

# The NASA/IPAC Teacher Archive Research Program (NITARP) is Recruiting New Educators!

## High-level summary

The NASA/IPAC Teacher Archive Research Program (NITARP; <http://nitarp.ipac.caltech.edu>) gets educators involved in authentic astronomical research. We partner small groups of educators with a mentor professional astronomer for a year-long original research project using NASA's vast archives of astronomical data from space- and ground-based telescopes. In exchange, we ask educators to leverage this experience by providing professional development for their colleagues in their local school districts. It involves trips for educator participants and their students to collaborate with scientists and present the research results, all of which are paid for by the program. The program is funded completely via a NASA ADAP grant, and is contingent on the availability of funds.

## Background

The Infrared Processing and Analysis Center (IPAC) is soliciting applications from educators with experience in astronomy (and bringing scientific research into the classroom or into other educational venues) to conduct research with a team of educators and a mentor scientist.

The **purpose of this program** is to provide educators with an authentic research experience in astronomy using data housed in NASA archives at the Infrared Processing and Analysis Center (IPAC) at the California Institute of Technology in Pasadena, California.

The intensive work in the program runs January to January. Since we only have a year to complete an original research program, we require some baseline astronomy knowledge of all our participants. Educators who are part of programs that get them into contact with real data are ideal candidates for us.

Historically, we have targeted grade 9-12 teachers, but 8<sup>th</sup> grade and community college educators have also participated, as have non-traditional educators such as museum educators, or amateur astronomers who do a lot of outreach, or educators not currently in the classroom.

The NITARP teams use archival data from many different NASA Astronomy missions, including but not limited to data housed at the NASA/IPAC Infrared Science Archive (IRSA), such as data from the Spitzer Space Telescope (one of NASA's Great Observatories), the Widefield Infrared Survey Explorer (WISE), and Planck; data housed at NExScI, and the NASA Exoplanet Archive, such as data from Kepler and CoRoT; data from the NASA/IPAC Extragalactic Database (NED); and/or other NASA astronomy archive holdings.

## Program components

The main program components involve multiple trips (for which NITARP pays) and a commitment from the teachers to educate others about their experiences, both of which are conducted over a minimum of 18 months to 2 years. There are 6 specific program components, which we now explain in more detail.

1. **Attending a NITARP workshop** held in Grapevine, TX, at the American Astronomical Society (AAS) meeting in January 2017. The purpose of this workshop is to meet your team, meet your scientist, learn about the basics of the NASA archives to be used, and start to define the research project to be conducted. The reason for attending the AAS meeting (and not just returning home immediately after the workshop) is to understand how AAS meetings work and to learn about current astronomy research and how research is presented in posters; time will also be spent continuing to work with your team to define your project. Your project may be something that you or another teacher in your group initiates, or it may be something that your scientist mentor suggests, or some combination of the two; your team will discuss it in person.

The AAS meeting starts the evening of Tuesday January 3, 2017 and goes through Saturday January 7. Our NITARP workshop is currently scheduled for Monday, January 2, necessitating travel on Jan 1. Participants are expected to attend the AAS from Monday (Jan 2) through Wednesday (Jan 4), but you are encouraged to stay through the end of the meeting on Saturday, (Jan 7), if your schedule permits. *You must attend this meeting. Applicants who state that they cannot attend the AAS meeting will not be accepted, even if the conflict is related to science fairs or sports coaching commitments.*

2. **Working long distance** with each other on a research program that uses data from any of the IPAC holdings, including but not limited to IRSA, NED, and/or the NASA Exoplanet Archive, in conjunction with NASA scientists, using telephone conferences (telecons) and internet-based resources such as email and a wiki (where everyone with an account on the system can edit pages, post images or proposal drafts, ask and answer questions, etc.). *You must be comfortable collaborating over phone and email. (There is a LOT of email!)*

3. **Meeting for 4 days** in Pasadena, California at Caltech (specifically IPAC) to work on the data and to understand the process of doing your science. Each team will decide when to meet (dates TBD by your team, probably – but not necessarily – in the Summer of 2017). This program is primarily for educators, but in order to support your educational efforts, we anticipate that, contingent on availability of funds, you may have the opportunity to bring up to 2 students per educator to IPAC. If you choose to bring students, they must be heavily involved in the project; more details will be available to the teachers in the program to guide in student selection.

