

# Impact Summary: The Spitzer Space Telescope Research Program for Teachers and Students



Tim Spuck-1, Stephen Pompea-2, Luisa Rebull-3, Varoujan Gorjian-3, Steve Howell-2, Chelen Johnson-4, Shana Kennedy-5, Beth Thomas-6, Matt Walentosky-5, Samantha Wheeler-5, and all those involved in the Spitzer Space Telescope Research Program for Teachers and Students

1-Oil City High School/NITARP, 2-National Optical Astronomy Observatory, 3-Spitzer Science Center, 4-Breck School/NITARP, 5-Oil City High School,

6-Great Falls Public Schools/NITARP. For additional information please contact Tim Spuck at [tspuck@hotmail.com](mailto:tspuck@hotmail.com) or Luisa Rebull at [rebull@ipac.caltech.edu](mailto:rebull@ipac.caltech.edu).



## 32 Teachers Trained in Doing Real Astronomy Research



The teachers include Jeff Adkins - CA, John Blackwell - NH, Karen Borders - WA, Howard Chun - RI, Lauren Chapple - MI, Harlan Devore - NC, Velvet Dowdy - KY, Cris DeWolf - MI, Peter Guastella - NY, Rosa Hemphill - OR, Ardis Herrold - MI, Chelen Johnson - MN, Virginia Jones - ID, Susan Kelly - NY, Thomas Loughran - IN, Tony Maranto - NH, Chris Martin - AZ, David McDonald - MT, Jeff Paradis - NY, Vincent Pereira - NY, Peter Pitman - MN, Steve Rapp - VA, Theresa Roelofsen - NJ, John Schaefer - PA, Babs Sepulveda - CA, Linda Stefaniak - NJ, Tim Spuck - PA, Dwight Taylor - AK, Jen Tetler - WA, Beth Thomas - MT, Cynthia Weehler - TX, and Lynne Zielinski - IL.

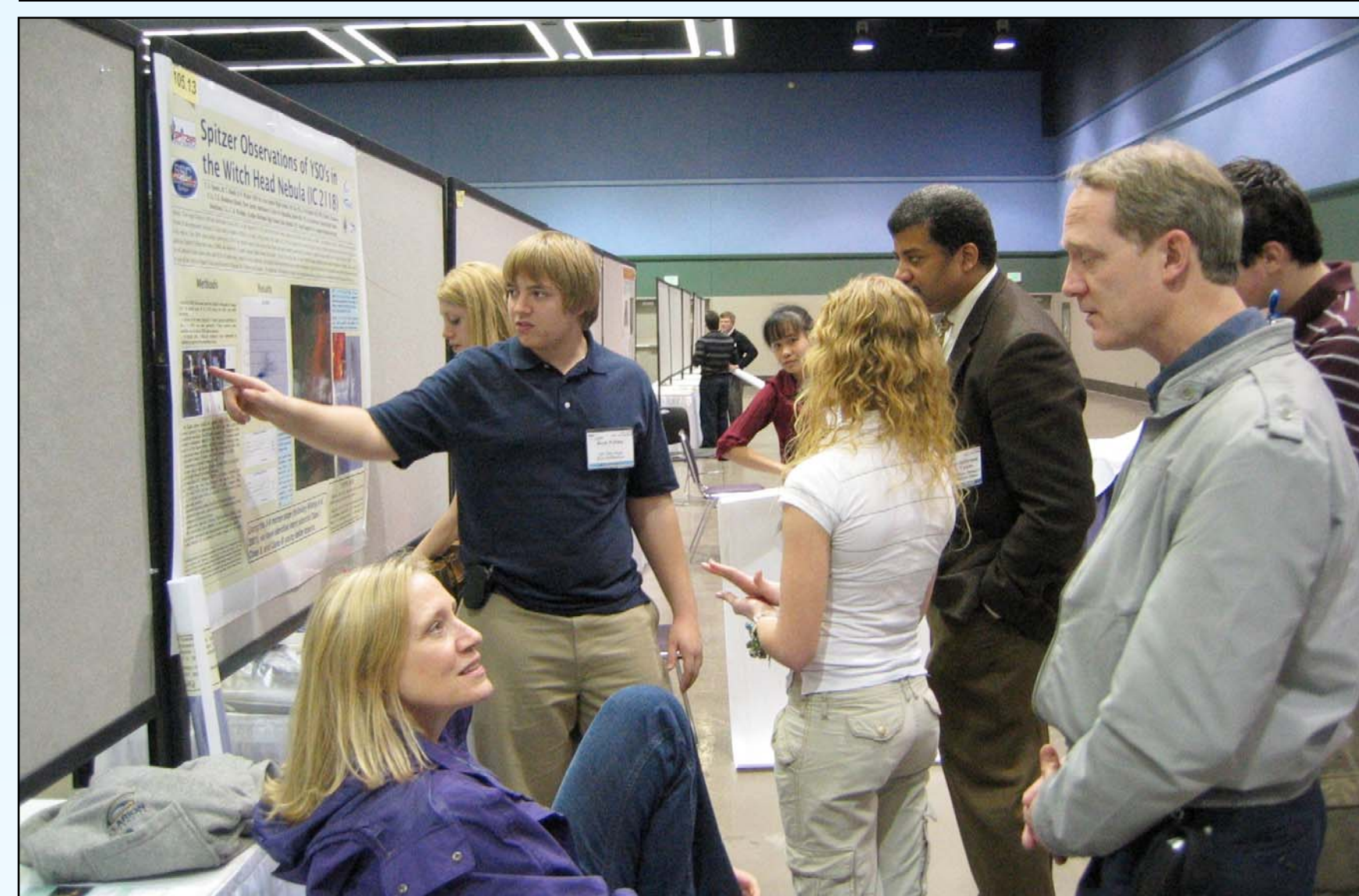
## 79 High School Students Visit the Spitzer Science Center and/or Attend AAS Meetings



