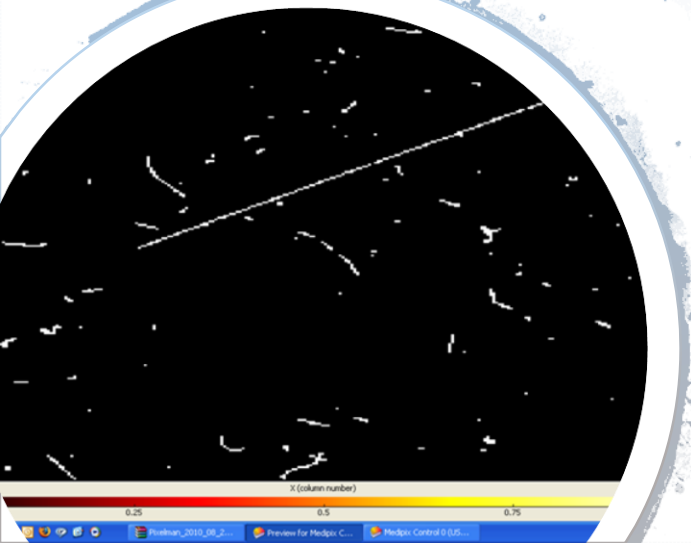

CERN@school

Inspiring the next generation of scientists and engineers

CERN@school – Inspiring tomorrow's scientists (for the last 12 years!)

Becky Parker


CERN@school
DELL
DELL

Original pilot schools

- Norton Knatchbull - Ashford
- Fort Pitt - Rochester
- Canterbury High – Canterbury
- Simon Langton Boys – Canterbury
- Cranbrook School – Cranbrook
- Dartford Girls - Dartford
- Dover Boys – Dover
- St Edmunds - Canterbury
- Oakwood Park – Maidstone
- Maidstone Girls' – Maidstone
- Bennett Memorial – Tunbridge Wells

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LANGTON SATELLITE TEAM

Pictured here with Larry Pinsky and Michael Campbell

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

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The Langton Ultimate Cosmic ray Intensity Detector

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Inspiring the next generation of scientists and engineers

LUCID was launched on TechDemoSat-1 from Baikonur on a Soyuz 2 rocket on 8th July 2014

Processing LUCID Data

Get data from payload → Convert data to x,y,ToT → Upload data to GridPP

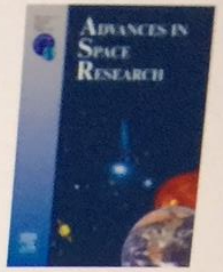
TAPAS
TIMEPIX ANALYSIS PLATFORM AT SCHOOL

Generate JDLs → Submit jobs → Run Tensorflow! → Submit to TAPAS

ELSEVIER

Advances in Space Research

Volume 63, Issue 5, 1 March 2019, Pages 1523-1540



First results from the LUCID-Timepix spacecraft payload onboard the TechDemoSat-1 satellite in Low Earth Orbit

Will Furnell [a, b], Abhishek Shenoy [a, c], Elliot Fox [a, c], Peter Hatfield [a, d]

Show more

https://doi.org/10.1016/j.asr.2018.10.045

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Abstract

The Langton Ultimate Cosmic ray Intensity Detector (LUCID) is a payload onboard the satellite TechDemoSat-1, used to study the radiation environment in Low Earth Orbit

