opened a dialogue that has closed most remaining items. The outcome of this exercise is being captured in a consensus document authored by Martin Harwit on behalf of the participants, and intended as input to the Decadal Survey. The document summarizes key science and technology opportunities to be pursued in the next decade, in the context of recent discoveries and upcoming facilities.

A special session at the January AAS meeting in Long Beach, CA entitled The Far-Infrared/Submillimeter Universe in High Definition has been scheduled for Tuesday January 6 for 2:00-3:30PM. The purpose is to inform the community of progress and make the document available for further comment and advocacy. That session is your opportunity to voice your suggestions if you have not already participated in the dialogue. The document will also be available at the IPAC, Spitzer, Herschel, WISE and other AAS displays.

This issue of the IPAC Newsletter also marks the renewed commitment to Exoplanet Science by NASA, JPL and Caltech, with the renaming of MSC as the NASA Exoplanet Science Institute (NExScI), and the introduction of the Sagan Fellowships and Sagan Workshop which replace the Michelson program as the premier fellowship and training program for young researchers working in exoplanet research. In parallel with the far-infrared community activities mentioned above, NExScI and the Exoplanet Program Office at JPL hosted a workshop in May also aimed at generating community consensus in the area of Exoplanet research. The report of the ExoPlanet forum is available in draft form (http://exep.jpl.nasa.gov/exep_exfCommunityReport.cfm).

As we participate as an IPAC community in long-term planning, we also look forward with much anticipation to the year ahead, which will see several major milestones. Most prominent will be the transition from the prime, cryogenic phase of the Spitzer Space Telescope to the Warm Mission phase, and the combined launch of Herschel and Planck towards the Sun-Earth L2 zone; both of these events are expected in April 2009. Later in the year, WISE will launch and start its all-sky mapping mission. And last but not least, the International Year of Astronomy in 2009 will offer many unique opportunities to share with the citizens of the world the passion we are each so fortunate to pursue as our regular occupation.

Dr. George Helou
IPAC Executive Director

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The Michelson Science Center is Now NExScI: the NASA Exoplanet Science Institute

The Michelson Science Center has been renamed the NASA Exoplanet Science Institute (NExScI). NExScI is the science operations and analysis center for NASA’s Exoplanet Exploration Program and will continue to support all MSC activities.

Specifically, NExScI supports projects such as the Keck Interferometer (KI), Space Interferometry Mission (SIM), NASA Keck single-aperture operations, and the Large Binocular Telescope Interferometer (LBTI) with operational software infrastructure and support, and archiving of and access to observational data. NExScI also supports science community activities including the Sagan Fellowship Program, Sagan Exoplanet Summer Workshop, and Exoplanet Exploration Program–related conferences. NExScI develops and maintains data archives and analysis tools such as the NASA Star and Exoplanet Database (NStED, which incorporates data from, among others, ground-based transit surveys and the CoRoT transit mission), the Keck Observatory Archive (KOA), and Keck Interferometer and Palomar Testbed Interferometer archives.

NExScI also runs the Time Allocation process for NASA’s share of the Keck Telescope (approximately 90 nights per year), and awards successful PIs with funding to help with their research. NExScI scientists also support the Exoplanet Exploration Program through their areas of active research, including the search for planets around young stars, resolving disks around young stars with KI, and planet transit searches. For more information see the NASA Exoplanet Science Institute website: http://nexsci.caltech.edu.

Sagan Fellowship and Workshop Announced

NExScI is pleased to announce the introduction of the Sagan Program which includes the Sagan Fellowship Program and the Sagan Exoplanet Summer Workshop. This program is named in honor of the late Professor Carl Sagan.

The annual Sagan Postdoctoral Fellowships support outstanding recent postdoctoral scientists to conduct independent research that is broadly related to the science goals of the NASA Exoplanet Exploration program. The proposed research may be theoretical, observational, or instrumental. Applications for the class of 2009 were due in early November and the Fellowship recipients will be announced in February 2009. The duration of the fellowship is up to three years: an initial one-year appointment and two annual renewals contingent on performance and availability of NASA funds.

In addition to the Sagan Fellowships, NASA also announced two other theme-based fellowship programs: the Einstein Fellowship Program which supports the Physics of the Cosmos research, and the Hubble Fellowship Program which supports Cosmic Origins research.

The Sagan Exoplanet Summer Workshop series are annual topical workshops that provide opportunities for students, postdocs, and staff alike to learn about the engineering and scientific application of exoplanet-related techniques used in the Exoplanet Exploration Program. This year’s Workshop on “Exoplanetary Atmospheres” will take place on July 19–24, 2009 on the Caltech campus in Pasadena, California. For more information, please see the workshop website: http://nexsci.caltech.edu/workshop/

Inspiring Next Generation Explorers: The Sagan Program was created to inspire the next generation of explorers seeking to learn more about planets, and possibly life, around other stars.

