

# LUCID press release and briefing document

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**Abstract.** This document provides the press release and briefing for the launch of the Langton Star Centre's LUCID experiment aboard Surrey Satellite Technology Limited's TechDemoSat-1. Additional information about all of the relevant partner organisations is also provided, as well as the media plan for the day of the launch. All enquiries should be addressed to the author in the first instance.

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## 1 Press release

Press information will be ready for release after the launch as soon as we hear from [SSTL](#) that the launch is successful. See Section 4 for the for full details of the media plan.

# LUCID - Launching tomorrow's scientists today

Sixth form students from a state school in Kent are preparing to collect data from their very own radiation detector in space – LUCID. This is planned to launch on **Tuesday 8th July 2014 at 15.58 28 seconds UTC** from the Baikonur Cosmodrome in Kazakhstan on board a Soyuz-2 launch vehicle with a Fregat upper stage, and is expected to send back information after a month of initial testing. (In the UK the launch will be at **16.58 and 28 seconds** because we are an hour ahead of UTC.)

Becky Parker, Director of the [Langton Star Centre](#) at the school, says “*You wouldn't go sailing without checking the wind. This detector checks the space weather; so that we know more about the environment we send satellites into in Low Earth Orbit. Our students are involved in real research. Nobody knows all the answers to these questions. Thanks to this space mission we will find out much more and we want other schools to join us analysing the LUCID data in this journey of discovery.*”

The space weather community, including NASA, are interested in this data which will give detailed insights into radiation in space. LUCID (Langton Ultimate Cosmic ray Intensity Detector) is a payload on TechDemoSat-1 which is part-funded by the UK government through the Technology Strategy Board (TSB) and the South East England Development Agency (SEEDA). The satellite has been developed and built by Surrey Satellite Technology Limited. LUCID is a project from the Langton Star Centre at the Simon Langton Grammar School for Boys, a state school in Kent which has a mixed sixth form. The school is particularly grateful to SSTL, CERN, STFC, The Royal Commission for the Exhibition of 1851, The Ogden Trust and GridPP for their fantastic support throughout this mission. You can find out more about the history and operation of LUCID in the rest of the document, as well as many brilliant supporters who have helped us in so many ways to bring LUCID to launch.

A large number of school students have been involved in the development of LUCID over the last seven years. Past and present members and leaders of the LUCID teams are available for interview.

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<b>Phone</b>	+44(0)7749 708583
<b>Website</b>	<a href="http://thelangtonstarcentre.org">http://thelangtonstarcentre.org</a>
<b>Twitter</b>	<a href="#">@LangtonStar</a>
<b>Facebook</b>	<a href="https://www.facebook.com/LangtonStarCentre">https://www.facebook.com/LangtonStarCentre</a>

## 2 LUCID briefing document

### 2.1 Background

In 2007, following a visit to [CERN](#), sixth form students from the school suggested the use of Medipix detector chips in a cosmic ray detector for a space experiment competition run by [Surrey Satellite Technology Limited](#) and the British National Space Centre (which has since become the [UK Space Agency](#)). [SSTL](#) has developed the students' original design in collaboration with the students, CERN scientists, and engineers from the [Medipix2 Collaboration](#) (including experts from [NASA](#) and the very generous and excellent help from Stanislav Pospisil and his team at the [Czech Technical University in Prague](#)). Particular mention should also be made of the phenomenal contribution from David Cooke, [SSTL](#) engineer, and Professor Larry Pinsky (Uni. of Houston/[NASA](#)) for their brilliant work, support and encouragement to students throughout the project.

### 2.2 Key scientific points

So much of our communications network, such as our mobile phones, relies on satellite communications. LUCID will provide a more detailed understanding of the types, energies, and directionality of particles hitting satellites in Low Earth Orbit (LEO). Crucially, the new data from this space-based experiment will be made accessible to all schools via the web, along with guidance and help so they can perform their own, original, publishable research. This ushers in a new set of opportunities for school students to be involved in fundamental space science research that will benefit society, especially when members of society plan to venture out into space themselves!

