

Organisation: [REDACTED] Applicant: [REDACTED]
Funding Sought: **£2,998.00**
Funding Awarded: **£3,000.00**

PG/S2/24/1007

Can we image the surface of the sun in order to measure its rotation speed?

PG/S2/24/1007

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Section 1 - Contact Details

PRIMARY APPLICANT DETAILS

Name
Surname



COLLABORATOR DETAILS

Role	STEM partner
Title	
Name	
Surname	
Organisation	University of Exeter

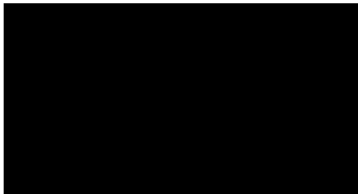
Role	Head teacher or Principal
Title	
Name	
Surname	

School contact details:

Please enter your School Name



Please enter your school address



Please enter your school postcode



Please choose your role at school from the list below

STEM teacher

Please select your school level from the list below:

Secondary

In Stage 2 we will require the name of a second staff member who can support you with this project and take over as lead if required. Please tick to confirm this is being considered

Checked

Please select the type of school from the list below:

Non fee paying

Is your school part of a multi-academy trust?

Yes

Please state the name of the multi-academy trust that your school belongs to

[REDACTED]

Will your project involve students with special educational needs and disabilities (SEND)?

No

How did you hear about the Partnership Grants scheme?

Other

Please provide some simple further details about how you heard about the scheme

Online - I searched for funding available for STEM activities

Has your school applied for a partnership grant before?

Previous recipients of partnership grants may apply for further funding, as long as the new application is made one year or more after the previous application.

However, you must make sure that your new project is not a simple extension of your previous one.

No

Section 2 - STEM Partner Details

Please include the full name of your STEM partner here

[REDACTED]

Please include the job title of your STEM partner here

Associate Professor

STEM partner contact details:

Please enter the STEM partner's organisation name

Physics and Astronomy Department, University of Exeter

Please select the type of organisation from the list below:

Higher Education Institution

Please provide the highest level of education held by your STEM partner

Professor (doctorate)

Why is this individual a suitable partner for the project?

The individual currently undertakes Astronomy research and is local enough to be able to actively participate in the investigation. His primary research interests are in plasma astrophysics, computational fluid dynamics generally, and stellar astronomy. His interests include magnetism in stars, mostly astrophysical magneto-hydrodynamics, but also observational studies of stellar rotation and activity. This exactly fits the area of interest for this investigation.

Will your project involve working with any other STEM partners?

No

Has the STEM partner applied for a Partnership Grant before?

No

Has the STEM partner been previously funded by the Royal Society through other grant opportunities

No

Section 3 - Project Overview

Project question

Can we image the surface of the sun in order to measure its rotation speed?

Please select the main strand(s) that your project falls under from the list below (please choose a maximum of 3):

- Engineering
- Physics

Please provide a short descriptive summary of your project, clearly explaining what the students will be investigating in this project (max 150 words).

Using a 3D printed spectroheliograph, with the necessary optical elements, we plan to doppler image the surface of the sun in a narrow band of wavelengths (probably h-alpha at 656.28nm). This will require the students to print and assemble a spectroheliograph then guide a telescope to safely observe the sun and collect a video of the spectra of thin slices of the sun's surface. This video will be processed into an image using available software solutions to produce a doppler image of the surface of the sun that will enable us to directly measure the rotation speed of the opposite sides of the solar limb (edges).

The equipment can also be used to measure stellar spectra and with small adjustments the magnetic field strengths of stellar surfaces. This will be a challenging project for the students involved and inspire students across the school to study physics and astronomy further.

Section 4 - Participants

Will there be a selection process to choose the students taking part in the project?

No

Please select your school region from the list below.

England

Please select which student year(s) will participate in your project from the list below:

- Year 10
- Year 11
- Year 12
- Year 13

What is the total number of students at your school?

1,750

How many students will be impacted by the project?

450

How many of the students impacted by the project will be taking part in the core investigative work and regularly interacting with the STEM partner?

