



2019 REQUEST FOR PROPOSALS – RECRUITING GRANTS PHYSICS TEACHER EDUCATION COALITION (PhysTEC)

INTRODUCTION

In the United States, there are more than 27,000 teachers of high school physics who serve students in more than 20,000 public and private high schools. While many of these physics teachers are excellent educators, fewer than half have a major or minor in physics or physics education. Physics consistently rates as a K-12 education field with a “severe shortage” of teachers, in which demand far exceeds supply for open positions. At issue is the low number of new physics teachers prepared each year: over 70% of U.S. secondary education programs failed to graduate even a single teacher with a physics major in a recent three-year period.

The Physics Teacher Education Coalition (PhysTEC) is guided by a vision of educating sufficient numbers of qualified teachers to provide an excellent physics education for *all* students. Each year, about 1,400 new teachers are hired to teach high school physics, but only about 600 have a major or minor in physics or physics education. Collectively, colleges and universities need to prepare about 800 more physics teachers per year. There are about 750 degree-granting physics departments in the U.S.; if each of these institutions graduated one more physics teacher per year, the national need could largely be met. PhysTEC *Recruiting Grants* are intended to support institutions to do just that—i.e., develop and institutionalize practices that sustainably increase numbers of students who become physics teachers.

To date, the PhysTEC project has funded over 40 institutions as *Supported Sites* to build model physics teacher education programs. These PhysTEC Supported Sites have demonstrated significant successes in increasing the number of highly-qualified physics teachers. A coalition of over 325 PhysTEC Member Institutions is served by an annual national conference and other opportunities to improve and promote physics teacher education. In addition, the project has conducted research, developed assessment instruments, and published a number of books, reports, and peer-reviewed articles on physics teacher preparation. More information is available on the project website at www.PhysTEC.org.

PROGRAM DESCRIPTION

Recruiting Grants will be awarded with a goal of establishing a cohort of institutions focused primarily on developing and sustaining successful recruiting strategies that can be implemented at a wide variety of institutions, including but not limited to institutions with Bachelor’s-granting physics departments. PhysTEC separately funds *Comprehensive Sites*, which are larger awards to establish model programs that address the entire teacher education continuum.

Recruiting strategies

Institutions with Recruiting Grants are expected to embrace the goal of increasing the number of highly qualified secondary physics teachers. In this sense, recruiting can broadly encompass any action designed to increase the number of physics teachers educated at your institution. PhysTEC Supported Sites have experimented with a wide variety of activities to recruit more teachers, for example:

- Marketing – Raising awareness about opportunities in physics teaching among students, including physics majors and those in closely related disciplines, is a first step to recruiting. It is critical that students have accurate information about the teaching profession and are exposed to positive role models. Some institutions also promote their program outside the university, e.g., to high school students or potential career changers.
- Advising – Students considering or pursuing physics teaching need encouragement and guidance from people knowledgeable about the profession and ways to explore pathways leading to a teaching career. This can involve official advising services as well as an informal network of faculty, staff, and local teachers.
- Pathways – A variety of flexible and streamlined pathways leading to a physics degree and teaching certification is key to recruiting a larger number of students to physics teaching, as students may develop an interest in teaching at different points in their academic career. Improving existing pathways or establishing new pathways can substantially increase the number of students pursuing physics teaching.
- Early teaching experiences – Opportunities for prospective teachers to test the waters and experience physics teaching early in their college career are important to attracting more students to teaching. Experiences working with pre-college students are especially important for prospective teachers to develop and confirm a passion for teaching (or decide it is not for them). Well-structured teaching opportunities at the college level, such as a Learning Assistants program, can also introduce students to the rewards and challenges of teaching.

PTEPA Rubric as a guide

As a starting point to consider what kinds of activities and strategies might be appropriate for your institution, we recommend using the Physics Teacher Education Program Analysis (PTEPA) Rubric as a guide (available at www.phystec.org/thriving). The PTEPA Rubric was developed in a recent study of *thriving* programs, defined as those graduating five or more physics teachers per year, and it characterizes common practices of these highly successful programs. The rubric comprises six standards, and the first three are most relevant for Recruiting Grants: *Standard 1 – Institutional Commitment*, *Standard 2 – Leadership and Collaboration*, and *Standard 3 – Recruitment*.