### 2.3 The LUCID experiment

LUCID is able to characterise the energy, type, intensity and directionality of high energy particles thanks to its five Timepix detector chips. These have been developed by the [Medipix2 Collaboration](#), originally for medical applications in X-ray imaging. As shown in figure [3a](#), the chips are arranged in an open-faced cube configuration. To shield the detector from low energy background particles, LUCID is covered by aluminium covering shown in Figure [3b](#).

### 2.4 TechDemoSat-1

Part-funded by the Technology Strategy Board and South East England Development Agency (SEEDA), [TechDemoSat-1](#) is a collaborative project to bolster the UK's thriving space industry by providing a low-cost opportunity for innovative commercial and research payloads under development in the UK to gain flight heritage. It is planned to fly in a polar orbit, an altitude of

approximately 635 km, for three years after it launches. LUCID is one of eight UK payloads onboard TechDemoSat-1.

*Further information:*

- <http://www.sstl.co.uk/Missions/TechDemoSat-1/TechDemoSat-1>
- <http://www.sstl.co.uk/Missions/TechDemoSat-1/Gallery>

## 2.5 CERN@school

The nationwide roll out of LUCID data has been made possible by a Science in Society Large Award from the [Science and Technology Facilities Council \(STFC\)](#). It is part of a wider programme of engagement with data from these detector chips called [CERN@school](#), which is hosted at the Langton Star Centre. [CERN@school](#) is managed by [SEPnet](#) Director of Outreach Clare Harvey. Dr Tom Whyntie, a CERN scientist, is the “Schools Research Champion” for [CERN@school](#) and is supported by a Special Award from the [Royal Commission for the Exhibition of 1851](#) and the [GridPP](#) Collaboration. Further details about [CERN@school](#) may be found below.

## 2.6 Supporting quotes

**Professor Larry Pinsky**, Chair of Physics at the University of Houston and NASA astronaut dosimetry expert said of LUCID:

*“It’s like playing at being NASA or the European Space Agency, but they’re not really playing, they’re doing the real thing.”*

**Dr Jonathan Eastwood**, Lecturer in Space and Atmospheric Physics, Imperial College London and [STFC](#) Advanced Fellow said,

*“LUCID is not just an educational experiment. LUCID’s research-quality data will be of direct interest and use to the wider science community, allowing students to engage in real research, studying the basic physics of how space weather works.”*

**Professor Sir Leszek Borysiewicz FRS**, Vice-Chancellor, University of Cambridge said\*

*“Education – you will know this already -- is the process of teaching someone something that they have not understood before. Research is the process of understanding things that nobody has understood before. The brilliance of Simon Langton School is to take a flavour of the excitement I experienced and continue to experience every day in university life -- the excitement of knowing what nobody has ever known before -- and bringing it into the classroom.”*

\* Quote taken from his keynote address entitled “The Thrill of Discovery” the Opening of the [Langton Star Centre](#), 7th December 2011.

## 2.7 Image gallery



Figure 1: The original LUCID team pictured with Professor Larry Pinsky (far left), Chair of Physics at the University of Houston and NASA astronaut dosimetry expert, and Michael Campbell (second from left), Head of the [Medipix2 Collaboration](#) at CERN.



Figure 2: An artist's impression of the original LUCID team, all of whom went on to study STEM subjects at university.