What is NExScI?

The NASA Exoplanet Science Institute (NExScI) plays a vital role in NASA’s program to discover and characterize planetary systems and Earth-like planets around nearby stars. NExScI is the science operations and analysis service organization for NASA’s Exoplanet Exploration Program projects and their user communities. In addition, NExScI hosts the Sagan Program including fellowships and workshops, and administers public data archives including the NASA Star and Exoplanet Database (NStED), the W. M. Keck Observatory Archive (KOA), and the Keck and Palomar Testbed Interferometer Archives. For more information please see: http://nexsci.caltech.edu.
Planet Detection Tools and Archives

NExScI builds on the experience gained from the Infrared Processing and Analysis Center (IPAC), Infrared Science Archive (IRSA), and Spitzer Science Center (SSC) to develop multi-mission tools and science data archives in support of the Exoplanet Exploration Program and its science community. These tools, including the getCal tool suite, the Visibility Modeling Tool (VMT), and the SIM observation planning tool suite, address interpretation of interferometer observations in terms of stellar and disk models as well as transit analysis capabilities suitable for the CoRoT and Kepler missions.

The NASA Star and Exoplanet Database (NStED) is a stellar and exoplanet archive. NStED can be used to carry out detailed searches on over 70 parameters for more than 140,000 bright, nearby stars, and all currently known exoplanets and their host stars, including those from the CoRoT mission. NStED also has a dedicated interface for transit survey data sets, including TrES observations of the Kepler field and the KELT survey of the Praesepe region. See: http://nexsci.caltech.edu/archives/nsted/

The Keck Observatory Archive (KOA) contains both level 0 and 1 data taken with the Keck HIRES instrument from 1994 to the present. Currently, data on more than 2500 scientific objects are available to the public. KOA is a collaboration between NASA, the NASA Exoplanet Science Institute, and the W. M. Keck Observatory. http://nexsci.caltech.edu/archives/koa/

Data from the Keck Interferometer are available to PI's and the public through a searchable database. The public Palomar Testbed Interferometer Archive includes over 1100 sources. For access to data from either archive, see: https://nexsciweb.ipac.caltech.edu

Proposal Opportunities

The next NASA Keck Observing call for proposals will be for the 2009B semester. Look for the call to be posted in February with a March 6 deadline. This call will be open to exoplanet, solar system, and Cosmic Origins galactic and extragalactic proposals, and will also feature a call for CoRoT Key Science projects. For more information see: http://nexsci.caltech.edu/missions/KeckSolicitation

Supported Conferences and Meetings

• SIM Science Studies Workshop, September 24–25, 2008, Pasadena, CA
• Missions for Exoplanets: 2010-2020, April 21–23, 2009, Pasadena, CA
• Sagan/Michelson Fellows Symposium, October 2009, Pasadena, CA
• Pathways Towards Habitable Planets, September 14-18, 2009, Barcelona, Spain

Congratulations to SIM Science and Data Analysis Awardees

4 SIM Data Analysis Awardees were selected to participate in a near-term project to calculate the ability of SIM to detect an Earth-mass planet in the habitable zone (HZ) around a nearby star, in the presence of a multiple-planet system as well as instrumental and astrophysical noise:
• Stefano Casertano, Space Telescope Science Institute: Characterization of Planetary Systems and Detection of Earth-Like Planets With SIM/PlanetQuest
• Debra Fischer, San Francisco State University: Modeling Multi-Planet Systems
• N. Jeremy Kasdin, Princeton University: Using Dynamic Filtering for the Analysis of Astrometric and Radial Velocity Data Sets for the Detection of Terrestrial Exoplanets with SIM
• Matthew W. Metterspaugh, U.C. Berkeley Space Sciences Laboratory: Characterizing Exoplanet Systems with Astrometric and Radial Velocity Measurements

19 SIM Science Studies Awardees were selected to conduct concept studies that will lead to scientifically-productive observations using SIM. Following selection, team members met at a workshop held on Sept. 24-25, 2008 in Pasadena, CA. Summaries of the selected proposals and presentations from the workshop are available online:
• Guillem Anglada-Escude, Carnegie Institute of DC: Gaia-SIM legacy project
• Eric Ford, University of Florida: Detection and Characterization of Resonant Planetary Systems with SIM
• Bernard Gaudi, Ohio State University: Measuring the Astrometric Signature of Transiting Planets with SIM
• Dawn Gelino, Caltech: Determining How the True Reflex Motions and Dynamical Orbits for Interacting Binaries Depend on Photocenter Contamination
The WISE polar data will serve as prime calibration fields for both absolute and relative measurements. WISE will be absolutely calibrated on the same basis as that established for the Spitzer IRAC and MIPS instruments. Accordingly, the WISE team, in collaboration with the Spitzer Science Center, have conducted a 0.6 square degree survey for both ecliptic poles using IRAC and MIPS mapping, as well as IRS spectroscopy of previously identified calibrator stars.

