



*Space Infrared Telescope Facility*

**SIRTF**

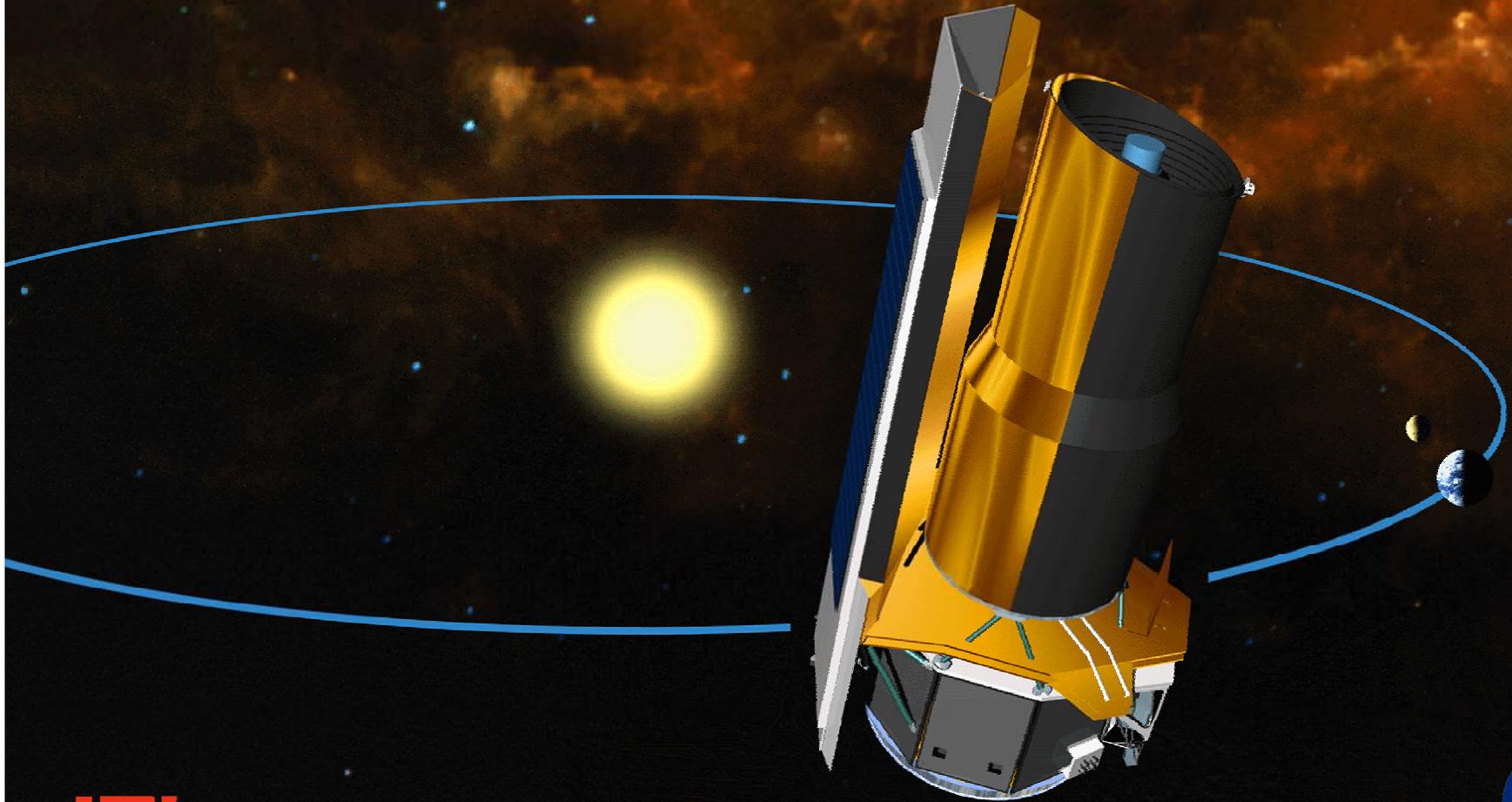
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# **The SIRTF Mission Description and Data Archives**