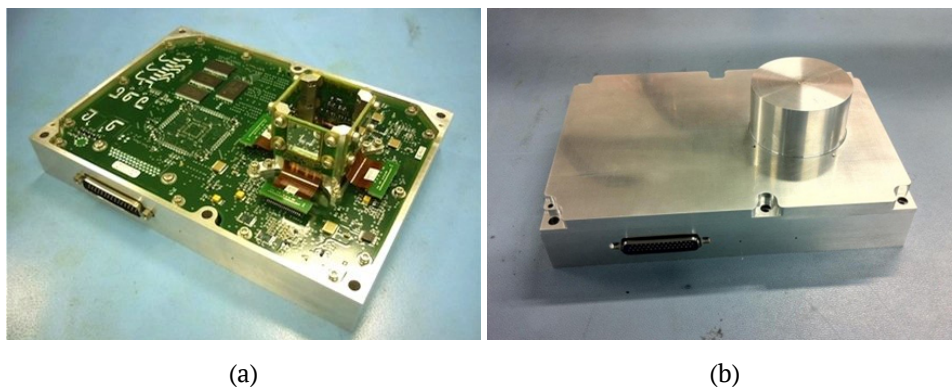


Figure 3: The LUCID experiment with the aluminium shielding a) removed, and b) in place.



Figure 4: Members of the current LUCID student team with TechDemoSat-1 at [Surrey Satellite Technology Limited](#) in Spring 2013.

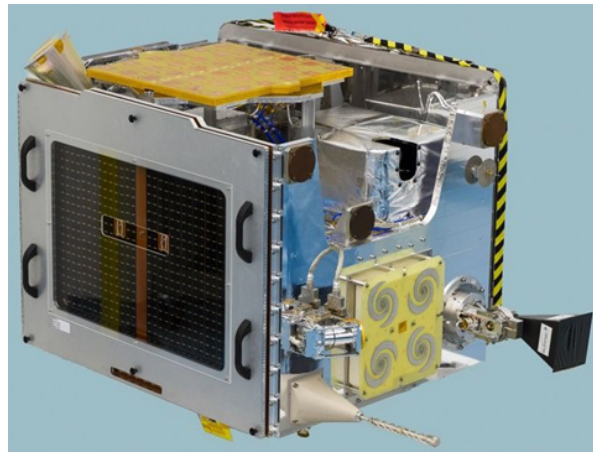


Figure 5: TechDemoSat-1. Credit: [SSTL](#).

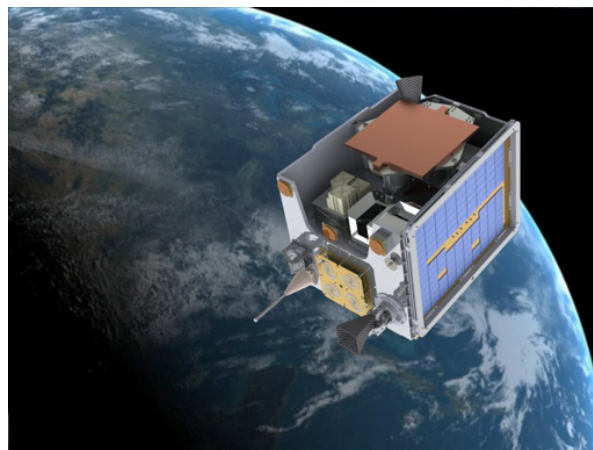


Figure 6: TechDemoSat-1 in orbit (artist's impression). Credit: [SSTL](#).



## 3 Partner organisations

### 3.1 The Langton Star Centre

The [Langton Star Centre](#) gives school students opportunities to work on authentic research projects alongside scientists and engineers from academia and industry. The students experience real science and their teachers are reinvigorated by involvement in cutting-edge work in their subject. This new approach leads to an increase in the uptake of STEM subjects in schools, and has been piloted in 30 locations for physics-based research and five school/university partnerships for biosciences research.



Figure 7: The [Langton Star Centre](#), the research facility attached to the [Simon Langton Grammar School for Boys](#) in Canterbury, Kent (United Kingdom).

At the [Simon Langton Grammar School for Boys](#), a state school with a mixed sixth form, and the home of the [Langton Star Centre](#) is based, uptake into AS/A2 physics has increased to over 230 students in the sixth form. The Langton supplies almost 1% of the total entry to physics undergraduate courses, and 2% of female undergraduate physicists.