4. **Attending the AAS meeting** in National Harbor, MD (effectively Washington, DC) in January 2018 to present results of your project, both from a scientific and educational perspective. Again, we anticipate that, contingent on availability of funds, you may have the opportunity to bring up to 2 students per educator to the AAS.

Travel costs associated with all three of these meetings (trip to AAS meeting to get started, trip to IPAC to work on project, and trip to AAS to present project results), within reason, are covered by NITARP. Due to the fluid fiscal situation with NASA funds, we may have a changing budget during 2017. If we do not believe we have funds, we will not go on the trip, *so you will never be left hanging with unreimbursed reasonable travel expenses.*

5. **Serving as NASA/NITARP ambassadors** who give 12 hours of professional development workshops in their home school districts. Each educator will be expected to give the equivalent (in hours) of 3 half-day professional development workshops in their district, or neighboring

school districts, and at least 3 talks on the project (e.g., local, state, regional, or national teacher conferences) over the first 18 months to 2 years of your time in the program. The professional development workshops can focus on just one aspect of your project (e.g., infrared astronomy).

6. **Serving as mentors** in the community of NITARP teachers. Educators are expected to participate in the NITARP community. Educators may be asked to join new teams explicitly as mentor teachers for new teams. Additional activities and opportunities may be available to the alumni community.

Educators are asked to submit regular reports to us at IPAC describing project-related activities (workshops, etc.).

## Summary and High-Level Timeline

1. **May 2016:** Release of this application
2. **1 August 2016:** Application website opens to accept applications.
3. **19 September 2016:** Deadline for application submission; web-based interviews of short-list candidates the following week.
4. **Late September/early October 2016:** Applicants notified of application status (acceptance/rejection) and assigned to teams with mentor astronomer.
5. **January 2017:** Go to the American Astronomical Society (AAS) meeting in Grapevine, TX to meet the astronomer you will work with, meet your team, and get a sense of how astronomy research is done and presented.
6. **Spring 2017:** work remotely by e-mail and telephone with your astronomer to write a proposal to use archival astronomical data to address a specific astronomical question.
7. **Summer 2017:** Travel with up to two students to Pasadena to the Infrared Processing and Analysis Center (IPAC) at Caltech for 4 days to train in analyzing the data for your science.
8. **Fall 2017:** Use the knowledge gained at IPAC back at your school to analyze the data and write a poster presentation about your scientific results.
9. **January 2018:** Present your results at the AAS meeting in National Harbor, MD.
10. **Rest of 2018:** Give 12 hours of professional development workshops in your community based on your experience in NITARP.
11. **Beyond 2018:** Stay involved with the program, with the possibility of becoming a mentor to support another team of NITARP teachers.

For more detailed milestones over a given NITARP cycle, please see our website (below).

## Evaluation Criteria and Important Notes

**Is this program for you?** If you are selected for this program, and accept our offer of participation in the program, here are some things you need to know:

- (1) ... You will be traveling using government guidelines as part of the program. As such, complex and potentially non-intuitive travel restrictions may apply. *In some instances, you will be asked to float a balance for your travel expenses (like your hotel bill) over a*

*credit card billing cycle before your reimbursement can be processed. We cannot cover substitute charges, but the per diem rates are generous and are likely to cover most if not all of such fees. **We cannot pay salary.***