90

Please provide the name for a second member of staff from your school who will support you with the project and can take over the running of the project if under any circumstances you are no longer able to act as the lead on the project

[REDACTED]

Please provide the job title for this second member of staff

Science teacher and Astronomy Club co-lead

Will any other schools be involved?

Yes

Please provide some detail about how the other schools will be involved and when in the project.

The school is a part of a Multi Academy Trust [REDACTED] with 7000+ pupils aged 5-18. The school astronomy clubs (mainly staff involved), with the local astronomy club (Kernow Astronomers), provide outreach into these schools supporting space camps/star parties and the space curriculum as requested. We will use the equipment and the results of the project to further the daytime space science activities. The school runs regular astronomy events (3 in last year) advertised across all the local schools and community, which this project will massively support and provide inspiration including CPD for attending school teachers who are invited.

Section 5 - Planning

Please select the submission deadline you are aiming for?

End of April 24

Please select the term when you plan to start your project.

Autumn term (October 24 onwards)

Please state how many terms you expect your project to run for.

3.0

If you will be working with additional STEM partners alongside your lead STEM partner, please provide some simple detail about who the additional STEM partners are.

Kernow Astronomers (kernowastronomers.com) are a not for profit local group of amateur astronomers (although they are quite excellent at what they do!) working in the north and central Cornwall region. The Kernow Astronomers provide technical advice to help us select suitable telescopes and mounts. They will also assist with advice on how to track and observe the sun safely. They help the school with their outreach and the school staff [REDACTED] assist them with outreach in return. They also run community outreach, for example each month they attend the National Trust site at Carnewas which is particularly dark to provide astronomy outreach to the public.

Kernow Astronomers will assist us with the 3D printing aspect of the project in which they have some experience of printing astronomy gizmos for adapting telescopes.

Exeter University Stem Partners have indicated that they have a number of Postdocs who could become involved in the project -e.g. giving talks concerning the topics covered by the project.

In the table below please provide details about your project plan. Please note, each project should have several investigations which all link together and help the students answer the overall project title.

Project element description	Please provide some detail about what the students will be doing	Please detail what equipment will be needed for this element. If no equipment will be needed please state N/A.	Please clearly explain how the STEM partner(s) will be involved with this element and how they will engage with students. If the STEM partner(s) will not be involved please state N/A.
<p>Please select the project element Background research session</p>	<p>Choice of the right equipment to complete the task (e.g. telescope choice and mount choice) - students will be exposed to the requirements for the project and involved in the decision making process and the necessary focal length and field of view, necessity to track solar object and record the information (camera choice). Also wider research i.e. how does a spectroheliograph work?</p>	N/A	<p>Kernow Astronomer STEM partners and Lead Teachers to lead this work</p>
<p>Please select the project element Investigation</p>	<p>3-D printing the elements of the spectroheliograph and construction, learning to track the sun, focus align and calibrate the image and record the video.</p>	<p>Optical elements of the spectroheliograph, 3-D printing (access only +plastic for construction), 400mm FL 72mm aperture telescope and focal reducer, telescope mount, halpha etalon.</p>	<p>Kernow Astronomers STEM Partners will be assisting with the 3-D printing as they have some experience and with teaching the students how to track and safely observe the sun. (The project lead also has significant experience in this)</p>

<p>Please select the project element</p> <p>Data handling and evaluation session</p>	<p>Learning to turn the resultant data into a doppler image to measure rotation of sun. Utilising software to turn the video into an image. Learning to interpret the resulting doppler image.</p>	<p>Software available with the solex optical kit. School computers. Stacking and sharpening software e.g. PIPP and Autostakkert.</p>	<p>Exeter Uni STEM partners to assist the students in understanding the doppler images produced and what a solar spectrum is. Also speaking to the students about the sun's atmosphere and magnetic field. i.e. explaining and providing inspiration. This element could be in person or online via teams or similar.</p>
<p>Please select the project element</p> <p>Project presentation</p>	<p>Students will turn the resulting investigation into a poster and powerpoint presentation to present to the STEM partners and at outreach events. Students will present their findings to their peers.</p>	<p>N/A</p>	<p>STEM partners (Kernow Astronomers and Exeter Partners) invited to attend a presentation event either at a solar outreach event or in school.</p> <p>The students could present the findings to either STEM partner that cannot attend online as an alternative.</p>
<p>Please select the project element</p> <p>Other</p>	<p>Students from schools within CELT MAT and across central and North Cornwall invited to attend sun/star watching events where they will see the presentation poster and the equipment and receive outreach/observe the sun. Students within the school (especially the two existing astronomy clubs) will observe the sun in halpha and in other narrow bands.</p>	<p>all the equipment from the project (see above) plus any other telescopes (from STEM partners)</p>	<p>Kernow Astronomers will provide supporting outreach and answer questions and provide presentations to the students on astronomy at the school but also across other schools within the local community and MAT</p>