The SEP was already partially covered by the SAGE Legacy Survey of the LMC, and so additional Spitzer observations were carried out to complete the WISE CVZ in the south. These Spitzer surveys are used to: (i) provide consistent calibrators in both of the WISE CVZs, (ii) develop new calibrators, (iii) establish the photospheric character of all candidate calibrators, (iv) assess the long-term stability for secondary standards, (v) identify objects that will saturate the WISE arrays and (vi) identify galaxies that are resolved by IRAC.

The NEP is graced – depending on how you look at it! – by the spectacular planetary nebula the “Cat’s Eye” (NGC 6543). It is so bright in the mid-infrared that it will saturate the WISE arrays, and induce a variety of image artifacts. At the very center of the NEP lies the nearby barred, Seyfert 2 spiral galaxy, NGC 6552. Although it is well resolved by Spitzer (and WISE) at short wavelengths, it is unresolved at 24 microns, which means it will serve as a valuable calibrator for the longest WISE band. The NEP contains tens of thousands of stars detected by the Spitzer survey, many of which will also be detected by WISE and will serve as secondary, relative standard stars. In addition to point sources, the field contains well over ~100 resolved galaxies. These sources will be used to help characterize the extended emission extracted by WISE.

The SEP coincidentally is located in close proximity to the Large Magellanic Cloud. So unlike the NEP, which is almost exclusively Milky Way stars, the SEP is dominated by stars from the Milky Way’s satellite galaxy, providing a population of evolved (red) giant stars for both calibration and science cross-purposes. The preliminary results of the detection, extraction and analysis of the NEP Survey will be presented at the Long Beach AAS, January 2009.
The NASA Herschel Science Center (NHSC) was established at IPAC with support from NASA, and began operations in 2001. The NHSC will operate throughout the lifetime of the Herschel mission, including the post-cryogen archival phase. NHSC works closely with the ESA-Herschel Science Center, the HIFI, PACS, and SPIRE Instrument Teams, and the U.S. observers (Open-time, Key Projects, and Guaranteed-Time) to help optimize Herschel-based science.

The goals of the NHSC include:

• Ensure the necessary resources and tools are available to the U.S. scientific community to take advantage of the scientific capabilities of the observatory in a timely manner.
• Act as an interface between the ESA Herschel Project and the U.S.-based scientific user community.
• Advocate U.S. community needs with NASA, the HSC and ESA Project.
• Provide the U.S. astronomical community with technical support throughout all phases of the Herschel mission, from pre-launch through to the transition to archival phase.
• Manage the U.S. data analysis funding for the U.S. user community.

Scientific Goals of the Herschel Space Observatory

Herschel is the only space facility dedicated to the submillimeter and far infrared part of the spectrum. Its vantage point in space provides several decisive advantages, including a low and stable background and full access to this part of the spectrum. Herschel has the potential of discovering the earliest epoch proto-galaxies, revealing the cosmologically evolving AGN-starburst symbiosis, and unraveling the mechanisms involved in the formation of stars and planetary system bodies. Specific goals include:

• Wide-area photometric surveys of the extragalactic and galactic sky to measure dust-enshrouded star formation activity throughout cosmic time and in our own and nearby galaxies.
• Detailed studies of the physics and chemistry of the interstellar medium both locally and in external galaxies.
• Observational astrochemistry of gas and dust as a tool for understanding the stellar/interstellar lifecycle.
• Spectroscopic and photometric studies of solar system objects and their atmospheres.

(Left) This table illustrates the scientific capabilities of the Herschel Space Observatory.

(Bottom right) The Herschel Space Observatory is named in honor of musician and astronomer William Herschel (1738-1822). Herschel discovered infrared radiation, which he called “calorific rays”. In addition, he built over 400 telescopes, discovered Uranus, studied binary stars, measured the motion of the sun in the Galaxy, and invented the word “asteroid.”
Herschel Open Time Key Programs

The Herschel Key Program (KP) Open Time (OT) Announcement of Opportunity (AO) proposal submission was closed on October 25, 2007. 62 valid proposals were submitted, and 21 proposals (with a total of over 5,000 hrs) were accepted. One-third of the accepted KP proposals are led by U.S. PI-s. A list of all accepted programs can be found at http://herschel.esac.esa.int/Key_Programmes.shtml

Upcoming Events

NHSC Pre-Launch Data Processing Workshop: In the spring of 2009, the NHSC will host a data processing workshop directed toward US-based members of KP teams. This workshop will provide hands-on experience in handling Herschel data. The exact date is to be defined.