**TRAINING:** Teachers/students attended work sessions at the Spitzer Science Center where they learned how to use MOPEX, Spot, Leopard, and other data analysis software and techniques.

**Abstract:** The Spitzer Space Telescope Research Program for Teachers and Students was a four-year joint project between the Spitzer Science Center (SSC) and the National Optical Astronomy Observatory (NOAO) that concluded in 2009. Through the program, teams of teachers and students were provided with unique opportunities to observe with the Spitzer Space Telescope and work with Spitzer and NOAO scientists. **This study finds evidence of significant success.** From the eleven major research projects sponsored by the program, 33 scientific posters have been presented, and a number of scientific papers have been published. Records indicate there have been nearly 100 newspaper, radio, and TV reports, and numerous Internet articles reporting on various aspects of teacher and student involvement in the project, and over 100 students feel the program has influenced them to pursue careers in science. **This highly successful program has now become the NASA/IPAC Teacher Archive Research Project (NITARP),** with funding from the NASA ADP program and the archives at IPAC.

## Spitzer Teachers and Students Deliver Nearly 200 Presentations - Reach Over 14,000



Teachers and students involved in the project have been sharing their experience with other educators, scientists, amateur astronomers, and members of the general public. These presentations have taken place in their local areas, as well as in the state, national, and international arena. Some examples of forum locations include:

- American Astronomical Society meetings
- National Science Teachers Association conferences
- State Science Teachers conferences
- Christa McAuliffe Planetarium
- Carnegie Science Center
- Hands-On Universe Conference in France
- INTEL Science Fair
- ASTROBLAST Regional Star Party
- American Institute of Aeronautics and Astronautics

## High School Students using Spitzer Data/Research Receive Regional and International Science Awards

- 1200+ students use Spitzer data through the program,
- 105 students feel the program has influenced them to pursue careers in science,
- 45 students select careers in space sciences,
- 42 students involved in the project have entered science fairs across the United States, and they are bringing home top prizes.