Please detail how you will share the work carried out through your project and what legacy it will have.

Teachers from all the local schools will be invited to attend the public astronomy events at which they will be given CPD. We will also be inviting the local community to attend via social media and local radio. We will offer to provide outreach into local schools through the Kernow Astronomers. We have a lunchtime astronomy club

which has 90% female composition but these students have been reluctant (student feedback) to attend dark evening events, so daytime outreach through solar astronomy is an ideal way to encourage these students to pursue astronomy/physics careers to boost the numbers of women choosing Physics at A-level and beyond. This continuing outreach, increased interest and uptake across our students will be the real legacy of this project. Increased numbers of students from all backgrounds choosing Physics at degree level. The kit can be extended to take stellar spectra and magnetic field strengths.

Section 6 - Project costs

Are you applying for a £1,500 or £3,000 grant?

£3,000

Budget heading		2024 - 2025	Total
		2024 - 2025	
Project Item			
Solex (Shelyak Star"Ex High Resolution Optical Kit)	Cost	£609.00	£609.00
	Latest Cost	£609.00	£609.00
Telescope and focal reducer	Cost	£1,450.00	£1,450.00
	Latest Cost	£1,450.00	£1,450.00
40mm Coronado PST double stack etalon	Cost	£759.00	£759.00
	Latest Cost	£759.00	£759.00
spectroheliograph body construction	Cost	£180.00	£180.00
	Latest Cost	£180.00	£180.00
Partnership Grant top-up	Cost	£0.00	£0.00
	Latest Cost	£2.00	£2.00
Project Item Total	Cost	£2,998.00	£2,998.00
	Latest Cost	£3,000.00	£3,000.00
Grand Total	Cost	£2,998.00	£2,998.00
	Latest Cost	£3,000.00	£3,000.00

Section 7 - Lead Applicant Declaration

Declaration

I hereby declare that the information provided in this application is true and correct to the best of my knowledge.

Checked

I understand that all reports must be submitted in a timely manner otherwise the Royal Society retains the right to reclaim grant money. Details about the reporting requirements can be found [here](#).

Checked

I understand that if I have funding left at the end of my project it must be spent in one of the following ways:

- To pay for teacher cover for the teachers involved to embed the learnings from the project in the school.
- To replace consumables so that the project can re-run.
- To purchase equipment to develop and extend the original project.
- To run a session or showcase the project work at a conference.
- To produce teaching resources or guidance documents about the project which could be shared with other schools to run a similar project.
- To pay for a school trip which relates to the work the students carried out through their project.
- To produce a video, blog or podcast about the project (and share with the Society).

Checked

Name and Surname



Date

08 March 2024

Section 8 - Collaborating Applicant Declaration (STEM partner)

Declaration

I hereby declare that the information provided in this application is true and correct to the best of my knowledge.

Checked

Name and Surname



Date

18 March 2024

Section 9 - Head Teacher/Principal Support

Full name:



I confirm that the school is aware of this grant application and gives their full support to the lead applicant to run the project.

Checked


I understand that the Royal Society retains the right to reclaim grant money if the lead applicant does not submit the required reports in a timely manner.


Checked


Supporting documents

Please upload any documents (PDF), that you feel may support this application.

 [Royal Society Head statement.docx](#)

 25/03/2024

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