



NITARP: The Desolation of AAS

or

*becoming a braver, stronger educator
without a magic ring!*

Peggy Piper

Lincoln Way HS/Adler Planetarium

Greater Chicago Area



Wannetta Rocks!!

Don't stress.....

- Save receipts
– (not food)
- Email all
- Snail mail all
- Email Wannetta
with questions

TRAVEL REIMBURSEMENT

Please RETURN "original" receipts for:

- Airfare ticket _____
- Taxi _____
- Airport Shuttle _____
- Hotel lodging _____
- Rental Car _____
- Gasoline for rental car _____
- Home Airport parking _____
- Hotel parking (if not listed on hotel bill) _____
- Faxes, business calls (wakes listed on hotel bill) _____
- Miscellaneous _____

NOTE: Meal receipts are not needed.

→ If you drove your personal car from Your Home to the local Airport, please provide the one-way mileage _____ If dropped off list roundtrip mileage indicate RT one-way _____

→ Return one-way mileage from local Airport to Your Home in your car _____

Ⓞ Date and Time you left home to start your trip: _____

Ⓞ Date and Time you arrived at hotel/meeting site _____

Ⓞ Date and Time you left hotel/meeting site _____

Ⓞ Date and Time you returned home from trip: _____

PLEASE RETURN RECEIPTS TO:

Wannetta Lockhart
Caltech/IPAC
1200 East California Blvd
MS 314-6
Pasadena, CA 91125

**MAIL MY CHECK TO ME/TEACHER
PROVIDE MAILING ADDRESS:**

Phone # _____

QUESTIONS? Please call or email Wannetta at: (626) 395-1933 or wannetta@ipac.caltech.edu or FAX 626 395-2028

Thank you!

Workshop



You are here



NITARP 2014 AAS WORKSHOP

5 Jan 2014, Chesapeake 12, Gaylord National Resort and Convention Center

- 8:30-9:00 Breakfast (pastries) and gathering
- 9:00-9:30 Welcome and general introduction. Introduce everyone to everyone (Gorjian/Rebull)
- 9:30-10:30 General description of program milestones and goals (Rebull/Gorjian)
- 10:30-10:45 Photographs/break/mingle
- 10:45-11:15 Intro to IPAC archives (IRSA, NED, ...) (Rebull)
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- 4:00-4:30 Poster-Pop-Ups from 2013 class.
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Relax!!!

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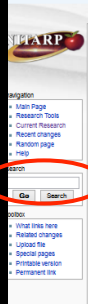
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Wiki 😊

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Bond w/
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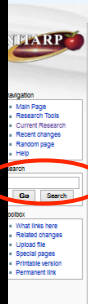
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AAS 2014



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8:30am	101 Plenary Session: Kavli Foundation Lecture: The Hubble Deep Field and Its Legacy, Robert Williams (STScI), 8:30am-9:20am, Potomac Ballroom A
9:00am	Exhibit Hall, 9:00am-6:30pm Cyber Café, 9:00am-6:30pm, Exhibit Hall Career Center, 9:00am-6:00pm, Exhibit Hall Posters, 9:00am-6:30pm, Exhibit Hall 145 New Science from the CASH/CANDELS Multi-Cycle Treasury Programs Poster Session 146 Exoplanets and Kepler Poster Session 147 HAD III: Poster Session 148 Instrumentation: Ground or Airborne Poster Session 149 Instrumentation: Space Missions Poster Session 150 AGN, QSO, Blazars Poster Session 151 Stellar Atmospheres, Winds Poster Session 152 Stellar Evolution: Helium Stars Poster Session 153 Pulsars & Neutron Stars Poster Session 154 Novae, Dwarf Novae, Variables, Evolved Stars 155 Binaries: X-ray Binaries, X-ray Binaries 156 Variable Stars Poster Session 157 Dwarf Stars Poster Session 158 The Sun Poster Session 160 Developing Our Own Future: Undergraduate Research and Enrichment Programs Poster Session
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10:15am	Press conference, 10:15am-11:15am, Chesapeake D
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9:30am	152 Stellar Evolution, Stellar Populations Poster Session 153 Pulsars & Neutron Stars Poster Session 154 Novae, Cataclysmic Variables, Evolved Stars 155 Binary Stellar Systems, X-ray Binaries 156 Variable Stars Poster Session 157 White Dwarfs 158 The Sun Poster Session 160 Developing Our Own Future: Graduate Research and Enrichment Through Peer-Led Program
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10:00am	Careers 101: Career Planning Workshop for Graduate Students and Postdocs, 10:00am-11:30am, Potomac Ballroom A Special and Oral Sessions 102-118, 10:00am-11:30am 102 Cosmology & CMB I 103 Exoplanets and Protoplanets 104 Exoplanets: Atmospheres and Migration 105 Extrasolar Planet Characterization & Theory I 106 Galaxy clusters: Star Formation, AGN, Interactions 107 History of Astronomy 108 HEAD I: News from the Galactic Center: A Multiwavelength Update on the Sgr A*/G2 Encounter 109 Instrumentation I: Space Missions 110 Intergalactic Medium I 111 Star Medium & Dust I 112 Nearby Dwarf & Irregular Galaxies 113 Novae, Dwarf Novae and Evolved Stars 114 Solar and Stellar Winds 115 AGN 116 Results from the Pan-STARRS1 Surveys 117 Star Formation I
10:15am	118 AGN 119 AGN 120 AGN 121 AGN 122 AGN 123 AGN 124 AGN 125 AGN 126 AGN 127 AGN 128 AGN 129 AGN 130 AGN 131 AGN 132 AGN 133 AGN 134 AGN 135 AGN 136 AGN 137 AGN 138 AGN 139 AGN 140 AGN 141 AGN 142 AGN 143 AGN 144 AGN 145 AGN 146 AGN 147 AGN 148 AGN 149 AGN 150 AGN 151 AGN 152 AGN 153 AGN 154 AGN 155 AGN 156 AGN 157 AGN 158 AGN 159 AGN 160 AGN 161 AGN 162 AGN 163 AGN 164 AGN 165 AGN 166 AGN 167 AGN 168 AGN 169 AGN 170 AGN 171 AGN 172 AGN 173 AGN 174 AGN 175 AGN 176 AGN 177 AGN 178 AGN 179 AGN 180 AGN 181 AGN 182 AGN 183 AGN 184 AGN 185 AGN 186 AGN 187 AGN 188 AGN 189 AGN 190 AGN 191 AGN 192 AGN 193 AGN 194 AGN 195 AGN 196 AGN 197 AGN 198 AGN 199 AGN 200 AGN
10:15am	11:11:11am, Chesapeake D/E
11:40am	111 Plenary Session: Linking Visualization and Understanding in Astronomy, Alysa Goodman (Harvard-Smithsonian CfA), 11:40am-12:30pm, Potomac Ballroom A Career hour 2: Having the Right Stuff: Outstanding Resumes/CVs for Outstanding Career Opportunities in Academia and Industry, 12:30pm-1:30pm, National Harbor 2
12:45pm	120 Town Hall: HAD Business Meeting, 12:45pm-1:45pm, National Harbor 5 121 Town Hall: The International Astronomical Union: Roles and Goals, 12:45pm-1:45pm, Potomac Ballroom D 122 Town Hall: The NASA Kepler Mission Town Hall: 2014 and Beyond, 12:45pm-1:45pm, Potomac Ballroom C 123 Town Hall: WISE Town Hall, 12:45pm-1:45pm, National Harbor 4 124 Town Hall: HST Town Hall, 12:45pm-1:45pm, Maryland Ballroom C
1:30pm	Amateur Talk: Origins of Habitable Planets, Alycia J. Weinberger (Carnegie Institution of Washington), 1:30pm-2:00pm, Maryland Ballroom A