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# SIRTF



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## SIRTF - An Overview

**SIRTF**

- ◆ Launch in **January 9, 2003** for a **2.5-to-5 year mission**
  
- ◆ **Multi-purpose, liquid-helium and radiatively-cooled observatory**
  - 85-cm telescope, diffraction-limited @ 6.5  $\mu\text{m}$
  - Imaging, spectroscopy from 3-180  $\mu\text{m}$
  - Instruments use large-format infrared detector arrays
  - Natural-Background limited sensitivity
  - Innovative mission concept
    - heliocentric orbit/warm launch*
  - >75% of observing time for general community
  
- ◆ **Builds on and extends results from IRAS, COBE, and ISO**
  
- ◆ **Completes NASA's Great Observatories; is a cornerstone of the Origins Program**



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# **SIRTF - Status and Upcoming Highlights (as of 10/02)**

**SIRTF**

- ◆ SIRTF Instruments delivered – performance is excellent
- ◆ Primary mirror exceeds cold figure requirements
- ◆ Assembled telescope meets image quality requirements
- ◆ Cryostat performance acceptable
- ◆ Entire observatory = cryostat+instruments+telescope+space craft finishing testing at L-M across runway
- ◆ SIRTF Science Center in place at Caltech serving as user interface
- ◆ Six legacy science teams selected in November, 2000
- ◆ Delivery to launch site – [November 2002](#)
- ◆ First Call for General Observer proposals – [November 2002](#)
- ◆ Launch – [January 2002](#)
- ◆ Start of science observations – [April 2003](#)
- ◆ Opening of public archive – [August 2003](#)



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# **SIRTF - Operational Features and Characteristics**

**SIRTF**

## ◆ **SIRTF Is Designed for Easy Operability**

### – **Heliocentric orbit**

- ◆ No eclipses or occultations - continuous operations
- ◆ Excellent sky access and visibility - sun angle 80-120 degrees
- ◆ 35% of sky visible at one time for >40 days. Repeat on ~six month centers
- ◆ Continuous viewing of ecliptic poles.

### – **No real time communication with spacecraft**

- ◆ Autonomous operations from stored sequences
- ◆ Data downlinked every 12 hours using body-fixed antenna and DSN
- ◆ Respond to Target of Opportunity as quickly as 48 hours

### – **Three array-based instruments designed for simple operations**

- ◆ Only two moving parts in payload
- ◆ Just seven distinct observing modes
- ◆ Limited number of array types, multiplexers, and [familiar] data formats

### – **Single instrument operation campaigns lasting 3-to-7 days**

- ◆ Optimized cryogenic system minimizes benefit of parallel operations



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# Applying the Bumper Sticker

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# SIRTF at L-M

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# Defining Scientific Programs for SIRTf

**SIRTf**

- ◆ Protoplanetary and Planetary Debris Disks
- ◆ Brown Dwarfs and Super Planets
- ◆ Ultraluminous Galaxies and Active Galactic Nuclei
- ◆ The Early Universe

*The SIRTf mission is driven only by the requirements of these programs, which are called out for SIRTf in the Bahcall Report*

*The resulting system will have very powerful capabilities in many other scientific areas, allowing SIRTf to be an **observatory for the entire scientific community***

*In addition, SIRTf will have great potential for the **discovery** of new phenomena in the Universe, and the mission must exploit this potential*



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# SIRTF Science Utilization

**SIRTF**

## Observing Time on SIRTF will be Allocated in Three Categories:

### ◆ **Community Time - >75%**

- Open to entire Scientific Community and Peer reviewed. Includes:
  - ◆ Legacy Science - Large, coherent investigations of lasting importance.
    - Data placed in public archive immediately to promote follow-on with SIRTF. Emphasized early in mission.
    - Six Legacy Programs selected, November 2000.
  - ◆ First-Look Survey
  - ◆ General Science - All other programs. First call for proposals, [November 2002](#).

