**Outreach and Public Engagement in the Department of Physics, Astronomy and Maths Strategy 2020-2025**

**University of Hertfordshire**

Authors: Nuala O’Flynn and Dr Ben Burningham

Date: 1st May 2020

**Introduction**

This document sets out the Department of Physics, Astronomy and Maths (PAM)’s strategy for outreach and public engagement over the next 5 years (2020-2025)

**Goals**

Outreach and public engagement (OPE) activities delivered by the Department of Physics, Astronomy and Maths (PAM) are aimed at progress towards the following goals:

1. Support and maintain science capital of people in underserved communities $^{[1]}$.
2. Improve the diversity of PAM applicants and close attainment gaps
3. Engage publics through two-way interaction with PAM research
4. Raise profile & esteem of UH in local community and beyond
5. Improve student experience
6. Cultivate a culture which embeds public engagement (PE) within PAM research

**Current Activities**

PAM currently engages in a range of activities that address some of these goals. These include monthly public open evenings and group visits at Bayfordbury Observatory during winter months (addressing III, IV and V) as well as to schools when requested through the Cosmos in the Classroom scheme which are full day and half day mobile astronomy planetarium sessions that cater for KS2 – KS4. (IV). These activities are operated via charging models so as to be cost neutral to PAM. These activities further support a small program providing astronomy at music festivals using the large mobile planetarium and mobile telescopes (III, IV, V). PAM also contributes to the activities of the UH widening access and student success (WASS) team on an as needed basis via e.g. primary level open days and taster sessions for partner schools and their feeders (I & II).

These activities are delivered through collaboration with a variety of partners. For example, all activities draw on the efforts of an outstanding team of undergraduate and postgraduate outreach assistants. Meanwhile, public open evenings also benefit from input from the Hertford Astronomy Group.

**Current strategic outlook:** Current activities are successfully addressing goals (IV) and (V), and making some headway with (III). As such, goals (I), (II) and (VI) will be the focus of most growth in the PAM OPE portfolio in the coming years, along with some refocusing to better address goal (III).

**Schools Outreach**

It has been well demonstrated that “igniting curiosity'' in young people from under-represented backgrounds and underserved communities is not enough $^{[1]}$. By working with the same children over several years, and partnering with their schools and community groups, we will do more than raise aspirations - we will create opportunity and guide progress towards STEM careers by supporting and maintaining science capital for those that need it most. Science capital can be defined as the sum of all the science-related knowledge, attitudes, experiences and resources that an individual builds up through their life.

We will achieve this by building on long term partnerships with WASS target schools (and their feeders) from Key Stage 2-4 (age 7-15 or schools years 3-9) to develop repeat interventions through a coherent programme of events and activities that schools pupils will participate in throughout their school careers. Some content will be research-based projects designed in collaboration with PAM researchers and other content has been developed by SEPnet or SEPnet universities.

In collaboration with the WASS team we will work to identify three target secondary schools. It has been demonstrated across the SEPnet/Ogden networks that this is a sustainable target in order to achieve long-term engagement. This will benefit from work already done by WASS in building relationships with these schools. We will also work with feeder primary schools to provide interactions with students over multiple years, to create long lasting connections with students.

Repeat interventions and long-term partnerships can also prepare 1st generation academic students for university life, and may positively impact attainment gaps (goals I & II). This approach is well aligned with the Ogden requirement of 15 students visited 3 times a year from underrepresented backgrounds.

Schools outreach will predominantly be delivered by the SEPnet/Ogden Outreach and Public Engagement Officer (herein refered to as the OPE Officer for brevity) and the team of PAM outreach ambassadors.

**Teacher Continual Professional Development (CPD)**

Supporting teachers is key to the central aims of our strategy and crucial to our commitment to help Physics teaching become more equitable. We particularly want to offer our support those who teach in primary schools, who do not have physics as a specialism, and those who teach in areas of social deprivation. Teachers’ encouragement of students to continue to post-16 has been found to be strongly correlated with intended participation$^{[2]}.$ and we aim to support teachers with a science capital approach to teaching and learning for the students in order to achieve this. (I & II).