Enjoy the ride!!

Scavenger Hunt



page | discussion | edit | theory | more | version | Piper | my talk | my preferences | my contributions | log out

WIKIPEDIA Peggy AAS 2012

Here's an example of how we can share info using our wiki. If you are new to wiki, feel free to look at what you see here, click the edit tab above to see what I actually entered. Between an Link's event and a format from you (be an edit, not a note).

AAS 2012 was my first time at a convention and it was a revelation event. I had a lot more connections that go-round which made the experience richer. I knew the lay of the land and was able to find what I was looking for. I was able to help some of the novices and my students that had not fully confidence their speaking to this vast assemblage of astronomy professionals has risen significantly and this translated directly to my ability to convey what I have learned to my teachers and my community.

—Peggy Piper 18:38, 13 January 2012 (PST)

Sunday Jan 8 - Day 1 AAS workshop and many receptions

We started off bright and early Sunday morning at the WTRAP group of 2012. I could see the excitement of the new teachers that I experienced two years ago. After general presentations (which sunk in much deeper this second time around) we broke in to our groups and started discussing the possibilities for our own projects. The presentations were so good that I had several projects that came before at that or similar searches for young Stellar Objects using a series of ideas to feed out the see they contained and less the substantially more professional. I had a great time and was able to help some of the novices and my students that had not fully confidence their speaking to this vast assemblage of astronomy professionals has risen significantly and this translated directly to my ability to convey what I have learned to my teachers and my community.

Linka gave us a super quick tutorial and VSOs and the methods of using the data. I had a great time and was able to help some of the novices and my students that had not fully confidence their speaking to this vast assemblage of astronomy professionals has risen significantly and this translated directly to my ability to convey what I have learned to my teachers and my community.

We will be using WISE data so I will definitely be using it in my own research.

Monday Jan 9 - Day 2 Poster presentations

The evening was filled with the Education group and the 13 of my high school students and my daughter with me to present on poster on writing the light curve of an asteroid. All of these projects are early stage and I am looking for feedback and advice from the experts. I had a great time and was able to help some of the novices and my students that had not fully confidence their speaking to this vast assemblage of astronomy professionals has risen significantly and this translated directly to my ability to convey what I have learned to my teachers and my community.

The Pipettes showed up dressed for success to present to the astronomical community. They showed great maturity and poise as they described their journey into astronomical research and the results of their research. They each describe their college hopes and their plans seemed bigger and more full of promise than I had heard in the past. I believe having the attention of the audience raised their expectations of themselves. This work was done independently of any outside group, but with the support of many outside groups. The group was especially proud of their talk with Mike Vaccaro and took the suggestion to bring their musical instruments to their afternoon session to heart.

At the Spitzer booth, Sally Sebok demonstrates what looks like a very promising spreadsheet template that looks like something I can use in my astronomy classes. One downfall may be that it is a google doc which my school doesn't access at the joint schools, but I can present this to my group and another quick meeting to make a few further tweaks a target for our research, doing some quick literature searches. The fact that I 1548 had not been nearly explored was very intriguing.

Discussing astronomy and music with me.

Scavenger Hunt Wiki??

Scavenger Hunt



HTARP Peggy AAS 2012

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The evening was filled with the Education, Undergraduate, and the Opening Receptions. I had 3 of my high school students and my daughter with me to present a poster on determining the light curve of an asteroid. All of these students are seniors in high school and the opportunity to meet exciting scientists and astronomers from all over the world was a eye opening experience. All of the adults that met with us were very encouraging of my involvement and asked questions about the poster that they were presenting. This was not only a boost to their confidence, but a nice base of things they would need to do the next day to present their poster.

The Pipettes showed up dressed for success to present their poster to the astronomy community. They showed great maturity and poise as they described their journey into astronomical research and the results of their research. When asked about their future plans, I heard each student describe their college hopes and their plans seemed bigger and more full of promise than I had heard in the past. I believe having the attention of such a distinguished audience raised their confidence and their work more. A variety of other outside groups. The group was especially inspired by their talk with Max M. Tuttle and took his suggestion to bring their musical instruments to their afternoon session to heart.