Herschel Launch: Herschel will be carried into space from Kourou, French Guiana, in April 2009 by an Ariane-5 launcher. Herschel will be launched together with ESA’s Planck satellite. The two vehicles will separate shortly after launch and will proceed independently to different orbits about the second Lagrange point of the Earth-Sun system.

Upcoming Opportunities for Participation in Herschel Science

The next Announcement of Opportunity (AO) for Herschel OT observations is planned for 6 months after launch, when inflight performance is in hand. In the early phases of the mission, the best way of operating the scientific payload will be consolidated, the observatory performance will be established, and the observing tools and manuals will be updated accordingly before issuing this AO. The AO will be open to everyone, including U.S.-based investigators. Subject to the availability of NASA funds, it is expected that the NHSC will provide financial support for U.S.-based investigators of accepted programs.

Latest Updates!

Interested in receiving periodic news about Herschel? Join our email list: https://lists.ipac.caltech.edu/mailman/list-info/nhsc-astro.
What is NED?
The NASA/IPAC Extragalactic Database is the world’s largest database of cross-correlated, multi-wavelength data for extragalactic objects. NED provides a portal into a systematic fusion of information integrated from hundreds of large sky surveys and tens of thousands of research publications. The contents and services span the entire observed spectrum from gamma rays through radio frequencies. As new observations are published in the literature and in large survey catalogs, they are cross-identified or statistically associated with previous data and fused in a unified database to simplify queries and retrieval. Queries may be submitted via the Web (http://nedwww.ipac.caltech.edu), email batch forms, and remote computer programs or scripts.

New in the January 2009 Release

Since the release of Derived Quantities in 2007, NED has been reporting radial velocities corrected for motions due to major attractors (super clusters) in a local velocity field model (Mould et al. 2000, ApJ, 529, 786), Hubble flow distances, and spatial scales, as well as quantities derived from the redshift corrected to the reference frame defined by the 3K background and further corrected for a concordance cosmological model with \( H_0 = 73 \, \text{km s}^{-1} \, \text{Mpc}^{-1} \), \( \Omega_{\text{matter}} = 0.27 \), and \( \Omega_{\text{vacuum}} = 0.73 \). A new feature in NED’s January 2009 release (example shown below) allows users to change the cosmological parameters used in the computations, including a short-cut to select high precision parameters from the recent Five-Year WMAP results (i.e., \( H_0 = 70.1 +/- 1.3 \, \text{km s}^{-1} \, \text{Mpc}^{-1} \); Hinshaw et al. 2009, ApJS, in press).

The growing richness of information available in NED presents a need to revamp the organization of the object query reports to make it easier to locate the different types of information and related categories of links to “drill down” for further details. Users with client computer programs and scripts that automate queries to the NED server are encouraged to use the XML/VOTable or simple ASCII table output modes to avoid having to frequently change parsing algorithms, as the HTML version of the query reports will continue to evolve primarily to meet the needs of interactive usage by people (rather than computers).

Integration of SDSS DR6 with NED

The NED Team and the IPAC Systems Group have been scaling up the computing and storage infrastructure, and updating software and data management techniques to handle data from very large modern sky surveys. The first dataset containing more than \( 10^8 \) objects to be integrated into NED is the Sloan Digital Sky Survey (SDSS) Data Release 6 (DR6) photometric catalog. Within the footprint of DR6 there were approximately 4 million objects previously in NED, requiring careful analysis to establish cross-matches and associations between the SDSS objects and observations at other wavelengths. The initial subset of DR6 integrated into NED includes over 150 million objects with status Primary; as recommended by the SDSS team, this excludes Family objects de-blended by the pipeline into smaller (Primary) components and also excludes repeated Secondary observations. With over 1.7 billion detailed photometric measurements (PSF, Model and CModel magnitudes for galaxies) in five bands, and hundreds of millions of diameter and position measurements (as well as crucial flags from the pipeline processing), SDSS has expanded NED’s tabular database volume by a factor of \( \sim 200 \). Testing is underway for a public release in January 2009.

Slices through a 3-D map of the distribution of galaxies in the SDSS. Credit: M. Blanton and the SDSS.