We plan to update our long-running secondary CPD training to include primary schools. We will continue our collaboration with the Centre for STEM Education with the addition of SEPnet to create a CPD programme that is interlinked with the schools outreach programme providing teachers with cohesive support while reaching the Ogden requirement of 30 teacher hours per year. The OPE Officer is to receive a formal qualification from the Centre for STEM Education for delivering CPD to physics teachers and the CPD for teachers will focus on:

* A science capital teaching approach as recommended by the ASPIRES study$^{[3]}.$
* Embedding careers in lessons as recommended by the Gatsby STEM Careers Review $^{[4]}.$
* Unconscious bias and stereotyping training as recommended by the Institute of Physics $^{[5].}$
* Engaging teachers with active physics and astronomy research from the University of Hertfordshire.

**Public Engagement**

The University of Hertfordshire is a signatory of the Manifesto of Public Engagement set out by the NCCPE which defines public engagement as the following:

*"Public engagement describes the myriad of ways in which the activity and benefits of higher education and research can be shared with the public. Engagement is by definition a two-way process, involving interaction and listening, with the goal of generating mutual benefit."*

Public engagement activities and events will mainly be carried out by PAM researchers such as PhD students, research staff and academic staff with clear links to research carried out in PAM. Any public engagement activities or events carried out should consider the goals set out at the beginning of this strategy and try to engage underserved audiences and communities.

The role of the OPE Officer and Director of Outreach and Public Engagement is to provide support, resources and guidance to PAM researchers who are participating in public engagement activities. Support can be provided on:

* How to develop, run and evaluate impactful methods of engaging different audiences with their research and assist in planning for REF impact cases.
* Applying for PE grant funding and when including engagement work in consolidated grant (what would previously have been pathways to impact, and now needs to be wrapped into the main body of application).

**COVID-19 Addendum**

During this unusual time, the typical outreach and public engagement the PAM department carries out has been greatly affected and although goals I, II and V will be much more challenging to achieve we hope to still continue with goals III and IV until the pandemic is over.

We are adapting our usual outreach and public engagement to an online platform. This will mainly be done via the Bayfordbury Observatory Facebook, Twitter, and Instagram pages as this is how we as a department can reach the most people and maintain our important Bayfordbury community. We plan to utilise the Facebook events feature to have Zoom astronomy sessions on PAM research that would have featured at the Bayfordbury Observatory open nights. These activities will hopefully not only have the impact of engaging our local community but also become an online place that researchers can easily reach publics with their research. We plan to continue our collaboration with local community groups such as Hertford Astronomy Group.

In addition, we will be working in collaboration with WASS and SEPnet to transfer some of the schools outreach programme, including teacher CPD, to online content where appropriate as it is currently thought that any face to face interaction with schools will not be possible until January 2021.

**The PAM Outreach and Public Engagement Team**

**Director of Outreach and Public Engagement - Dr Ben Burningham**

Operational and budgetary oversight of PAM OPE strategy and delivery, and line manager of OPE team members.

**SEPnet/Ogden Outreach and Public Engagement Officer- Nuala O’Flynn**

Responsible for PAM’s outreach and public engagement programme, with a particular focus on schools outreach.

**Bayfordbury Observatory Technical Officers – Dr Samantha Rolfe and David Campbell**

Responsible for maintaining the observatory telescopes and equipment for use at public events. Administrators and contributors to Bayfordbury Observatory social media accounts. Sam Rolfe has the additional role of a deliverer of OPE material at public events and school visits.

**Cosmos in the Classroom Coordinator - Emily Riley**

Project Lead for Cosmos in the Classroom which brings our mobile planetarium into schools who request it.

**References**

[1] UCL, Institute of Education, ASPIRES 2 Young people’s science and career aspirations, age 10-19 2020 (<https://discovery.ucl.ac.uk/id/eprint/10092041/15/Moote_9538%20UCL%20Aspires%202%20report%20full%20online%20version.pdf>)

[2] T. Mujtaba and M. Reiss, International Journal of Science Education, 35(11), 1824 (2013).

[3] UCL, Institute of Education, The Science Capital Teaching Approach, (https://discovery.ucl.ac.uk/id/eprint/10080166/1/the-science-capital-teaching-approach-pack-for-teachers.pdf)

[4] J. Holman and P. Finegold, STEM careers review, report to the Gatsby Charitable Foundation, (https://warwick.ac.uk/fac/soc/ier/ngrf/stem/movingon/research/500- stem\_careers\_review\_nov\_2010\_holman.pdf)

[5] Institute of Physics, Opening Doors, (www.iop.org/publications/iop/2015/file\_66429.pdf).