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Scavenger Hunt



HTARP Peggy AAS 2012

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—Peggy Piper 18.08.13 January 2012 (PST)

Sunday Jan 8 - Day 1 AAS workshop and many receptions

We started off bright and early Sunday morning as the NITARP group of 2012. I could see the same enthusiasm and fear in the eyes of the new to the second time around) we broke in to our groups and started discussing the possibilities for our research experience. We are fortunate to have seen Luika give us a super quick tutorial and VSOs and the methods used for choosing likely candidates, but at this point it is a bit of a blur. I had a chance to meet some of the other Young Stellar Objects using a series of the canonical paper (Luhman et al. 2003) and decide how to proceed. I had a chance to meet through some materials and see related posters. We will be using VSOs (and so I will definitely be stopping by the VSO booth to say hi!

The evening was filled with the Educators, the Undergraduates, and the Opening Reception. I had a chance to meet some of the other Young Stellar Objects using a series of the canonical paper (Luhman et al. 2003) and decide how to proceed. I had a chance to meet through some materials and see related posters. We will be using VSOs (and so I will definitely be stopping by the VSO booth to say hi!

Monday Jan 9 - Day 2 Poster presentation, talks and spitzer reception

The Posters showed up dressed for success to present their poster to the astronomical community. They showed great maturity and poise as they described their journey into astronomical research and the results of their research. When asked about their future plans, I heard each student describe their college hopes and their plans seemed bigger and more full of promise than I had heard in the past. I believe hearing the attention of such a distinguished audience raised their expectations of themselves. This work was done independently of any school group, but with the support of many outside groups. The group was especially inspired by their talk with Mike Mautner and took his suggestion to bring their musical instruments to their afternoon session to heart.

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DO IT NOW!!!

Jumping into the challenge

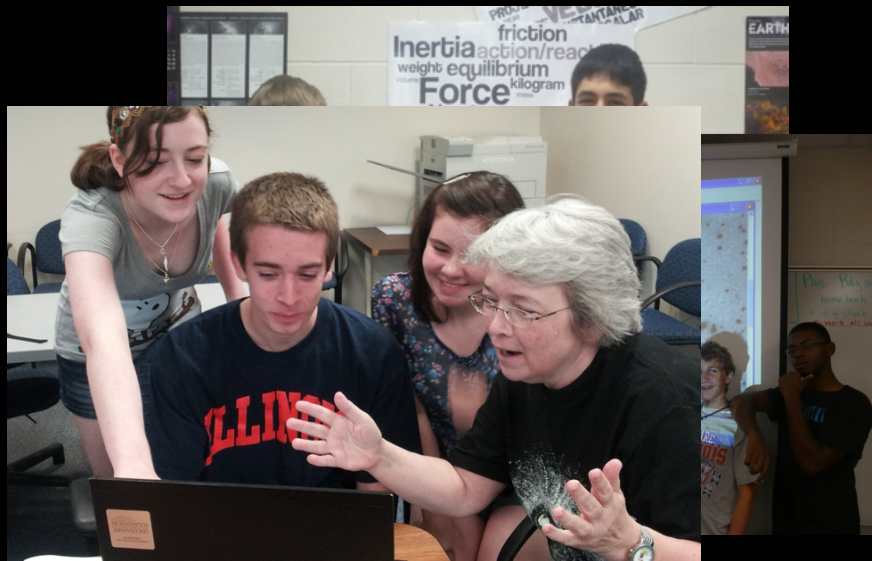


Choosing your students:
<http://nitarp.ipac.caltech.edu/resource/19>
Search NITARP NASA
go to Resources

Jumping into the challenge



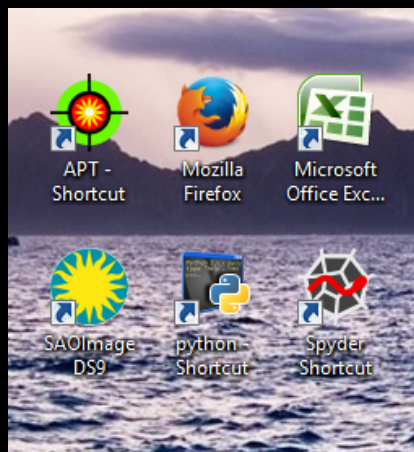
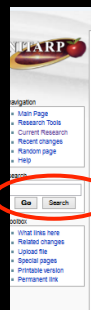
Jumping into the challenge



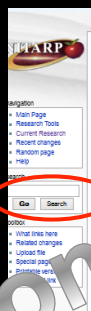
Jumping into the challenge



Spring – Prepare for Caltech

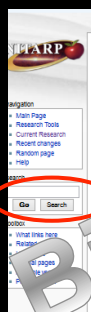


Spring – Prepare for Caltech



Communicate!!

Spring – Prepare for Caltech

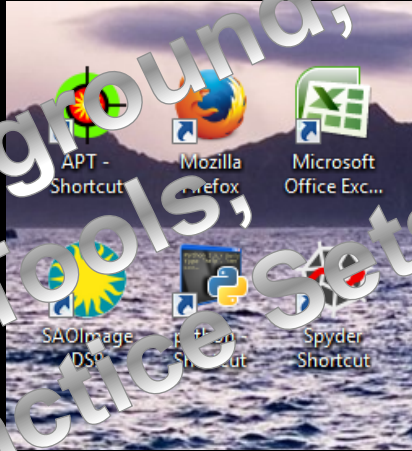


Big Picture

Spring – Prepare for Caltech



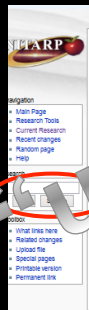
Background,
Tools,
Practice Sets



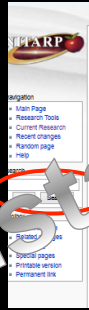
Spring – Prepare for Caltech



Use "you
experts!!!

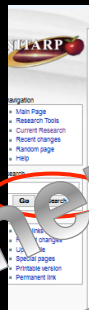


Spring – Prepare for Caltech



Install and use your software!!

Spring – Prepare for Caltech



Cherry pick for your kids

Spring – Prepare for Caltech



Summer Visit



Summer Visit



Fall Follow up



Class 0/I Protostars & Triggered Star Formation in NGC281

Thesis: Do differences in star formation triggers produce different protostars?