**Deer Valley High School, CA** - Brielle Hinckley won 3rd place at the 2006 Contra Costa County Science and Engineering Fair. Thomas Travagli and Aleksandr Morton won 1<sup>st</sup> Place at the Contra Costa County Science and Engineering Fair 2007 and 1<sup>st</sup> Place Contra Costa County Science and Engineering fair 2008. 1<sup>st</sup> Place California State Science Fair 2008.

**Manhasset High School, NY** - Ashley Peter, Will Wassmer and Rose Haber won 3rd place at the Rohm Haas Invitational Science Fair.

**Mecosta-Osceola Intermediate School District, MI** - Justin Boerma, Stephen Brock, Trevor DeWolf won Regional Science & Engineering Fair **Top Team Award** and the Michigan Earth Science Teachers Association Award of Excellence in Earth & Space Science.

**Oil City Area High School, PA** - Danielle Yeager won 1<sup>st</sup> Place at 2008 Pittsburgh Regional Science & Engineering Fair - Engineering/Robotics Senior Division; Matt Walentosky won a **Top Three Award** to move on to the 2008 **International Science & Engineering Fair** where he took 2<sup>nd</sup> Place in the Physics and Astronomy Division and the American Astronomical Society Sponsors Award; Nick Kelley won 1<sup>st</sup> Place in Earth/Space and Environment Senior Division and the Carnegie Science "Best of Show" Award. Matt Walentosky was a **semifinalist in the Intel Science Talent Search 2009**. Jennifer Butchart was awarded 1<sup>st</sup> Place Earth/Space and Environment Senior Division, and **Top Three Award** to move on to the 2009 **International Science & Engineering Fair** where she took 4<sup>th</sup> place in the Physics and Astronomy Division.

**Oregon Episcopal School, OR** - Emily Petroff won the 2007 Aardvark Science Expo with 1<sup>st</sup> Place in Physics & Astronomy and **Best of Fair** Physical Science and the Priscilla and Bart Bok Award, a 2nd Place Award at the 2007-2008 **Siemens Competition in Math, Science, & Technology** and was a Semifinalist at the 2008 Aardvark Science Expo and 1<sup>st</sup> Place in Physics.

## 12 Research Articles Published

### Astronomy Research Articles:

S. Guieu, L. M. Rebull, J. R. Stauffer, F. J. Vrba, A. Noriega-Crespo, T. Spuck, T. Roelofsen Moody, B. Sepulveda, C. Weehler, A. Maranto, D. M. Cole, N. Flagey, R. Laher, B. Penprase, S. Ramirez, S. Stolovy, **Spitzer Observations of IC 2118**, 2010, AJ, submitted

S. B. Howell, D. W. Hoard, C. Brinkworth, S. Kafka, M. J. Walentosky, Frederick M. Walter, and T. A. Rector, **"Dark Matter" in Accretion Disks**, 2008 ApJ 685, 418-427

S. B. Howell, C. Brinkworth, D. W. Hoard, S. Wachter, T. Harrison, H. Chun, B. Thomas, L. Stefaniak, D. R. Ciardi, P. Szkody, and G. van Belle, **First Spitzer Space Telescope Observations of Magnetic Cataclysmic Variables: Evidence of Excess Emission at 3-8  $\mu$ m**, July 2006, ApJ 646 No 1 L65-L68

L. M. Rebull, J. R. Stauffer, T. S. Spuck, A. R. Maranto, T. E. Roelofsen, B. Sepulveda, C. R. Weehler, **Spitzer Observations of Young Stars in the Witch Head Nebula (IC 2118)**, 2006, IAUS, 237, 199

### Articles Published in the 2009 RBSE Journal:

**Identifying T Tauri Stars Using Small Optical Telescopes** by Jennifer Butchart, Oil City Area Senior High School, Oil City, PA, Teacher: Mr. Tim Spuck, pages 24-32.

**Investigating Star Formation in Lynds Cloud 981** by Rachele M. Siegel Oil City Area Senior High School, Oil City, PA, Teacher: Tim Spuck, pages 33-45.

**Star Formation in Isolated Dark Nebulae: YSOs in LDN 981** by Justin Boerma, Stephen Brock, and Trevor DeWolf Chippewa Hills High School, Remus, MI, Teacher: Cris DeWolf - pages 46-56.