- (2) ... We will use your name in conjunction with media events (such as press releases) associated with the entire program. If you have concerns regarding the use of your name as associated with this program (e.g., your institution would not approve, or you wish not to be seen as affiliated with NITARP), this may not be the program for you. Please contact us if you have specific questions.
- (3) ... Students can be involved, but **this is not required**. (a) Any students you bring need to be heavily involved in the program; and (b) you are *not* obligated to bring two students on the two trips with student participation. It is just fine to bring just one, or none, if you believe that your participation is best served by such a decision. This program's goal is first to give *you* the experience, and secondly (really, *through* you) your students. On the other extreme, if you raise your own money, depending on your team, you may be able to bring more than 2 students on the trips, but more than 4 is strongly discouraged. You may involve as many students as you want at your home institution.
- (4) ... This is real research, the real deal. We don't know what you will find until after you do the work. And, by extension, this project does not easily fold itself into an existing classroom curriculum. It is a much more authentic model/experience that teaches collaborative research. Parts of it are useful in a classroom, **but it is not a prepackaged curriculum in itself**. We rely on you to translate your experience into your environment.
- (5) ... Most of your interaction with your team will be over email and phone teleconferences, because you will not necessarily all be co-located in the same area or even the same time zone. If you are not a regular user of email for communication, it will be extremely difficult to accomplish the necessary tasks during your first year of intensive work. **There is a lot of email.**
- (6) ... You need to know the basics of the astronomy, math, and computers that you need for this program. For example, if you are a biologist suddenly stuck with an astronomy teaching assignment, this program is **not** how to start learning about astronomy. This program starts from the assumption that you are up to speed on college-level Astronomy 101, and is designed to share how science really works.
- (7) ... Team applications are not accepted. Generally, only one teacher per school is accepted into the program.

**What are we looking for?** The application is below and consists of short-form answers to questions. When we read your application, we are trying to assess the following criteria:

- Are you reasonably up-to-speed on the astronomy, math, and computers you will need for this program? We only work with you intensively for a year, and we don't necessarily have time to "start at the beginning" on all of those three topics. **You should be reasonably comfortable with the basics of all three of those topics**, because many aspects of the program will feel like the deep end of the pool.
- Are you comfortable working in groups, remotely, even with people you have just met? Most of the work in this program is over email, wikis, and teleconferences. If you can't work remotely with your team, this program will be very hard for you, and for the rest of your team who is depending on you to pull your weight. **You need to be able to read and reply to email regularly, because there is a lot of email.**

- Are you already getting your students involved in research? This program focuses on doing authentic science, **not on tips and techniques for getting students involved in research** and/or including research in your curriculum. There are other resources for developing those skills (such as AAPT); you will most likely not learn this from us.
- Is our investment in you going to be well spent? We need you to get out there and **share what you have learned** with your environment, whether that be any combination of the following: your peer educators, amateur astronomers, your community, and/or more students; locally, regionally, and/or nationally; in print, online, and/or in person.
- Our primary audience has been (and continues to be) high school classroom teachers. By necessity, then, educators not in high school classrooms (community college, 8<sup>th</sup> grade, informal educators) must demonstrate in their application that they can fit into this framework – an 8<sup>th</sup> grade educator needs to show how they will bring the experience to the level of 8<sup>th</sup> grade students, or a museum educator needs to show how they will share the experience with their museum patrons, etc.
- What skills are you already bringing to the table? Maybe you have experience with databases. Or you spent a lot of time looking at images, asteroid hunting. Or, you have experience with astronomy in a wavelength not explicitly included in IRSA databases (such as radio or gamma-ray astronomy). If you don't have an advanced degree in science, you're our primary audience. If you already have a PhD or MS in astronomy, you are not our target audience, because you've already actually done science. In any case, please **make all of this clear in your application**.

## The Application

**Applications are due by 3pm Pacific time (6pm Eastern time) Monday September 19, 2016.**

***The program is likely to be oversubscribed and all teachers qualified for this program will not be selected.***

All US-based educators (formal or informal) are eligible. Teachers are expected to know the basics of astronomy and computers (e.g., what is a magnitude, what is a FITS file and how to use it, how to install software on your computer, etc.). Fairly recent vintage laptops will be required for the IPAC visit, as well as the ability to install software on said laptops. This program is primarily aimed at 9<sup>th</sup>-12<sup>th</sup> grade teachers but 8<sup>th</sup> grade teachers and/or community college professors, and/or non-classroom or non-traditional educators may also apply.