Motivation, Methodology: A variety of trigger mechanisms are seen to cause the onset of star formation (SF) in the Galaxy (Larson et al. 2001, Henney et al. 2002). NGC 281 is an unusual case in which two separate triggers appear to be responsible for SF in the same cloud (Goussier & Zinneber 1997, AJ, 113, 6).

We used Herschel to map NGC 281 in the far-IR (70, 160, 350 μm).

Herschel observations allow us to identify and measure brightnesses of the youngest protostars.

Star Formation: In the earliest stages of their development, stars are outshined by their natal gas.

The youngest protostars are most readily identified in the far-IR and submillimeter because the bulk of their emission is in these wavelengths.

Typical masses (0.1 to 100 M_{\odot}) range from 0.1 to 100 M_{\odot} .

East Star formation is thought to be triggered by Radiation Driven Impulsions (RDIs) (Adams & Wilner 2007, AJ, 134, 3).

- 70 visual candidates
- 11 after further vetting

Final Results:

- 8 Yes sources
- 23 Maybes

West Star formation is triggered by lateral compression of gas.

- 118 visual candidates
- 38 after further vetting

Final Results:

- 7 Yes sources
- 51 Maybes

Photometry Details: We were limited to aperture photometry only. We used the Aperture Photometry Tool (https://www.stsci.edu/hst/photometrytool) to correct for the dark background for 160 μm channels with aperture photometry. Consequently, 160 μm photometry was dropped from further analysis.

NGC 281: A Tale of Two Populations

East: A typical trigger: - occurs like envelope aligned along filaments or pillars.

West: A typical trigger: - local along ionization front.

Results: Comparison of NGC 281 protostars with a grid of models (stellar, protostar, cloud) based on physical characteristics of protostars. This found that protostars have mass ratios consistent with models where the mass of the gas is 10% higher by mass than the protostar, consistent with high mass star formation.

The East and West populations occupy the same region of the color-color plot. A lack of difference may signify lack of evolutionary differences in the accretion rates, or ages of the two groups.

Conclusions: East and West side comparison. We did not find any systematic differences in protostellar properties between the East and West groups. However, the populations are sensitive only to the high-frequency processes. Differences may yet exist in the low-frequency processes. Comparison to models and Orion A & B. Protostars in NGC 281 appear to have low mass initial mass, and are from later generation in Orion. We offer three scenarios to explain these results. Protostars in NGC 281 are at a later evolutionary stage compared to Orion A & B. Protostars in NGC 281 are at an earlier evolutionary stage compared to Orion A & B. Protostellar evolution is faster in NGC 281 compared to Orion.

Fall Follow up



Class 0/I Protostars & Triggered Star Formation in NGC281



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Motivation, Methodology:
A variety of trigger mechanisms are seen to cause the onset of star formation (SF) in the Galaxy. NGC 281 is an unusual case in which two separate triggers appear to be responsible for SF in the same cloud.

We used Herschel to map NGC 281 in the far-IR (70, 160, 350 μ m).

Herschel observations allow us to identify and measure brightnesses of the youngest protostars.

Star Formation:
The earliest stages of star formation are most readily identified in the far-IR and sub-mm because the bulk of their emission is in these wavelengths.

Typical protostars in NGC 281:
• 70 visual candidates
• 31 after further vetting
• Final Results:
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East Star formation is thought to be triggered by Radiation Driven Implosion (RDI).

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NGC 281: A Tale of Two Populations

East:
A typical source:
• cocoon-like envelope
• aligned along filaments or pillars

West:
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**118 visual candidates
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Final Results:
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• 23 Maybes

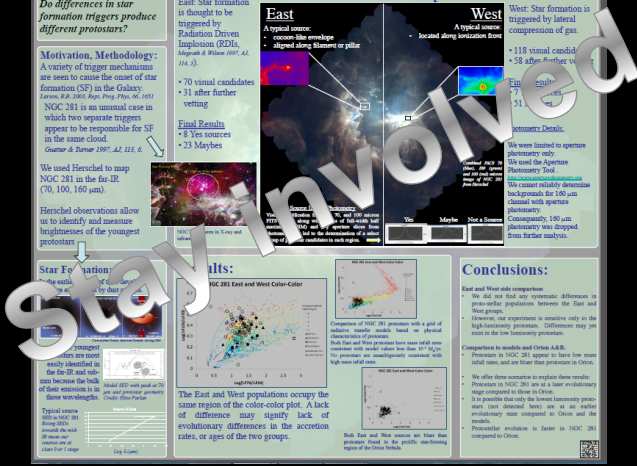
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East and West side comparison:
• We did not find any systematic difference in protostellar populations between the East and West groups.
• However, our experiment is sensitive only to the high-luminosity population. Differences may yet exist in the low-luminosity population.
• Comparison to models and Orion A&B.
• Protostars in NGC 281 appear to have low mass initial mass, and are later than protostars in Orion.
• We offer three scenarios to explain these results:
• Protostars in NGC 281 are at a later evolutionary stage compared to those in Orion.
• It is possible that only the most evolved protostars (not detected here) are at an earlier evolutionary stage compared to Orion and the models.
• Protostellar evolution is faster in NGC 281 compared to Orion.

NGC 281 East and West Color-Center

Comparison of NGC 281 protostars with a grid of model protostellar envelopes based on physical parameters of protostars.
This figure and that protostars have more red color compared with model color from 80" to 160" for protostars are unambiguously consistent with high mass initial mass.

The East and West populations occupy the same region of the color-color plot. A lack of difference may signify lack of evolutionary differences in the accretion rates, or ages of the two groups.

Both East and West contain an older star population found in the protostellar population of the Orion Nebula.