### Articles Published in the 2007 RBSE Journal:

**Spectral Analysis of Blazar S5 0716+714 using Spitzer Infrared Space Telescope and New Mexico Skies Telescopes** by Aleksandr Morton, Manutej Mulaveesala and Thomas Travagli, Deer Valley High School, Antioch, CA (Teacher Jeff Adkins) - pages 49 - 56

**Galaxy Clusters: The Local Effects on Star Synthesis** by Zachary Schroeder, Gross Pointe North High School (Teacher Ardis Herrold) - pages 66-79

**Star Formation Rate in Three High-Redshift Galaxy Clusters: A Contribution to the Study of Galactic Evolution** by Vinay Patel and Matt Pellegrino, Saint Joseph's High School, South Bend, IN (Teacher Thomas Loughran) - pages 80-94

### Articles Published in the 2006 RBSE Journal:

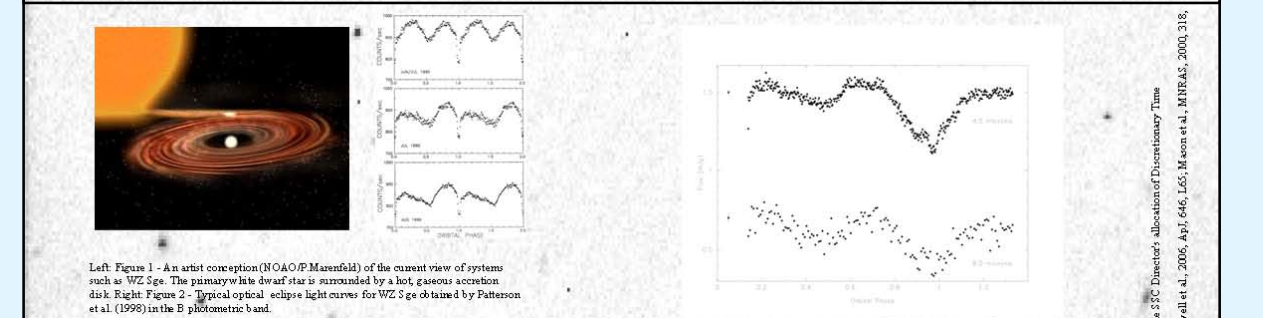
**Micro-Variability of 4c29.45 using the Spitzer Space Telescope and Ground Based Telescopes** by Brielle Hinckley, Deer Valley High School, Antioch, CA (Teacher Jeff Adkins) - pages 12-21



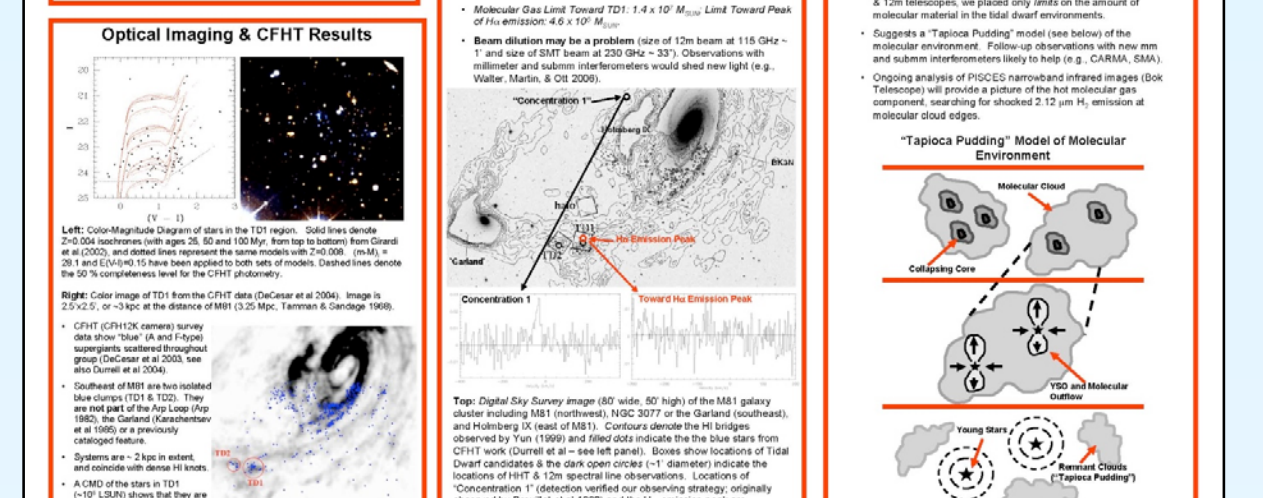
**TOP-LEFT:** Student Jessica Herrera, San Antonio, TX, interviewed SSC Director Dr. Tom Soifer for a story about authentic science research in the classroom for Texas Public Radio. Her interview was broadcast on station KSTX in San Antonio. **TOP-RIGHT:** Oil City students and teacher Tim Spuck get front page in the Sunday paper. Forty-eight newspaper articles, 37 radio broadcasts, 14 magazine/newsletter articles, two TV broadcasts, and numerous Internet articles across the USA reporting on various aspects of teacher and student involvement **reached an estimated 6 million viewers.**

