

More exciting than meeting Tim Peake!

The Tactile Universe

Dr Nicolas Bonne, Dr Karen Masters, Dr Jen Gupta, Dr Coleman Krawczyk,

Institute of Cosmology and Gravitation, University of Portsmouth

Put simply, we engage the blind and vision impaired (BVI) community with astrophysics and cosmology. We take a black and white galaxy image, and scale each pixel vertically based on its brightness and now have 3D printed two sets of 13 galaxy images in 3 photometric bands (78 prints).

We have worked with Guide Dog Association for the Blind Southampton, the University of Portsmouth Equality and Diversity Unit, and Action for Blind People Salisbury, at a project information session.



In October, project lead Nicolas Bonne attended the 3rd Symposium for Universal Design in Astronomy Education in Tokyo, Japan. He presented the project to an international audience of inclusive education professionals, and began the process of international dissemination and networking for the project. He has also been made a member of the International Astronomical Union Equality and Inclusion working group.

We trialled our tactile models with a totally blind primary school student. The rest of her class created their own galaxy classification scheme using galaxy images, and she was able to work alongside them using our models. She was able to understand what galaxies looked like, and she was quoted as saying 'this is the first time I felt like I was doing the same thing as the rest of my class' and 'getting to feel the shapes of galaxies was even more exciting than meeting Tim Peake'!

RHUL - the coldest place in the universe?

More efficient heat exchangers for cryogenics

Harriet Van der Vliet, Dr. Andrew Casey

Royal Holloway

We aim to make the cryogenics industry less vulnerable to the worldwide helium-3 crisis. We are identifying candidate materials for a new generation of more efficient heat exchangers for cryogenic applications which will reduce the required volume of helium-3 in a dilution refrigerator.

Talks with Oxford Instruments Nanoscience developed into an Innovate UK proposal, however OI has just pulled out of all of their Innovate projects. We are currently in discussion with companies and others about how we can exploit these ideas, perhaps through a bid for Innovate UK funding.

To win or not to win – a quantum question?

Quantum Information board game

Katarzyna Krzyzanowska, Prof Silvia Bergamini, Prof Andrew Norton

The Open University

Is it possible to familiarize and engage the public with research in quantum technologies, especially quantum computing?

We plan to make the target audience truly understand the term 'quantum computer', feel comfortable while discussing modern quantum technologies and make this knowledge boost their curiosity about the field through a new commercial strategic board game on the theme of quantum computing / quantum technologies.

(The starting date of the project was postponed from November 2016 to January 2017)



Seeing the Wood for the trees: Detecting cyber-threats in smart cities

James Etherington, Prof. Bob Nichol

University of Portsmouth

We were fortunate to be given access to a large data set of around 2.5 billion domestic smart meter readings. James Etherington's analysis demonstrated that we could identify unusual meter usage, for example changes in periodicity from the normal day to night pattern, or changes in the level of usage of an individual meter which are not reflected by other similar users.

The ICG's expertise in analysing data from sky surveys such as the Dark Energy Survey and the strong similarities between astronomical data and smart meter data in terms of volume and noise meant that the algorithms used in astronomy can readily be applied.

Representatives of the electricity supply sector quickly recognised the relevance of this to their industry. Our next steps are to seek further funding to develop the work on smart meters in collaboration with a utility company and also to identify further applications for example addressing issues arising from the internet of things and smart cities.

Phone Home ET

Integrated Antenna and Battery System

Dr Michael Woods and Dr Maria Alfredsson

University of Kent

We have discovered a gap in the market: while combined antenna/battery systems exist, e.g. those in mobile phones, none of these solutions is completely integrated.

We have successfully 2D printed a complete organic Li-ion battery. This achievement - a single ultra-thin and light weight component - is an important advancement towards the EPSRC's strategy in making electronics of organic materials, flexible designs and new printable manufacturing. We estimate the current Technology Readiness Level (TRL) on the project to 2, building the prototype should raise the TRL to 3.

The next step is to print the battery materials directly on the antenna substrate, and seal the system into our lab-prototype. We will present the lab prototype to QINETIC who will assist in producing and testing a full-scale prototype at their battery line. The product will also be presented to other interested partners, including the DSTL.

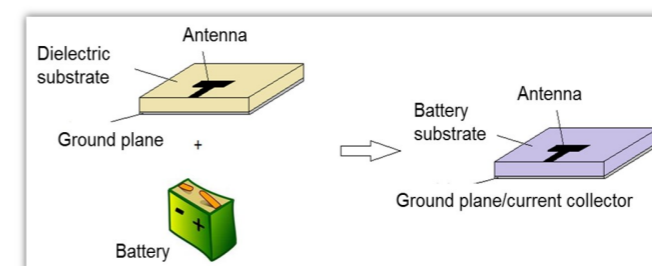


Figure Schematic design demonstrating the integration of a non-metallic Li-ion battery with a slot antenna.

Your IPS Fellows

We are fortunate in SEPnet to have two Industrial Partnership Fellows whose role is to facilitate commercialisation of Research, speeding up its Impact.

A flash in the pan?

Colin Hayhurst, SEPnet IPS Fellow, Sussex, is supporting James Sinclair in the University of Sussex to commercialise the Nanopulser. The advantage of the Nanopulser is its compact nature and therefore James made a first prototype for a general purpose light source, rather than one designed for the Sudbury Neutrino Observatory.



Initial market research showed that the fast light source could be useful in numerous applications, particularly the life sciences where they can be used to characterise molecules using measurements of fluorescence lifetime.

In parallel enquires have been made by a Japanese consortium who are considering buying the Nanopulser light system for a new particle physics experiment in 2018.

The team at Sussex are now seeking to create a spin-out company to serve these.

Getting together



Gill Prosser IPS Fellow, Portsmouth, is supporting SEPnet departments to identify ways to work together to develop impact in the future. This led to pilot a Collaborative PhD Scheme in the area of detector development. The scheme was designed to give small and medium sized enterprises (SMEs) access to PhD research with 3 or 4 SMEs joining together to support pre-competitive research, thus making the cost more affordable.

The scheme launched in autumn 2015 with initial contacts to SMEs across the region, the contacts were gleaned from academics, SEPnet's Employer Engagement team and extensive searching of LinkedIn and business directories. After an initial email campaign, follow up phone calls from academics and the IPS Fellows, a workshop was held where businesses and academics identified areas of common interest.

Further discussions have shown that there is potential for at least three projects, involving about ten students. In the short term these projects will generate research income for the four departments involved and in the medium and longer term impact as the businesses commercialise the projects.