2008 NED User Survey

A survey of NED users in the spring of 2008 resulted in responses from 677 users. The results indicate that, over all, users are quite pleased with the NED content and user interface. Responses to 13 questions pertaining to possible Enhanced Services (as funding levels permit) were ranked by the number of users who responded Very Important or Important. The survey results were factored into our proposal to the NASA Senior Review in May 2008, and they will continue to guide our priorities during the ongoing evolution of NED. Thanks to everyone who took the time to respond. For full details, see http://nedwww.ipac.caltech.edu/docs/surveys/2008/.
Infrared Science Archive Keeps Growing

New Data Sets and Sky Coverage

IRSA enhanced the research potential and wavelength coverage of its all-sky data sets by adding another 1.5 billion sources to its catalog holdings, bringing the total number to 3.5 billion, as well as expanding all-sky wavelength coverage to 0.46-100 microns. The new sources come largely from USNO-B and DENIS (see box below).

IRSA’s offerings also expanded in the last year to include additional data from COSMOS, the “Cosmic Evolution Survey,” which is designed to probe the formation and evolution of galaxies as a function of cosmic time and large-scale structure environment, and the ten Spitzer Legacy programs listed below.

Scanpi Modernized and Spitzer pBCD Interface Unveiled

The Scanpi tool, which is an interactive tool for viewing, plotting, and averaging the calibrated survey scans from IRAS, has proven indispensable in maximizing the scientific value of the IRAS data, especially for fluxes of extended, confused, or faint sources. Despite its continued use by the astronomical community, the 23-year-old software needed an overhaul. New functionality includes faster processing and better user interaction.

IRSA and the Spitzer Science Center also released an interface to provide access to Spitzer Space Telescope pBCD products. The interface supports queries by position, target name, instrument, and program parameters. It returns spatial coverage maps of Spitzer observations and data product previews, and supports bulk download of data.

Newly served large-area surveys:

- **USNO-B1.0** is a source list extracted from digitizations of all-sky optical photographic plates covering the years 1949-2002.
- **DENIS** is a far-red optical and near-infrared survey of the southern sky covering the years 1995-2001.

Newly served Spitzer Legacy data:

- **GLIMPSE I/II/3D** is a 3.6-8.0 micron survey of the Galactic Plane (see cover of this Newsletter).
- **MIPSGAL** complements GLIMPSE by providing longer-wavelength coverage of the Galactic Plane.
- **Taurus** provides 3.6-70 micron data for the Taurus Molecular Clouds.
- **GOALS** is an imaging and spectroscopic survey of galaxies in the IRAS Revised Bright Galaxy Sample.
- **SAGE** traces the life cycle of observable matter that drives the evolution of a galaxy’s appearance by studying the LMC and SMC.
- **FIDEL** detects warm dust emission from hundreds of relatively ordinary starburst galaxies and active galactic nuclei.
- **SINGS** researches the physics of the star-forming ISM and galaxy evolution.
- **C2D** follows stellar evolution from starless cores to planet-forming disks via observations of all nearby star formation areas.

Looking Forward

IRSA will continue integrating Spitzer Legacy data into its holdings while preparing to absorb the Spitzer cryogenic mission data in 2011.

Other projects on the horizon include adding more program-friendly interfaces, refining the IRSA website, and building the WISE and Planck archives. IRSA will also consider curating major data sets that add value to NASA missions in the IR and sub-mm regimes.

For more information, feel free to contact us through our website: http://irsa.ipac.caltech.edu/
**What is Spitzer?**

The Spitzer Space Telescope is the infrared component of NASA's family of Great Observatories, which includes the Chandra X-ray Observatory, Compton Gamma Ray Observatory, and Hubble Space Telescope. Cryogenically cooled and in Earth-trailing orbit, Spitzer currently offers imaging capabilities from 3.6-160 microns, and spectroscopy from 5-38 microns. Science operations are conducted by the Spitzer Science Center (SSC) within IPAC at Caltech.

In approximately April 2009, the liquid helium cryogen onboard Spitzer will be expended, but the observatory will remain operative with 3.6 and 4.5 micron imaging capabilities over two 5’x5’ fields-of-view. Sensitivity in these channels will remain unchanged from the cryogenic mission.

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**The Future of Spitzer Data Analysis Assistance**

As the transition to the post-cryogenic (“warm”) mission begins, the SSC anticipates a change in our strategy for providing support for data analysis instruction and assistance. It is most likely that the SSC will no longer host an annual week-long Data Analysis Workshop. Instead, we will shift the main effort for supporting data analysis to condensed workshops held in conjunction with AAS meetings, along with availability of expert assistance at the Spitzer exhibit during AAS meetings.