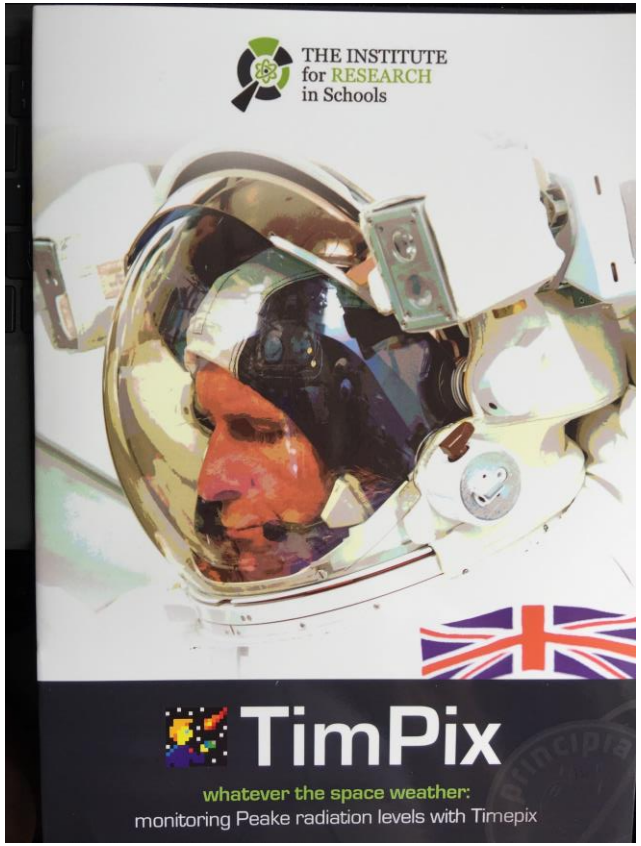
Present at CERN

CERN@school

Inspiring the next generation of scientists and engineers

Katherine Evans presenting at the CERN@school Symposium

TimPix project
Ayr Academy



THE INSTITUTE
for RESEARCH
in Schools

IRIS Vision and Aims

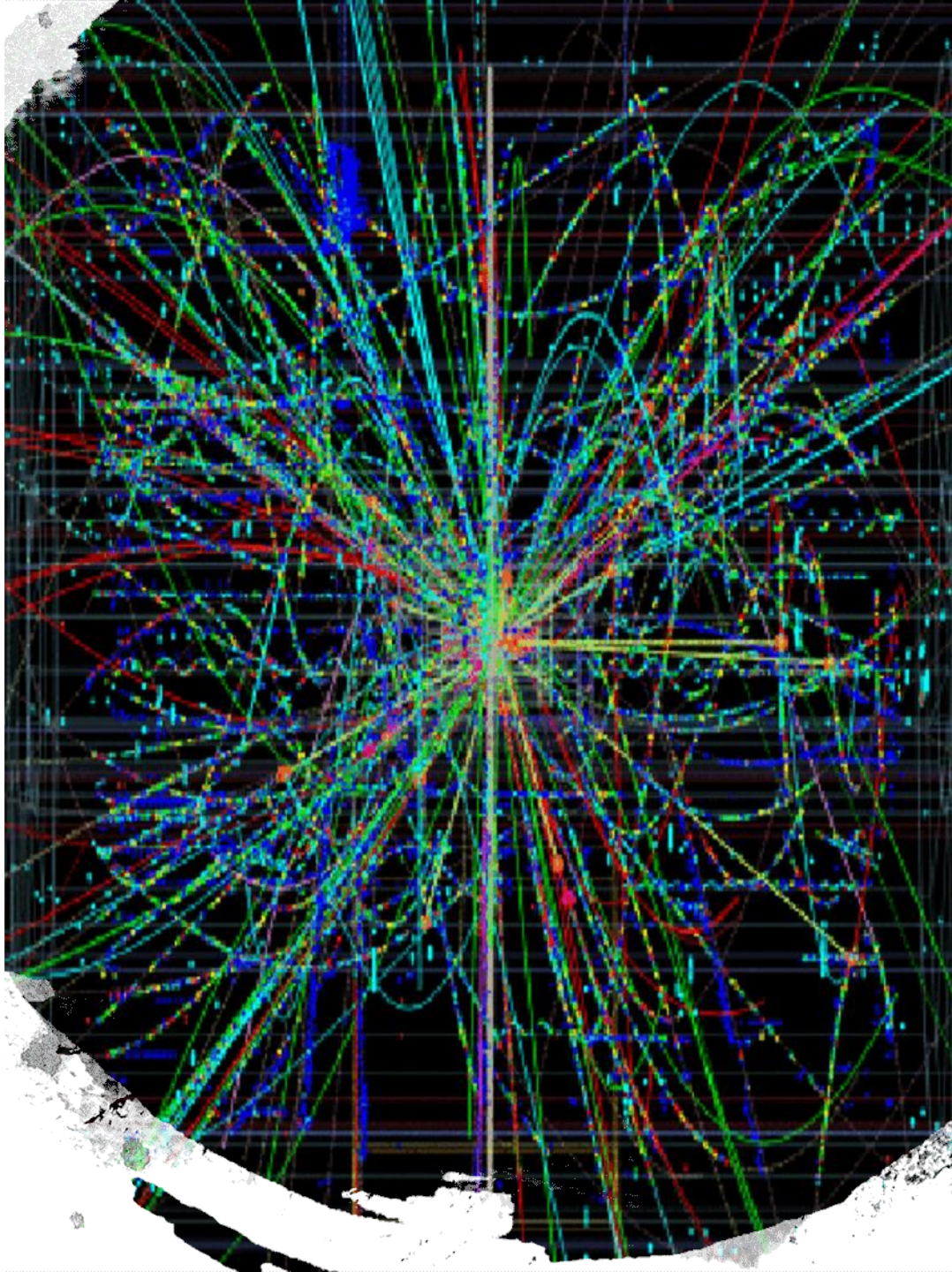
IRIS Vision is that school students, teachers and technicians should have the opportunity to become valued and contributing members of the scientific community.