**Website** <http://thelangtonstarcentre.org>  
**Twitter** [@LangtonStar](https://twitter.com/LangtonStar)  
**Facebook** <https://www.facebook.com/LangtonStarCentre>

### 3.2 The Science and Technology Facilities Council (STFC)

The [Science and Technology Facilities Council \(STFC\)](#) is one of seven publicly-funded research councils. It is an independent, non-departmental public body of the Department for Business, Innovation and Skills (BIS). It operates or hosts world class experimental facilities on behalf of the UK, including the ISIS pulsed neutron source, the Central Laser Facility, and LOFAR (in the

UK) and telescopes on La Palma and Hawaii (overseas). STFC is also the majority shareholder in Diamond Light Source Ltd. STFC enables UK researchers to access leading international science facilities by funding membership of international bodies, including the European Laboratory for Particle Physics (CERN), the Institut Laue Langevin (ILL), European Synchrotron Radiation Facility (ESRF), and the European Southern Observatory (ESO).

**Website** <http://www.stfc.ac.uk>  
**Twitter** [@STFC\\_Matters](https://twitter.com/STFC_Matters)  
**Facebook** [STFC on Facebook](https://www.facebook.com/STFC)

### 3.3 CERN@school

CERN@school is a programme supported by STFC (via a Science in Society Large Award) and the Royal Commission for the Exhibition of 1851 (via a Special Award) that brings technology from CERN into the classroom to aid with the teaching of particle physics. It aims to inspire the next generation of physicists and engineers by giving school students the opportunity to be part of a national collaboration of students, teachers and academics, analysing data obtained from detectors based on the ground and in space.

CERN@school uses a hybrid silicon pixel detector chip developed by the Medipix2 Collaboration to detect and visualise ionising radiation. The detector uses a very handy USB-based readout system and software developed by the Czech Technical University in Prague. It was first launched as a pilot project in ten schools in Kent. Support was then received from SEPnet (the South East Physics Network) to roll it out across the South East to University school partnerships. Now, with support from the STFC Large Award and the Royal Commission for the Exhibition of 1851 Special Award the project has gone nationwide. In collaboration with the Institute of Physics, 30 schools and research institutions now have access to a detector curriculum learning and extension research projects.

**Website** <http://cernatschool.web.cern.ch>  
**Twitter** [@CERNatschool](https://twitter.com/CERNatschool)  
**Facebook** <https://www.facebook.com/CERNatschool>

### 3.4 The Technology Strategy Board (TSB)

The Technology Strategy Board (TSB) is the UK's innovation agency, whose goal is to accelerate economic growth by stimulating and supporting business-led innovation. Tim Just, Head of Space at the TSB, said, "*TechDemoSat-1 is the first in-orbit satellite project directly funded by the Technology Strategy Board. This hugely exciting and anticipated development will provide true space flight heritage to a number of new ideas and companies. Once in orbit TechDemoSat-1 will be able to test several new satellite-based products and services from UK businesses, breaking one of the key barriers to innovation in the space sector by reducing risk in demonstrating new space-based solutions and technologies.*"



**Website** <https://www.innovateuk.org/>  
**Twitter** [@innovate\\_uk](https://twitter.com/innovate_uk)  
**Facebook** <https://www.facebook.com/technologystrategyboard>

### 3.5 Surrey Satellite Technology Limited (SSTL)

Surrey Satellite Technology Limited (SSTL) has been delivering small satellite missions for over 25 years – longer than anyone else in the world. This gives them the experience to justify their reputation as the world’s premier provider of operational and commercial satellite programmes. SSTL have been crucial to the success of the LUCID project, providing the scientific and engineering support required to turn the LUCID team’s design into reality.