For the winter 2009 AAS meeting in Long Beach, we will have at least one expert from the Spitzer Science User Support Team staffing the Spitzer exhibit at all times - please stop by the Spitzer exhibit with your data analysis questions and problems.

As always, you may continue to send specific questions to the Spitzer Helpdesk (help@spitzer.caltech.edu). The presentation materials from the most recent Data Analysis Workshop (August 2008) can be found at [http://ssc.spitzer.caltech.edu/sust/WORKSHOP/2008data1/agenda.html](http://ssc.spitzer.caltech.edu/sust/WORKSHOP/2008data1/agenda.html).

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**Cycle-6 Proposals**

After the Senior Review in July 2008, Spitzer received the go-ahead to plan for another two years of operations after the cryogen runs out in early 2009. In this “warm” mission phase, Spitzer can operate until early 2014, providing up to 35,000 hours of science observing time using IRAC 3.6 and 4.5 micron imaging channels.

The Cycle-6 call for Exploration Science GO Proposals closed on October 10, 2008. 38,000 hours were requested, and approximately 10,000 hours will be available. Selected Exploration Science proposals were announced in December 2008.

The SSC is soliciting Regular General Observer Cycle-6 (GO) proposals, with about 1,500 hours available. The deadline for the Cycle-6 Regular GO Proposals is Friday February 6, 2009, at 5pm PST. The SSC is no longer accepting theory or archival proposals, but it is anticipated that funding for archival research will be supported via other NASA programs.

Cycle-6 observations are expected to begin 6 weeks after the cryogen runs out.

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**New IRAC PRFs**

New point response functions (PRFs) have been released for IRAC, which represent a significant improvement over those previously released by the SSC. For true point sources, we are able to obtain agreement between fitted and aperture flux measurements at better than the 1% level. For more information, see the IRAC PRF Fitting page at [http://ssc.spitzer.caltech.edu/irac/prf/index.html](http://ssc.spitzer.caltech.edu/irac/prf/index.html).

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**Tool Updates**

We announce an update to the Spitzer Mosaicking and Point Source Extraction tool, MOPEX, to be released in December 2008. The latest version includes a new, faster background option in MedFilter, based on SExtractor. This follows the major update earlier this year (v18.1.5), which introduced two new pipelines into the GUI: APEX QA (source subtraction for checking the quality of PRF fitting) and PRF Estimate (for users who wish to generate their own PRFs from their data). Also included is a beta version of APEX User Input (command-line version only), which allows users to input their own source detection lists into APEX. MOPEX is available for download from the Post-BCD pages on the SSC website: [http://ssc.spitzer.caltech.edu/postbcd](http://ssc.spitzer.caltech.edu/postbcd). For current users, MOPEX will check for auto-updates whenever it is started while connected to the internet. Please ensure that the auto-update feature is turned on (Options > Use Automatic Mopex Version Update).
The 5th Annual Spitzer Conference, “New Light on Young Stars: Spitzer’s View of Circumstellar Disks” took place in Pasadena from 26-30 October 2008. Spitzer’s unprecedented sensitivity has enabled major advances in the study of protostellar, protoplanetary and debris disks, leading to a wealth of new discoveries on display at the meeting.

Although a wide variety of topics were presented, a full day was devoted to the characterization of circumstellar disks, with much emphasis on Infrared Spectrograph (IRS) detections of organic molecules and water in the planet-forming material around young stars. IRS spectra like the one shown below have given a better view of the earliest stages of planetary formation, and may help shed light on the origins of our own Solar System, and the potential for life to develop in others.

A discussion of disk evolution later in the week focused on so-called “transition” disks. Circumstellar disks usually display spectral energy distributions characteristic of warm dusty circumstellar material starting near the central star and stretching all the way out to large radii. However, a number of the disk candidates show transitional SEDs, with a flux density deficit in the IRAC bands, suggesting that the inner regions of the disk have been swept up or carved away by orbiting stellar companions or planetary bodies, or the disks are seeing significant photo-ionization at smaller radii, clearing out the circumstellar material closest to the star. Interestingly, more transition disks appear to exist around older stars (more than 10-20 million years old), leading many to speculate that the phenomenon is evolutionary, with the “classic” SED indicative of young, primordial disks, and the transition SED characteristic of a short-lived stage at the end of the primordial disk lifetime.

Overall, the conference was a great success, and the organizers thank the participants for their insightful and enthusiastic contributions. The presentations from the conference will be available on the website in early December:
http://www.ipac.caltech.edu/spitzer2008/index.html

This plot of infrared data shows the signatures of water vapor and simple organic molecules in the disk of gas and dust surrounding a young star. The data on the top line were captured by NASA’s Spitzer Space Telescope’s infrared spectrograph (IRS), and reveals the signature of water vapor along with carbon dioxide, hydrogen cyanide, and acetylene—some of the basic building blocks of life.