IRIS Aims

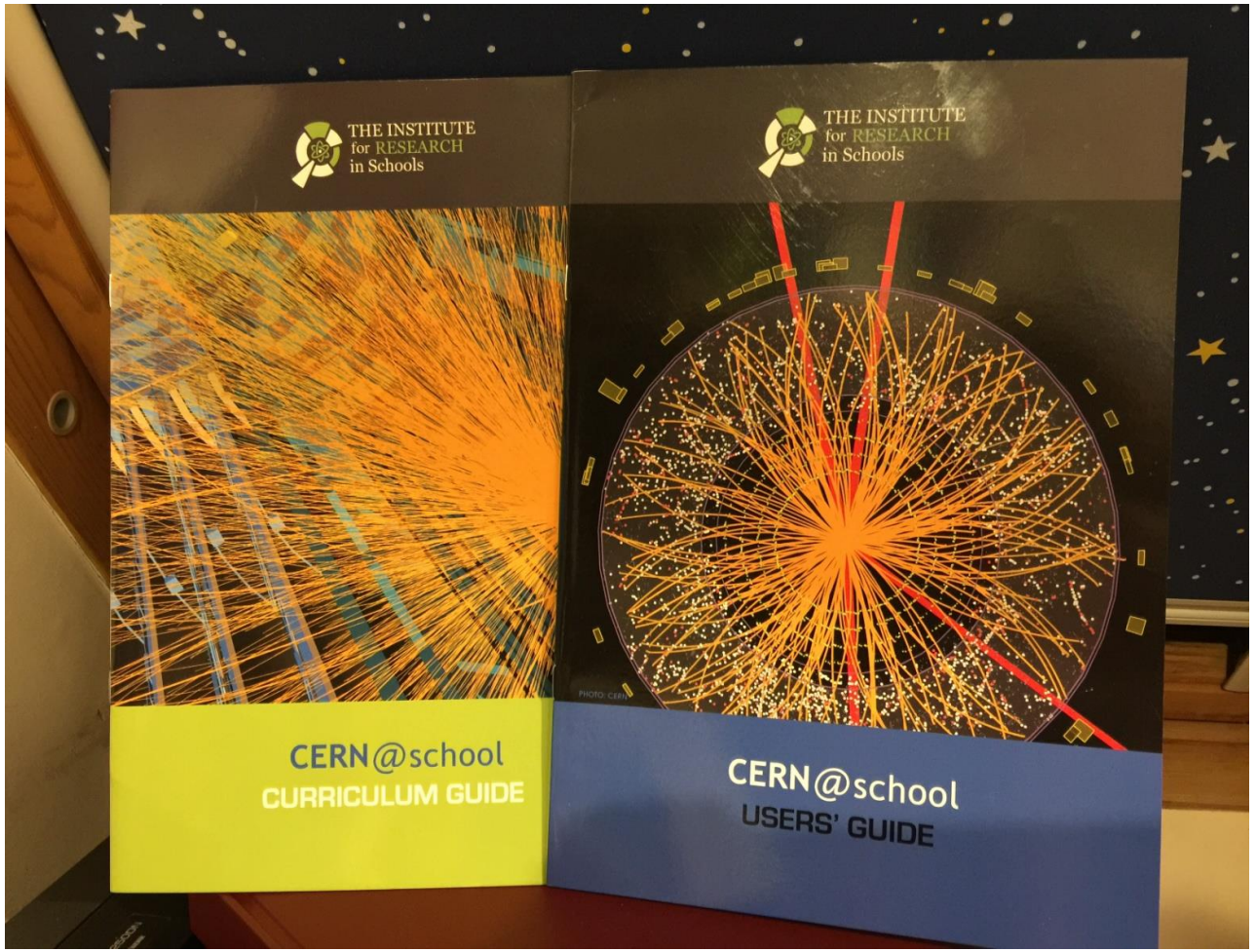
1 Establish and facilitate school based research projects, where school students are able to participate in cutting edge challenges in STEM.