**Website** <http://www.sstl.co.uk/>  
**Twitter** [@SurreySat](https://twitter.com/SurreySat)

### 3.6 The UK Space Agency

The UK Space Agency is at the heart of UK efforts to explore and benefit from space. The UK’s thriving space sector contributes £9.1 billion a year to the UK economy and directly employs 28,900 people, with an average growth rate of almost 7.5%. The Agency provides funding for a range of programmes such as the National Space Technology Programme and FP7, and works closely with national and international academic, education and community partners.

**Website** <https://www.gov.uk/government/organisations/uk-space-agency>  
**Twitter** [@spacegovuk](https://twitter.com/spacegovuk)  
**Facebook** UK Space Agency on Facebook

### 3.7 The Institute of Physics

The [Institute of Physics \(IOP\)](https://www.iop.org/) is a leading scientific society; a charitable organisation with a worldwide membership of more than 50,000, working together to advance physics education, research and application. The IOP’s [Physics Teacher Network](#) supports [CERN@school](#) by helping to manage the national distribution of the Timepix detectors. Detectors have been assigned to [Physics Network Coordinators](#) (PNCs) throughout the United Kingdom and Republic of Ireland. The PNCs oversee the use of the detectors in schools in their region.

**Website** <http://www.iop.org>  
**Twitter** [@PhysicsNews](https://twitter.com/PhysicsNews)  
**Facebook** <https://www.facebook.com/instituteofphysics>

### 3.8 CERN

At [CERN](#), the European Organization for Nuclear Research, physicists and engineers are probing the fundamental structure of the universe. Founded in 1954, [CERN](#) sits astride the Franco-Swiss border near Geneva. It was one of Europe's first joint ventures and now has 21 member states. At [CERN](#), scientists use the world's largest and most complex scientific instruments to study the basic constituents of matter. The instruments used at [CERN](#) are purpose-built particle accelerators and detectors. Sub-atomic particles are made to collide together at close to the speed of light by the accelerators. Detectors observe and record the results of these collisions. The process gives the physicists clues about how the particles interact, and provides insights into the fundamental laws of nature.

**Website** <https://cern.ch>  
**Twitter** [@CERN](#)  
**Facebook** <https://www.facebook.com/cern>

### 3.9 The Medipix2 Collaboration

The [Langton Star Centre](#) has worked closely with the Medipix2 Collaboration led by Michael Campbell. This is a group of Universities and research institutions from across the world that develops and applies hybrid silicon pixel detectors to a range of uses, including the Large Hadron Collider and medical imaging. LUCID uses five [Timepix](#) hybrid silicon pixel detectors developed by the Medipix2 Collaboration, which feature a  $300\ \mu\text{m}$  thick silicon sensor bump-bonded to a Timepix readout chip.  $256 \times 256$  pixels provide 65,536 readout channels from each  $1.98\ \text{cm}^2$  sensor element. The Timepix chip evolved from the Medipix2 chip. The pixels have identical size to those of Medipix2, but with Timepix an estimate of the energy deposited by detected particles can be made. This is what will make LUCID's measurements of the space radiation environment so in demand by the space weather community.

**Website** <http://medipix.web.cern.ch>

### 3.10 The Royal Commission for the Exhibition of 1851

The [Royal Commission for the Exhibition of 1851](http://www.royalcommission1851.org/) awards grants and fellowships in support of science and industry to the value of £2m a year. First established in 1850 to stage the Great Exhibition, the Commission initially invested the Exhibition's profit by purchasing the land for development of the South Kensington cultural estate of museums, colleges and the Royal Albert Hall and it continues to manage the freehold of much of this estate. It also makes a small number of Special Awards to support projects consistent with its overall aims. Many of these are focused on raising the awareness of the young to the opportunities presented by science and engineering. [CERN@school](mailto:CERN@school) was awarded a Special Award to support Dr Tom Whyntie as "Schools Research Champion" for the programme as it became a nationwide project.