By comparing the observed data with a model, shown on the lower line, astronomers can determine the physical and chemical details of the region. The model is constructed by adjusting the relative spectral contributions of each chemical component until the theoretical line matches the observed data. The calculations that went into the model provide information on how much of a given material is present, what its temperature is and how much area it covers.
In the Shadow of the Castle

By David Ardila

Visiting Spain, one is often struck by the contrasts of a dynamic country barreling into the future but with a rich, deep past, evident everywhere one looks. The Aulencia Castle, an ancient fortress adjacent to the European Space Astronomy Centre (ESAC) is a striking example of this contrast. Located in the small city of Villanueva de la Cañada, just outside Madrid, ESAC is home to the Herschel Science Centre (HSC), which will provide operational support for the Herschel Space Observatory (see pages 7-8).

Approaching ESAC from the highway, the first thing one sees from the distance are the remnants of the Aulencia Castle. The fortress consists of a rectangular tower, with the remnants of cylindrical towers marking the corners, sheathed in high brown and red walls. As one takes in this trace of the 14th century, progressing along the road, ESAC’s two 15 meter antennas come into view, nestled in a narrow valley and invisible almost until the last minute. The area itself resembles the central Californian coast, with low rolling hills dotted by oak and olive trees.

Dominating the hill adjacent to ESAC, the Aulencia Castle provides a visual reference from almost everywhere in the Centre. The main castle tower is over 60 feet tall. Close up one sees that the crumbling walls are made of rough-hewn stones, interlaced with double bands of red brick, and pockmarked with bullet holes. Graceful rounded arches are all that remains of most of the roofs. Taking its name from a nearby river, the Aulencia Castle formed part of a network of fortresses built by the arabs, during the 800 years in which most of Spain was called al-Andalus. Originally, al-Andalus was part of the Umayyad Caliphate, the huge Islamic empire that extended from the Indus river to today’s Portugal. The castle was taken by the Christian kings of Spain in the 14th century and at times it marked the frontier between the Christian north and the Muslim south. Most of the current building dates from this period.

The castle was passed down by generations of landowners, and through the years it served as guardhouse, stable, and warehouse. It became a fortress again during the Spanish Civil War (1936-1939). By then, it housed an arms depot guarded by a Soviet garrison and was shelled by General Franco’s army during the 20-day long battle of Brunete in July 1937. The battle left approximately 40,000 people dead.

ESAC also has a long history, thankfully not as violent as that of the castle. In 1978, ESAC opened as a satellite tracking station known as VILSPA (the name will be familiar to astronomers of a certain age). In the intervening decades, ESAC has hosted the science operation centers of IUE, ISO, and many other missions. Currently, in addition to HSC, the ESAC campus houses the XMM-Newton Science Operations Centre and the installations of LAEFF (the Fundamental Physics and Space Astrophysics Laboratory).

As of 2008, gunshots are sometimes heard, but they come from hunters chasing boar and deer. Since ancient times, the Aulencia Castle has overlooked the changing landscape, a silent witness to history next to Europe’s window into space.
PLANCK

Planck: Looking Back to the Dawn of Time

The European Space Agency’s Planck mission will measure the intensity and polarization of the entire sky over a range of frequencies from 30 to 857 GHz (wavelengths 1 cm to 350 microns). The entire sky will be observed 4 times, with an angular resolution of 5 arcminutes at the highest frequencies to 30 arcminutes at the lowest frequency. All astronomical sources at the 1 Jansky level, and fluctuations in the surface brightness of parts per million, will be detected.

The U.S. Planck Data Center is hosted within IPAC at Caltech.

Planck will launch together with Herschel on an Ariane-space 5 rocket from French Guiana; all preparations are in progress for an April 2009 launch. Planck will survey the sky continuously during its lifetime; the cryogens are expected to last approximately 2 years.

What is Planck?

The Planck team at IPAC is responsible for archiving mission data and creating the Early Release Compact Source Catalog (ERCSC) from the first half-year of the mission.

The ERCSC will be the first sensitive all-sky point source survey at many microwave frequencies, and it is intended to discover sub-millimeter sources for follow-up by Herschel during its cryogenic lifetime and other facilities, including SOFIA, afterward.

The scope of the ERCSC has been expanded to include two multi-frequency based science catalogs as supplements to the source lists in each of the 9 Planck bands. These are the Early Release Sunyaev-Zel’’dovich (ESZ) and Cold Cores (ECC) catalogs.