Fall Follow up



Class 0/I Protostars & Triggered Star Formation in NGC281



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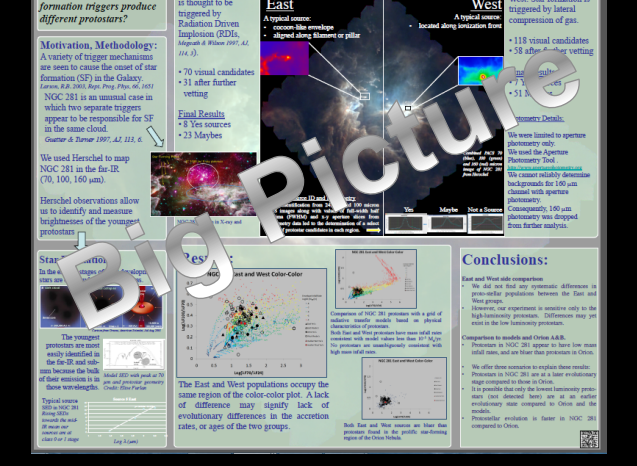
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AAS 2015



AAS 2015

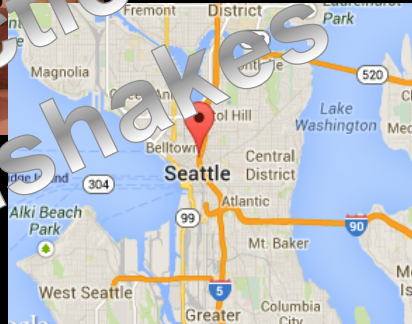


Rinse and Repeat
with Kids!!!

AAS 2015



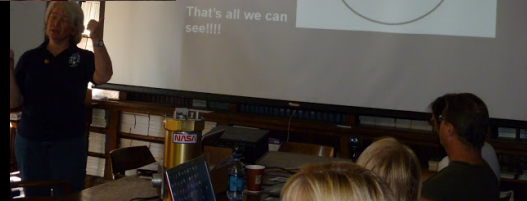
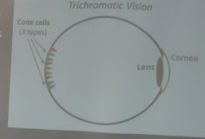
Practice
handshakes



Pay It Forward!!!



Our Eyes are
Cones on retina
detect color
We have 3 types
Red
Blue
Green
That's all we can
see!!!!



Pay It Forward!!!



Start with what you know

- IASC - International Astronomical Search Collaboration
- WISE - Wide-field Infrared Survey Explorer
- WISE pinpoints location
- Bob Holmes, Charleston, IL, provides multiple ground based images
- IASC assigns image sets

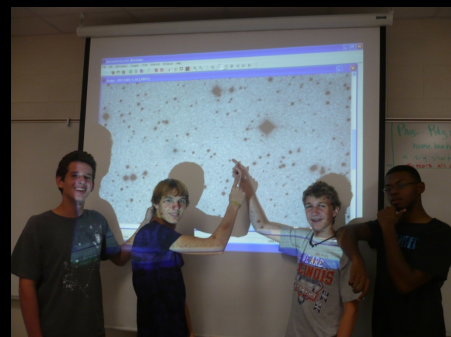
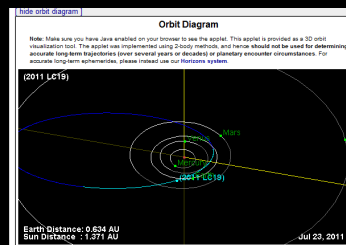


Pay It Forward!!!



- Image Processing
 - Astrometrica
- Online Resources
 - Minor Planet Center for Ephemeris
 - JPL Near Earth Program for orbit diagrams and known info
- Provide location to MPC to help better define their orbits and...

LWN
Asteroid Hunters
Saving the world!!!

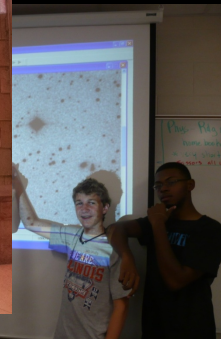
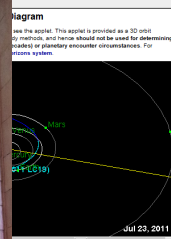


Pay It Forward!!!



- Image Process
 - Astrometric
- Online Resou
 - Minor Plane
 - Ephemeris
 - JPL Near Ea
 - for orbit dia
 - known info
- Provide locati
 - help better de
 - orbits and...

LW
Asteroid
Saving
world



Pay It Forward!!!



SOFIA IR materials

- Color Filters
 - Understand how eye works
 - Relate to use of filters for other wavelengths
- IR detectors
 - Digital cameras "see" IR
 - Solar cells collect IR
 - IR video camera - new**
- Python Programming
 - Used to gather and analyze data from camera (HAWC)
 - Basic programming in Physics classroom



Search – SOFIA Active Astronomy
 Links at – starsatyerkes.net

Pay It Forward!!!



SOFIA

- Color
 - Un
 - Re
 - oth
- IR de
 - Dig
 - So
 - IR
- Python
 - Us
 - dat
 - Basic programming in Physics classroom



NASA's Infrared Missions



Spitzer Space Telescope



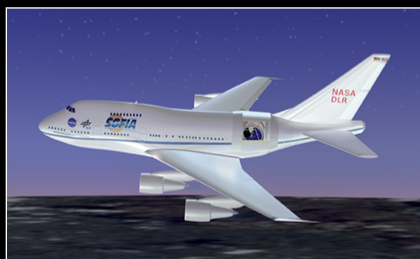
WISE



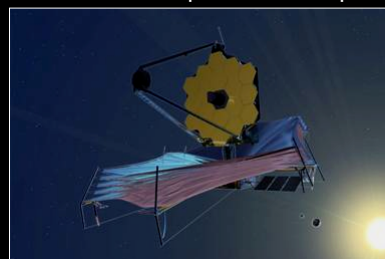
Hubble WFC3 2009



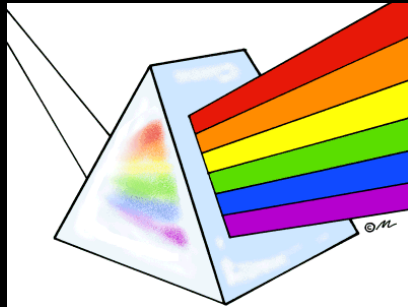
SOFIA



James Webb Space Telescope



White Light



Contains all the frequencies of light.