## 33 Science Research & Education Posters Presented

### WZ Sge: Dark Matter in Accretion Disks



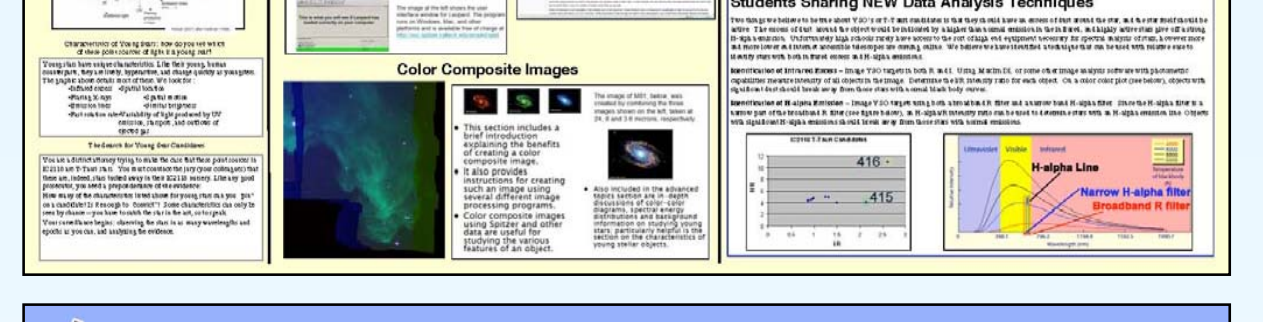
### Multiwavelength Observations of Tidally Induced Star Formation in the M81 Group



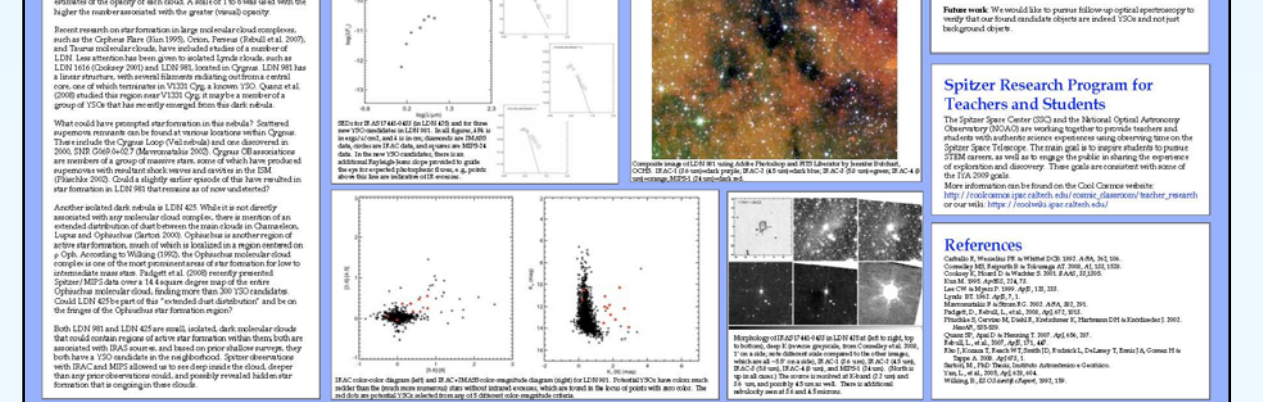
### Education with Infrared Astronomy & Spitzer