### ◆ **Guaranteed Time - SWG Members and Instrument Teams**

- 20% of first 2.5 yrs of operations; 15% thereafter

### ◆ **Director's Discretionary Time - 5%**

### ◆ **Archival Research will also be supported**

### ◆ **SIRTF Science Center is User Interface to SIRTF**

- Tom Soifer is SSC Director; George Helou is Deputy
- Visit the WEB SITE: <http://sirtf.caltech.edu/SSC/>



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## **SIRTF First-Look Survey**

**SIRTF**

- ◆ In part designed to mitigate loss of WIRE mission
- ◆ Will immediately follow completion of In-Orbit Checkout and Science Verification periods
- ◆ ~100 hours of time
- ◆ Take a first look at sky to be used for planning future SIRTF observations
- ◆ Contains
  - *Extragalactic component, with data from SIRTF, VLA, Sloan Digital Sky Survey, NOAO MOSAIC R-band*
  - *Galactic component*
  - *Ecliptic component*
- ◆ No proprietary period for data



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# SIRTF Legacy Science

**SIRTF**

## ◆ Requirements

- *Large, coherent scientific investigations - not realizable as series of smaller GO Programs*
- *Programs whose data are of general and lasting importance to the broad community and also stimulate SIRTF follow-on*
- *Data are non-proprietary, enabling timely and effective opportunities for both SIRTF follow-on and archival research*

## ◆ Scope

- *Six teams selected in November, 2000, with a total of 3160 hours of observing time. Legacy Science will utilize about 50% of the first year of SIRTF observing time.*
- *Limited amount of time on NOAO facilities was allocated in the same process*
- *Teams funded prelaunch to plan SIRTF observations, gather ancillary data, **prepare analysis tools**, etc.*
- *All teams planning to deliver value-added products – **data bases, catalogs, atlases, and non-SIRTF data - for distribution to community via SSC***

- ◆ Further information on the SIRTF SSC web site:  
<http://sirtf.caltech.edu/>



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## Archive Products

**SIRTF**

- ◆ Still under definition but:
  - *Pipeline products will be in FITS format*
  - *Output of pipeline will be fluxed and calibrated images with defects such as cosmic ray hits removed - Basic Calibrated Data”*
  - *There will also be tools to generate “Browse Quality Data”*
- ◆ Outside of what is already available plus what will be developed by the Legacy Teams, there are no other plans for the development of data mining software
- ◆ Archival research will be funded through the SSC, starting with the Cycle-1 call for proposals



# The Legacy Science Program



- ◆ **Mark Dickinson (STScI) & 38 Co-Investigators @ 13 institutions**  
*“GOODS: Great Observatories Origins Deep Survey”*  
647 hours (IRAC, MIPS)
- ◆ **Carol Lonsdale (IPAC/Caltech) & 19 Co-Is @ 9 institutions**  
*“SWIRE: SIRTF Wide-area Infrared Extragalactic Survey”*  
851 hours (IRAC, MIPS)
- ◆ **Robert Kennicutt (U. Arizona) & 14 Co-Is @ 7 institutions**  
*“SINGS: SIRTF Nearby Galaxies Survey”*  
512 hours (IRAC, MIPS, IRS)
- ◆ **Ed Churchwell (U. Wisconsin) & 13 Co-Is @ 6 institutions**  
*“The SIRTF Galactic Plane Survey (GLIMPSE)”*  
400 hours (IRAC)
- ◆ **Neal Evans (U. Texas) & 10 Co-Is @ 8 institutions**  
*“From Molecular Cores to Planets (Cores to Disks)”*  
400 hours (IRAC, MIPS, IRS)
- ◆ **Michael Meyer (U. Arizona) & 18 Co-Is @ 12 institutions**  
*“The Formation and Evolution of Planetary Systems (FEPS)”*  
350 hours (IRAC, MIPS, IRS)