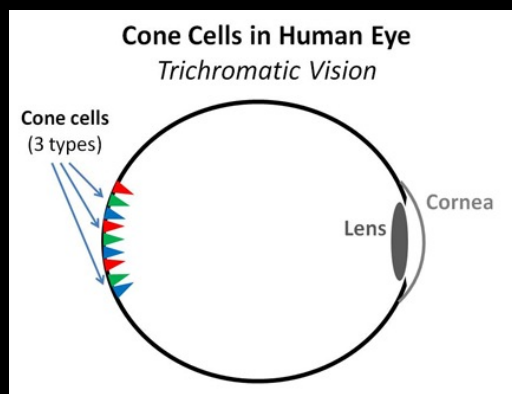
Our Eyes are Detectors



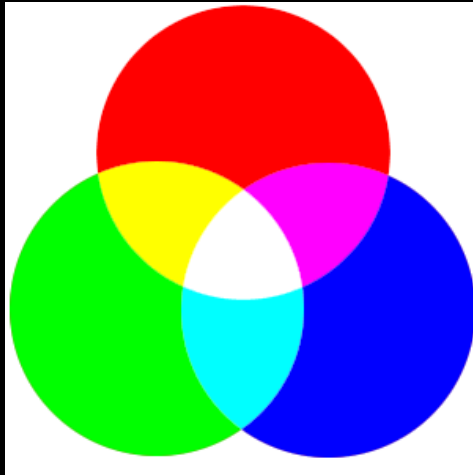
Cones on retina detect color

We have 3 types
Red
Blue
Green

That's all we can see!!!!



Mixing Colors of Light



Red, Green and Blue cones are each stimulated by certain frequencies.

Our brain mixes colors to give us all the colors of the spectrum.

Gel Color Code



- **Red** – shows in red, disappears in others
- **Blue** – shows in blue, disappears in others
- **Green** – shows in green, disappears in others
- **White** – shows in all three gels

*our red works the best!

Gel Color Code



- **Red** – shows in red, disappears in others
- **Blue** – shows in blue, disappears in others
- **Green** – shows in green, disappears in others

*our red works the best!

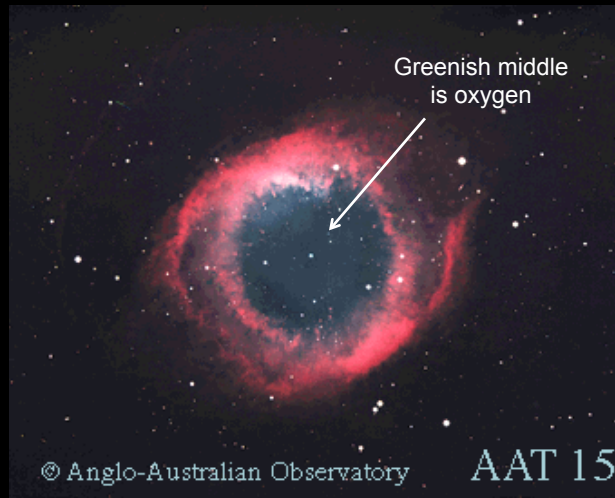
Helix Nebula



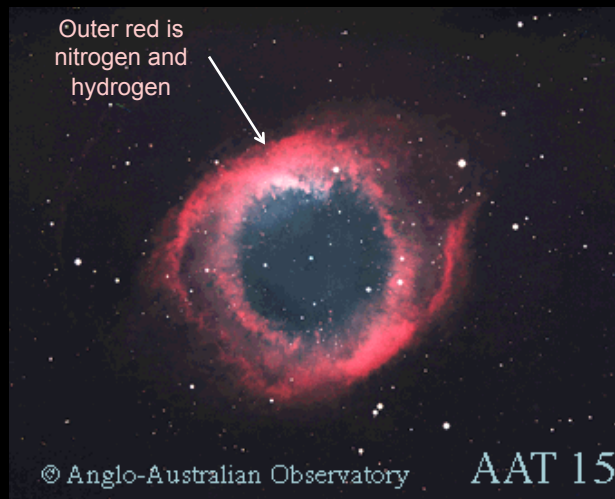
© Anglo-Australian Observatory

AAT 15

Helix Nebula



Helix Nebula



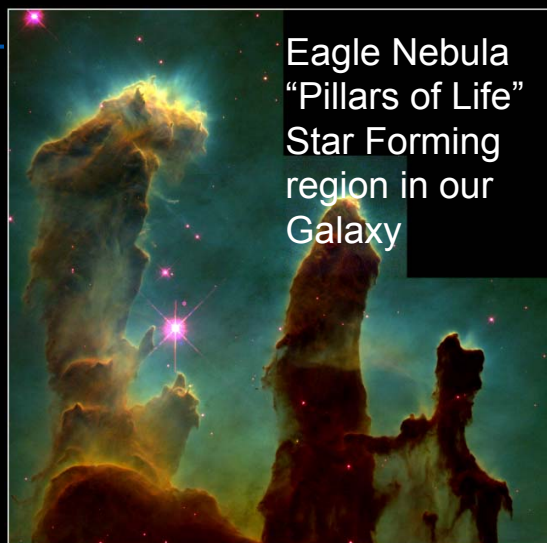
Helix Nebula



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AAT 15

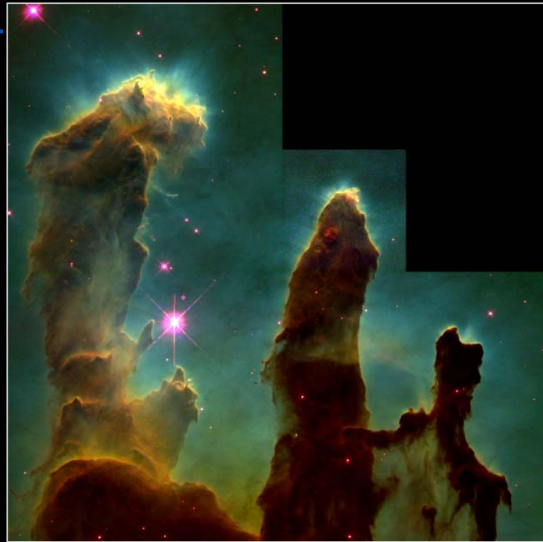
Eagle Nebula
"Pillars of Life"
Star Forming
region in our
Galaxy