The NITARP teacher application consists of a series of short answers to questions, submitted as a PDF file to a website. (PDF files can be created from Word using the file print---save as PDF command.) The questions are below. Please include the various question headings before each of your answers (note that you can copy-and-paste from this PDF file). **There is a 3-page limit, 12-point font, 1-inch margins. The application should be submitted to the website <https://cat.ipac.caltech.edu/nitarp/> (note https, not http) by the deadline.** This website will be open and available to accept applications starting **August 1**. This 3-page limit is a total page limit, not pages per question.

Selection will be conducted by a committee composed primarily of representatives from IPAC, including the scientists who will mentor NITARP teams in 2017. Additional external representatives from other astronomy education programs are likely to also be involved, depending on the numbers of teachers applying from those other programs.

In 2017, we expect to need to conduct web-based interviews using Google+ Hangouts with the short list of candidates. These interviews will be arranged individually with the people on the short list of candidates the week after the deadline (week of Sep 26).

Educators who have applied before but did not get selected are encouraged to apply again, ideally taking into consideration the feedback given. All applicants will be notified of the status of their application within 3-4 weeks of the application deadline.

**The web form includes:**

- Name
- School
- School Address
- School Phone Number
- Grades Currently Taught
- Subjects Currently Taught
- Mailing Address for Correspondence
- Email address for Correspondence

And a place to upload your PDF.

**Your PDF should include short essay answers to the following questions** (note that you should include the headings but need **not** copy the entire question into your answer):

*1. Educational Background-General*

Describe your educational background, degrees, and subjects studied. Relate how this background sets a foundation for being part of an astronomy research team. Why did you become a science teacher?

*2. Educational Background-Specific*

Describe your specific background in physics and astronomy, if applicable. Describe your experience with scientific research in general and with astronomy in particular. Be specific about any analysis of astronomical data in which you may have participated. Be specific about your involvement in projects and how it might relate to being a NITARP teacher. Describe your involvement in any NSF or NASA-funded education projects or scientific research projects. Describe any grants you have received or leadership roles you have assumed.

*3. Experience with Student Research and Productivity*

Describe your role in encouraging student research. (Hint: we do not mean sending your students to the library.) Describe how you currently use research projects in the classroom or other educational settings. Do you use inquiry-based learning in science labs in the classroom? Describe in general how you have made good use of experiences that attempt to bring research into your classroom or your educational venue.

*4. Ability to participate*

Describe your ability to participate in a long-term research project, including support of school district and administrators for your involvement in this project and ability to miss school. Be as specific as possible about the level of support and flexibility of your district. Are you able to attend all of the program dates set so far (i.e., the AAS in January)? If not, please explain.

*5. Ability to share the experience*

Describe very briefly your general plan for your 12 hours of professional development presentations/workshops associated with this project. We realize the details of your plans will change once you get into this, but one of the main strengths of the NITARP program is the ability of our graduates to take the experience into the education and wider communities and inspire the next generation of scientists. How will you bring your NITARP experience back to your local environment? (Hint: workshops at NSTA are not enough.)

*6. You and your NITARP team*

Describe your aptitude for astronomical research and why you want to be part of a team of NITARP teachers. What educational or scientific strengths do you bring to the team? How will you integrate the NITARP experiences with your teaching? Are you able to function on a research team that may be under some pressure to meet deadlines? Do you have any ideas for research that can be conducted using Spitzer, IRSA, NED, and/or the NASA Exoplanet Archive?

*7. Benefits*

What are you hoping to get out of this experience?

*8. Advertising*

How did you hear about us? (We are always trying to improve our advertising and recruitment.)

**Applications are due by 3pm Pacific time (6pm Eastern time) Monday September 19, 2016.**

If you have any questions, please contact us via our central email at [nitarp@ipac.caltech.edu](mailto:nitarp@ipac.caltech.edu) -- email is likely to result in the fastest response, but if you would like to have a phone conversation, please contact us:

Dr. Luisa Rebull, NITARP Director, 626-395-4565

- or -

Dr. Varoujan Gorjian, 818-354-2068

More information on the program (including projects past teams have completed) can be found at <http://nitarp.ipac.caltech.edu/>