**Website** <http://www.royalcommission1851.org/>  
**Twitter** [@RoyalCom1851](https://twitter.com/RoyalCom1851)

### 3.11 The GridPP Collaboration

[GridPP](http://www.gridpp.ac.uk/) is a collaboration of particle physicists and computer scientists that are responsible for the distributed computing grid that powers the UK's contribution to the Worldwide LHC Computing Grid (WLCG). As a key part of a worldwide infrastructure, the Grid was used to process the data from the Large Hadron Collider (LHC) which led to the discovery of the Higgs boson. It also supports many other scientists and engineers, in other fields of research and industry. [CERN@school](mailto:CERN@school) has a Virtual Organisation (VO) on the grid which will allow it to process and store LUCID data on an industrial scale, as well as run simulations of the experiment to better understand its performance in different space radiation environments. This work brings students close to the operational methods of physicists and encourages development of coding skills, an essential part of modern-day science.

**Website** <http://www.gridpp.ac.uk/>  
**Twitter** [@GridPP](https://twitter.com/GridPP)  
**Facebook** <https://www.facebook.com/gridpp>

### 3.12 The Ogden Trust

The **Ogden Trust**'s educational bursaries and grants were first conceived by Peter Ogden during 1998 and launched in 1999. The Trust's aim is to maximise the opportunities available to young people in all parts of the UK's educational system and is now focused on science, particularly physics. The Trust supports a range of initiatives, programmes and projects to promote the teaching and learning of physics. The Trust has supported Becky Parker as an Ogden Teaching Fellow and a number of Ogden Partnership schools are active in the **CERN@school** programme.

**Website** <http://www.ogdentrust.com/>  
**Twitter** [@ogdentrust](https://twitter.com/ogdentrust)  
**Facebook** <https://www.facebook.com/Ogdenpartnerships>

### 3.13 SEPnet

The **South East Physics Network** is better known as **SEPnet**, a consortium of physics departments in nine universities in the south east of England. These work together to deliver excellence in physics, leading the way with a fresh approach to collaboration, teaching and research. **SEPnet** originally embraced the **CERN@school** programme using detectors in link schools. Clare Harvey, Director of Outreach at **SEPnet** is funded by **STFC** to project manage **CERN@school**.

**Primary contact** Miss Clare Harvey, Director of Outreach  
**Email** [clare.harvey@sepnet.ac.uk](mailto:clare.harvey@sepnet.ac.uk)  
**Website** <http://www.sepnet.ac.uk>  
**Facebook** <https://www.facebook.com/SEPnet>

### 3.14 Kent County Council

**Kent County Council** (KCC) has constantly supported the approach of the **Langton Star Centre**, and initially kick started the **CERN@school** programme when the Kent Youth Parliament, a committee of young people in Kent, decided to support the application by the original LUCID team to bring exciting current technology from **CERN** into schools.

## 4 Media plan

If any partner wishes to circulate this material to specific contacts straight after the launch then please let Becky Parker know.

The media plan is as follows:

- 1) Prepare a list of all press and media contacts;
- 2) Have all the material ready to go out on notification of a successful launch from [SSTL](#);
- 3) Be prepared to engage in social media and enquiries after the successful launch. The hashtag to use is #LUCID;
- 4) Have students ready to be interviewed after the successful launch. There will be current and past members of the LUCID team standing by!
- 5) Consider potential for further media coverage when the data starts to come down, when students see data for the first time, and it is made available to other schools;
- 6) Have a party at school at the time of the launch and film the students watching in case this is useful for publicity. This will be Tuesday 8th July 2014 4-6 pm in B8 (the Feynman Room). There will be themed food and water rockets launching beforehand. All students, staff and governors are most welcome to attend.

Very many thanks to everyone who has made this possible, and especially to Joelle Sykes ([SSTL](#)) for her help with coordinating this document.



## Version History

Table 1: Version history.

Version	Description	Author
1.0	Initial version.	BP
1.1	Minor edits.	TW