Gaseous Pillars • M16

HST • WFPC2

PRC95-44a • ST ScI OPO • November 2, 1995
J. Hester and P. Scowen (AZ State Univ.), NASA



Red = singly ionized sulfur

Green = hydrogen

Blue = doubly ionized oxygen

Gaseous Pillars • M16

HST • WFPC2

PRC95-44a • ST ScI OPO • November 2, 1995
J. Hester and P. Scowen (AZ State Univ.), NASA



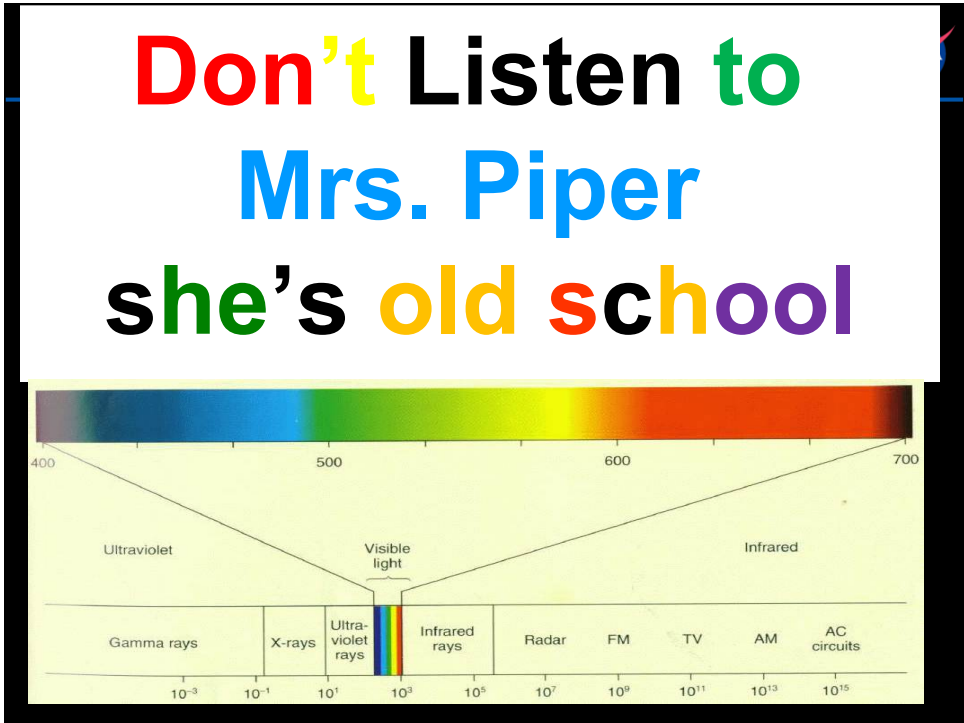
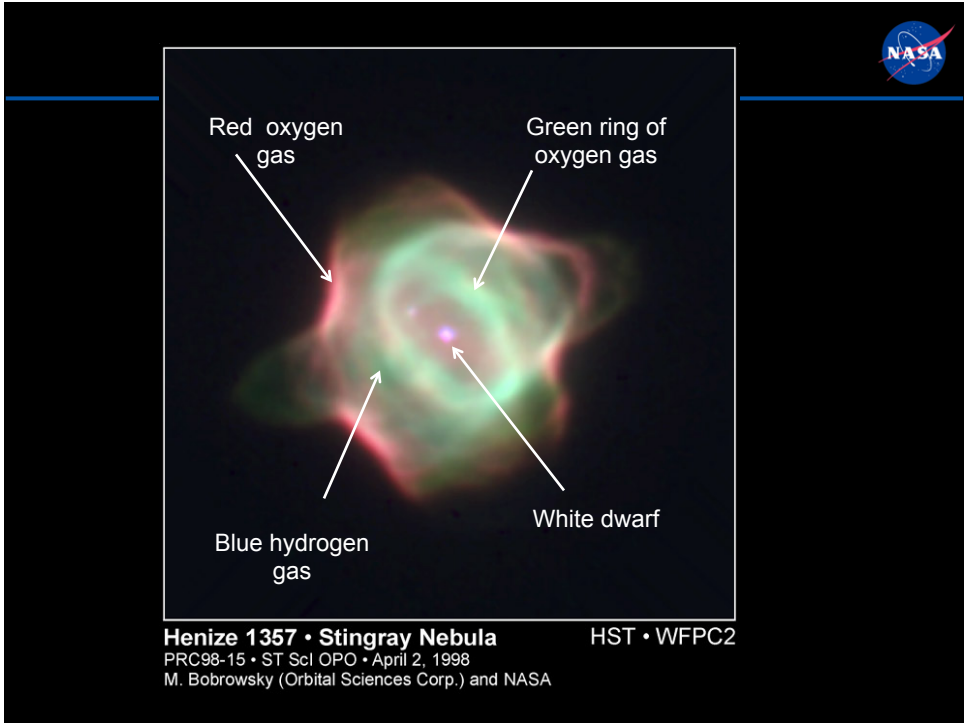
Planetary Nebula
An exploded star!