It is not expected that institutions with Recruiting Grants will adopt every practice of every thriving program (which are represented as items in the rubric), but that institutions will thoughtfully assess which ideas best fit their needs and have the most potential to advance physics teacher recruitment and preparation within their context. (The thriving programs studied did not adopt every single practice but engaged in a selection of practices.) The [User's Guide](#) for the PTEPA Rubric has supports for interpreting your results, including an importance/synthesis ratings exercise that can help identify potential areas for program improvements. Note that not all elements of the rubric are relevant to every institution.

Creative new ideas for improving physics teacher recruitment are also welcome in response to this RFP. The project is continually evolving and seeking new and innovative strategies for improving physics teacher preparation.

Get the Facts Out recruiting toolkit

Institutions awarded a Recruiting Grant will be expected to implement the Get the Facts Out recruiting toolkit (available at getthefactsout.org). The toolkit contains flexible and customizable

recruitment materials and strategies designed to promote the teaching profession. Research-based materials and activities target misperceptions often held by students, faculty, and advisors about the teaching profession, including myths about teacher compensation, retirement prospects, and job satisfaction. The Get the Facts Out toolkit includes posters, brochures, student-facing and faculty-facing activities, and more; site leaders can choose to implement modules that best fit their local needs.

Additional considerations for Recruiting Grants

Institutions should strategically assess opportunities to recruit more physics teachers. The most accessible pool for recruiting future teachers is college students already on your campus, including physics majors, minors, and graduate students. Beyond the physics department, students in closely allied disciplines offer further opportunities for recruiting physics teachers. These disciplines can include, for example, applied physics, astronomy, materials science, math, chemistry, and some branches of engineering. Education majors and career changers have also contributed to the ranks of PhysTEC teachers at sites that recruit for and have workable pathways for these students. Recruiting significant numbers of high school students can be more challenging since students may not apply to or be admitted to your institution and may not choose a relevant major.

A Teacher in Residence (TIR), which is *optional for Recruiting Grants*, has been a valuable component of PhysTEC programs at many Supported Sites and contributed significantly to increasing the numbers of physics teachers. Their first-hand knowledge of the teaching profession, connections to local schools, and expertise in pre-college physics teaching typically brings much needed skills and expertise to a physics teacher preparation program. TIRs have led or contributed to many of the recruiting activities listed above, and their presence as an ambassador for physics teaching in the physics department has been effective in shifting attitudes and presenting teaching as an attractive career option. In addition, TIRs have helped to foster student community around teaching, which can enhance efforts to recruit more physics teachers. A number of PhysTEC institutions have experimented with a part-time TIR due to limited resources. Part-time TIRs typically keep their pre-college teaching job and spend a few hours per week at a university supporting the physics teacher education program. TIRs sometimes teach physics courses, which can help to supplement their stipend and promote contact with students.

PhysTEC support is intended to help launch new activities and structures that will be sustained by the institution after the award period is completed. Funds should be requested for efforts where there is a reasonable expectation they can be sustained, if not a formal institutional commitment to sustainability. Institutional commitments can be documented in letters of support as described below.

AWARDS

PhysTEC will award up to five (5) Recruiting Grants to begin funding in July 2020. Each Recruiting Grant will be up to a total of \$25,000 for a two-year period (2020-2022). During the planning period in the first half of 2020, awardees will receive travel support to attend the PhysTEC Conference.

ELIGIBILITY

Eligible organizations

The lead organization must be a university or four-year college that offers a physics degree and teacher certification program, and be located and accredited in the U.S. A consortium of institutions may also include two-year colleges or non-profit entities.

PI eligibility

The principal investigator (PI) must be a tenure-track or tenured faculty member in the physics department with a significant personal commitment to improving their physics teacher education program. It is often useful for programs to have collaborative arrangements with the School of Education or other unit housing the teacher certification program, and to include a co-PI in Education. The PTEPA Rubric (especially Standards 1 and 2) describes some ways in which these units may collaborate with physics departments. This type of collaboration could lead not only to a successful PhysTEC program, but also to other funding efforts such as NSF Noyce grants.

PROPOSALS

If you plan to apply for a PhysTEC recruiting grant, please email David May (may@aps.org) by September 1 to indicate your intent. An email of intent is not required but is much appreciated as this will help us with planning the review process. **Proposals are due September 27, 2019 at 5 p.m. local time.** Email proposals as an electronic attachment in PDF format to David May at may@aps.org. Late proposals will not be accepted.