300 point sources detected by the Archeops balloon-borne experiment (flying a precursor of the Planck HFI instrument) from 143 to 545 GHz (Desert et al. 2008, A&A, 481, 411). These submillimeter sources having color temperatures down to 7 K are mostly inconspicuous in their IRAS colors or remain undetected by IRAS.

The Sunyaev-Zel’dovich effect produces a distortion of the CMB spectrum by inverse Compton scattering raising the energy of CMB photons as they interact with high energy electrons. The objects found in the ESZ catalog are dense galaxy clusters containing significant amounts of hot gas. The cold cores (T < 15 K) of molecular clouds are the earliest stages of star formation and can be identified in the Planck submillimeter data by their characteristic spectral energy distributions. The ECC catalog creation is closely tied to the Herschel Open Time Key Programme on Galactic Cold Cores which will utilize Planck data for target selection.

For more information: http://planck.ipac.caltech.edu
Sagan Fellows to Study Extraterrestrial Worlds

IN THE NEWS

WASHINGTON – NASA announced the new Carl Sagan Postdoctoral Fellowships in Exoplanet Exploration, created to inspire the next generation of explorers seeking to learn more about planets, and possibly life, around other stars.

Planets beyond our solar system, called exoplanets, are being discovered at a staggering pace, with more than 300 currently known. Decades ago, long before any exoplanets had been found, the late Carl Sagan imagined such worlds, and pioneered the scientific pursuit of life that might exist on them. Sagan was an astronomer and a highly successful science communicator. NASA's new Sagan Fellowships will allow talented young scientists to tread the path laid out by Sagan. The program will award stipends of approximately $60,000 per year, for a period of up to three years, to selected postdoctoral scientists. Topics can range from techniques for detecting the glow of a dim planet in the blinding glare of its host star, to searching for the crucial ingredients of life in other planetary systems.

“We are investing in our nation's best and brightest in an emerging field that is tremendously inspiring to the public,” said Jon Morse, Astrophysics Division director at NASA Headquarters in Washington.

The Sagan Fellowship will join NASA’s new Einstein Postdoctoral Fellowship in Physics of the Cosmos and the Hubble Postdoctoral Fellowship in Cosmic Origins. All three fellowships represent a new theme-based approach, in which fellows will focus on compelling scientific questions, such as “are there Earth-like planets orbiting other stars?”

“NASA’s science-driven mission portfolio, its cultivation of young talent to pursue cutting-edge research, and the decision to commit its genius to a question of transcendent cultural significance, would have thrilled Carl,” said Ann Druyan, Sagan’s widow and collaborator, who continues to write and produce.

“That this knowledge will be pursued in his name, as he joins a triumvirate of the leading lights of 20th century astronomy, is a source of infinite pride to our family,” said Druyan. “It signifies that Carl’s passion to engage us all in the scientific experience, his daring curiosity and urgent concern for life on this planet, no longer eclipse his scientific achievements.”

The selection of Sagan Fellowship recipients will be announced in February 2009.

“There is an explosion of interest in the field,” said Charles Beichman of NASA's Jet Propulsion Laboratory in Pasadena, Calif. “Now we are going down a scientific path that Carl Sagan originally blazed, torch in hand, as he led us through the dark.” Beichman is Executive Director of NASA's Exoplanet Science Institute at the California Institute of Technology in Pasadena, which will administer the fellowship program.

Recently, NASA's Hubble and Spitzer space telescopes have made landmark observations of hot, Jupiter-like planets orbiting other stars. The telescopes detected methane and water in the planets’ atmospheres -- the same molecules that might serve as tracers of life if discovered around smaller, rocky planets in the future. In a 1994 paper for the journal Nature, Sagan and colleagues used these and other molecules to identify life on a planet -- Earth. They used NASA's Galileo spacecraft to observe the molecular signatures of our “pale blue dot,” as Sagan dubbed Earth, while the spacecraft flew by.

“Only a select few scientists carry the insight, vision and persistence to open entire new vistas on the cosmos,” said Neil deGrasse Tyson, astrophysicist and Frederick P. Rose Director of the Hayden Planetarium at the American Museum of Natural History in New York. “We know about Einstein. We know about Hubble. Add to this list Carl Sagan, who empowered us all -- scientists as well as the public -- to see planets not simply as cosmic objects but as worlds of their own that could harbor life.”

NASA's Kepler mission, which Sagan championed in his last years, will launch next year and will survey hundreds of thousands of nearby stars for Earth-like worlds, some of which are likely to orbit within the star's water-friendly “habitable zone.” Favorable for life as we know it. For more information:

http://nexsci.caltech.edu/sagan