Henize 1357 • Stingray Nebula

HST • WFPC2

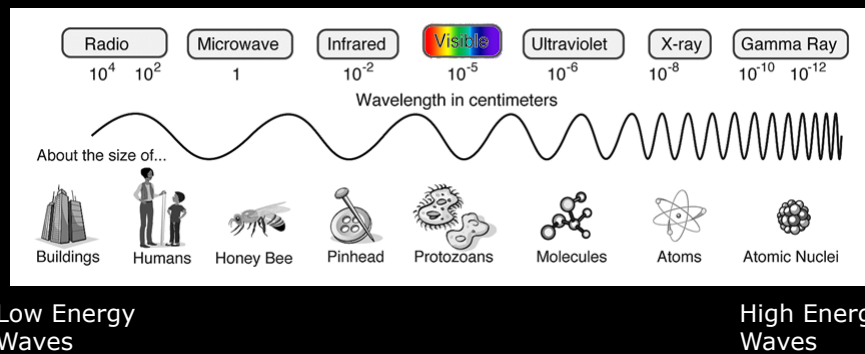
PRC98-15 • ST ScI OPO • April 2, 1998
M. Bobrowsky (Orbital Sciences Corp.) and NASA



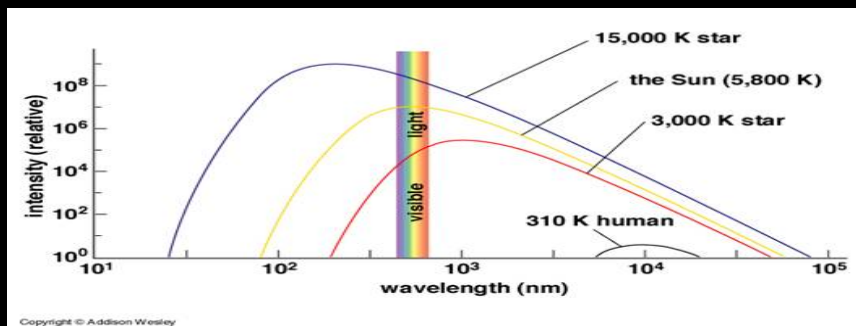
The Spectrum of Light



- Visible light is a tiny fraction of the *Electromagnetic Spectrum*
- Gamma rays--billions of waves per inch
- Radio waves--up to miles-long wavelengths

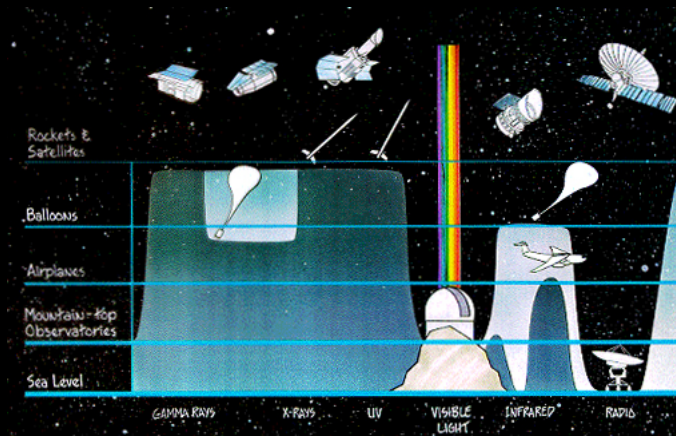


The Physics of Light



- All objects in the Universe emit light depending on their temperature.
- Cool objects emit primarily long wavelength light
- Hot objects emit primarily short wavelength waves

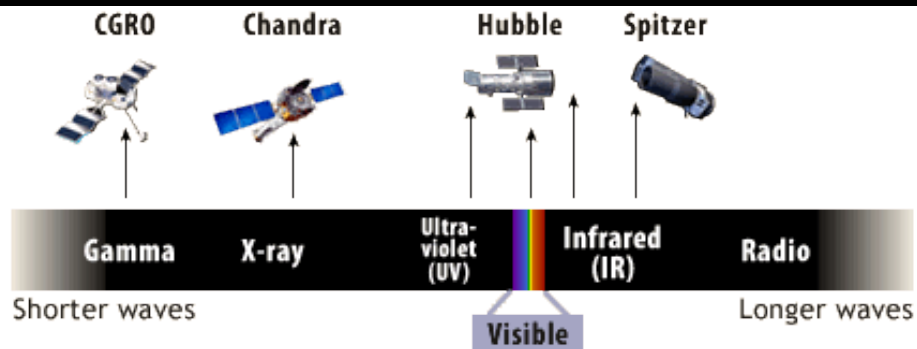
But there's a Challenge...



- Earth's atmosphere blocks or absorbs almost all incoming radiation
- Even mountain-top observatories get a limited view of the universe

Infrared telescopes need to observe from high altitude or in space

NASA Great Observatories

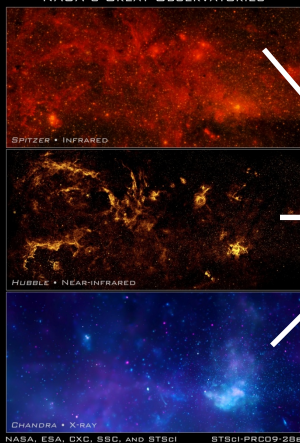


Telescopes capture images in different frequencies
(CGRO is no longer in operation)

Putting them all together



CENTER OF THE MILKY WAY GALAXY
NASA'S GREAT OBSERVATORIES



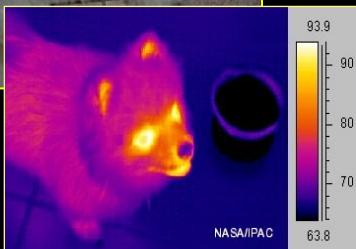
CENTRAL REGION OF THE MILKY WAY
NASA'S GREAT OBSERVATORIES



We all produce . . .



. . . Infrared Light



Why Study Infrared?



- Visible: dark nebula, heavily obscured by interstellar dust ("Horsehead Nebula")
- Near-Infrared: dust is nearly transparent, embedded stars can be observed forming
- Mid- and Far-Infrared: glow from cool dust is directly observable



Visible



Near Infrared

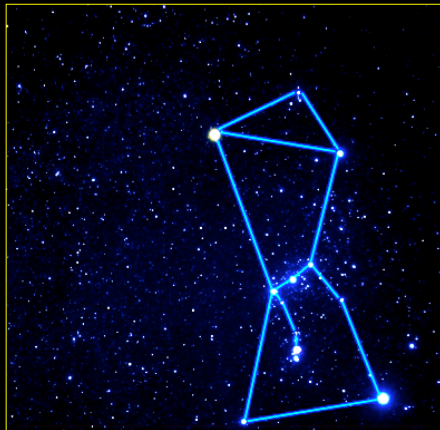


Mid-Infrared

Two Views of Orion



Visible Light (Akira Fujii)



Infrared (IRAS)