There will be a webinar on the PhysTEC RFP in early-mid June. Details will be emailed to PhysTEC Member Institutions and will be available at www.PhysTEC.org. Project management welcomes inquiries and consultation during the proposal writing process. Please contact David May (phone: 301-209-3252, email: may@aps.org) or Monica Plisch (phone: 301-209-3273, email: plisch@aps.org).

The proposal format is similar to that of a standard NSF proposal, but substantially simplified. Review criteria listed below indicate how proposals will be evaluated. Please keep in mind that while a brief description of existing efforts can be useful to provide context, the emphasis of the proposal should be on the types of actions to be undertaken as a result of PhysTEC funding, and how these efforts will result in a significant increase in physics teachers.

Project description

The project description should be a maximum of 5 pages. Text should be single-spaced, written in Arial 10-point font or larger, with at least one-inch margins. Proposals must include and clearly identify the following elements in the project description section:

- **Project goals.** Give a numerical goal for increasing physics teachers prepared by your institution(s), and define any other major project goals during the period of PhysTEC funding.
- **Background.** Provide background information on your institution as indicated below.

- **Institution profile.** Include a brief description of the institution, including student enrollments, demographics, in-state student percentage, and institutional mission.
- **Physics department profile.** Include a brief description of undergraduate and graduate programs as applicable, with numbers of degrees in each of the last 3 years.
- **Physics teacher education.** Briefly describe existing program(s) to educate physics teachers and the numbers of graduates in each of the last 3 years.
- **Synergistic programs.** Briefly describe existing programs or initiatives relevant to the PhysTEC effort and outline the nature of any interactions.
- **Project activities.** Describe how you intend to address PTEPA Standards 1-3, listed below. Before completing this section, we suggest you complete the PTEPA Rubric for your program to help identify potential activities (see “PTEPA Rubric as a guide,” above). New and innovative ideas are also welcome, beyond the items listed on the PTEPA Rubric.
 - **Institutional commitment.** Describe the commitment of university leaders to establishing and maintaining a supportive climate for STEM teacher preparation, and alignment of the institutional mission with teacher education. Specify how program activities will be sustained by the institution after PhysTEC funding ends, including commitments of resources.
 - **Leadership and Collaboration.** Name the team members who will lead and carry out the project and indicate their roles and responsibilities; also, describe team members’ expertise, activities, and positions of leadership that are relevant to building a strong physics teacher preparation program. If you plan to engage a Teacher in Residence (TIR, not required), describe their roles and responsibilities. In addition, describe how the physics department will work collaboratively with the school of education or relevant unit for teacher certification to further project goals.
 - **Recruitment.** Indicate the populations from which the program will recruit prospective teachers, including physics students and others in aligned majors, and describe the strategies that will be used to engage these populations and actively recruit them to physics teaching. Keep in mind that recruiting can broadly encompass any action designed to increase the number of physics teachers educated at your institution, such as offering early teaching experiences or building streamlined programs (see “Recruiting strategies” above).

Additional proposal sections

There is no page limit for the additional sections listed below, and none of the sections will count toward the page limit for the project description.

- **Project summary.** Before the 5-page project description, include a half-page project summary suitable for the web.
- **References.** Any references should be included in a separate section from the project description.
- **Biographical sketches.** Provide an NSF-style, two-page CV for senior members of your project team listed in the project description.
- **Letters of support.** Any letters of support should include specific commitments of resources or other contributions. Letters that offer only endorsement rather than tangible support are discouraged.

- **Budget.** An NSF-style budget and budget justification are required with the proposal. Include a budget for each project year and a summary budget for the entire project. The budget justification should include a description of each budget item.
 - **Travel.** At a minimum, travel support for the PI to the PhysTEC Conference each year should be included. We also encourage additional members of the leadership team to attend this meeting. Do not include travel to the 2020 PhysTEC Conference (before funding begins), as this will be reimbursed separately by the project.
 - **Evaluation.** A budget for external evaluation is not necessary, as the PhysTEC project has contracted with external parties who will evaluate each site and the program as a whole. Evaluation and assessment for internal purposes (e.g., program monitoring and redesign) is allowable.
 - **Indirect cost limitations.** No indirect costs are allowed on participant support or TIR salary, if applicable. The indirect cost rate is limited to the NSF negotiated indirect cost rate for the institution.