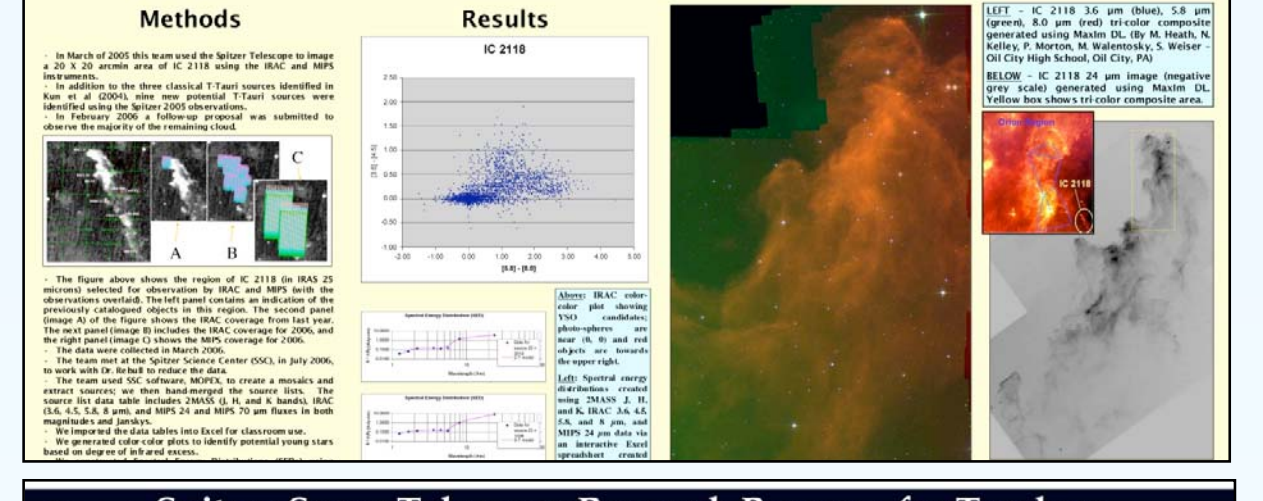
### The Spitzer Space Telescope Research Program for Teachers and Students: The Wiki



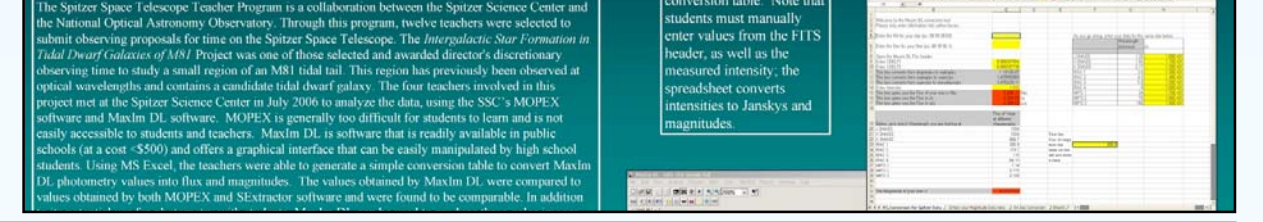
### Star Formation in Lynds Dark Nebulae



### Spitzer Observations of YSO's in the Witch Head Nebula (IC 2118)



### Spitzer Space Telescope Research Program for Teachers and Students: Using Spitzer data in your classroom with (relatively) simple software



**What's Next? New Teacher training for the NASA/IPAC Teacher Archive Research Project (NITARP) began 3 January 2010, with high school student involvement starting this Spring.**