PROPOSAL REVIEW

All applications will go through an NSF-style review process. A panel composed of external reviewers and the PhysTEC project management team will evaluate proposals. Anonymous comments from the panel discussion will be sent to Principal Investigators. New sites will be announced in December 2019 after the entire process is completed. Funding will begin 1 July 2020, to allow for a planning period in the first half of 2020.

Review criteria

Panels will use the following criteria during review of initial letters (which are optional) and full proposals.

- Potential to increase the number of physics teacher graduates – *How large is the pool of potential physics teachers including physics majors and others? How well conceived is the plan to recruit future teachers, and retain them to successful graduation?*
- Potential to successfully implement PTEPA Rubric Standards 1, 2, and 3 – *How will PTEPA Rubric standards be successfully addressed in the local context? Was evidence from the rubric used to generate the plan of action? What existing programs and efforts will support implementation of the plan with regard to these standards?*
- Qualifications of team to carry out project – *Is the team well positioned to implement proposed changes in the physics department and school of education? What is the knowledge and experience of the team in physics education? Does the PI have a significant commitment to the project?*
- Evidence of institutional support – *What institutional resources will be leveraged in support of a successful program? What resources will the institution commit to sustaining the project after PhysTEC funding? How will the administration stay informed about and connected to the project?*
- Extent to which the institution adds diversity – *What is the potential of the project to increase diversity among physics teachers? How does the type of institution and geographic location extend the portfolio of PhysTEC Supported Sites, and provide further examples of successful teacher education programs?*

AWARD ADMINISTRATION

Institutions with Recruiting Grants will be expected to participate in project activities described below.

Memorandum of Understanding

The project will negotiate an institution-specific Memorandum of Understanding (MOU) with each Recruiting Grant awardee. The MOU will include a detailed list of activities to be carried out by faculty and staff during the project year (July 1 to June 30 of the following year). The MOU will also include a budget for each project year.

Communication

The Principal Investigator will be assumed to serve as the primary point of contact, and the PhysTEC project management team will communicate with this person on all project matters. In addition, communication will be facilitated by a listserv and monthly videoconferences, and an online drive will be used to facilitate document exchange.

Site Leader activities

The Principal Investigator from each site is expected to participate in monthly videoconferences during the academic year and attend the annual PhysTEC Conference. The purpose of these meetings is to ensure smooth operation of the project, provide input on project policies, share ideas, and help spread knowledge of excellent teacher preparation activities. New awardees should also plan to attend the PhysTEC Conference in early 2020 and will receive travel support separately from the grant.

Annual reports

We ask each institution to compile an annual report that we will place on the PhysTEC website to inform the broader community of its progress and activities. As part of the annual report, each institution will be asked to submit recruiting materials and resources developed as part of the project in a form that can be disseminated to other institutions.

Assessment

We collect data from every site annually to help with local assessment of progress and to characterize project success as a whole. Gathering this data may involve securing the approval of your institution's Institutional Review Board. The project will expect the following from each awardee:

- Data and a clear description of methods used to count teachers prepared by your program for each year of the project as well as the three years prior to PhysTEC funding (to provide a baseline). These numbers will be used, in part, to measure your success. This should include separate categories for the number who graduate from your physics teacher education program and the number who are in the pipeline as future physics teachers.
- Updated contact information for all graduates that meet the definition of a PhysTEC Graduate. We send a brief survey to all PhysTEC Graduates each year to ask about employment outcomes. We ask each site to maintain contact with all graduates during the project and for a period of five years following funding, to assist with gathering

employment and retention data. We may also ask site leaders to report on career plans of PhysTEC Graduates.

- Survey data using the research-validated instrument, *Perceptions of Teaching as a Profession (PTaP)*, to assess departmental climate for teaching careers.
- Completion of the *Physics Teacher Education Program Analysis (PTEPA)* Rubric to characterize program activities and annual growth.

We may also ask, from time to time, for short descriptions of project successes or activities. These feature innovative programs set up at your institution, or significant successes in your work toward the goal of improving teacher preparation.

ABOUT PHYSTEC

The PhysTEC project has support from the National Science Foundation and through individual and corporate gifts to the American Physical Society's (APS) Campaign for the 21st Century. The project is led by APS in partnership with the American Association of Physics Teachers. More information about PhysTEC is available at www.PhysTEC.org