2 To provide opportunities for teachers and technicians to contribute to and mentor science research with their students.

3 To promote and facilitate sustained collaborations between schools and universities and other partners so as to develop research projects that make a genuine contribution to knowledge.



Understanding radiation and having a chance to develop projects with cutting edge technology



CERN@school loans 2018-9

CERN@school
Inspiring the next generation of scientists and engineers

Equipment loans

	Number of loans	Average number of students per school*	Total number of students engaged with detector*
2016-17	28	40	1120
2017-18	30	90	2700
2018-19	50	60	3000
TOTAL			6820

*Based on post-loan survey responses

THE INSTITUTE for RESEARCH in Schools

Timepix

Angular dependence of background radiation detected by Timepix

Abingdon Science Partnership; Abingdon School; Larkmead School; John Mason School; Fitzharrys School
Institute for Research in Schools; University of Oxford Physics Department

Overview

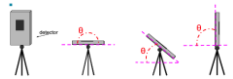
Using a Timepix detector, we measured the relative energy distribution in a series of tests with the detector at different angles. Our results demonstrate that the recorded energy per pixel is highest when the angle of the detector is in the region of 40 degrees from the horizontal.

Aims

We aimed to determine the effect of varying the angle of the detector on the energy of radiation detected. Our hypothesis was that we should detect highre energy from muon tracks with the detector vertical whereas background radiation should not be affected by detector angle.

Background information

The Timepix chip consists of an array of 256 by 256 pixels covered by silicon and aluminium layers. When ionising radiation hits the detector, its energy is deposited in the silicon layer as it comes to rest or passes through. An electrical signal is generated in the pixels struck and is then amplified. The pixels are read by the software and a picture of the radiation strikes is produced.

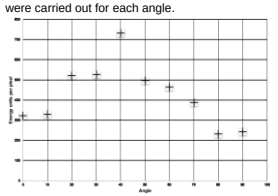


Methodology

The detector was set to a 95V bias, and there was no cover on the detector. The experiment was run in the same location. A ten minute sample of data for each angle was collected and this was repeated three times each (angles used in the experiment: θ = 0· , 10· , 20· , 30· , 40· , 50· , 60· , 70· , 80· , 90·).

Results

Our graph shows that there is an angular asymmetry of radiation detected. Despite the fact that the number of pixels which were triggered remained fairly constant, the mean relative energy per pixel was greatest at 40 degrees, with the value gradually decreasing for greater and lesser angles. This trend was confirmed by the three repeats that were carried out for each angle.

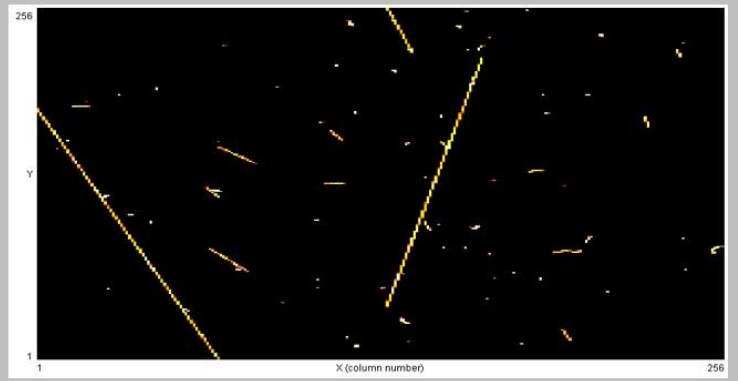


Conclusion

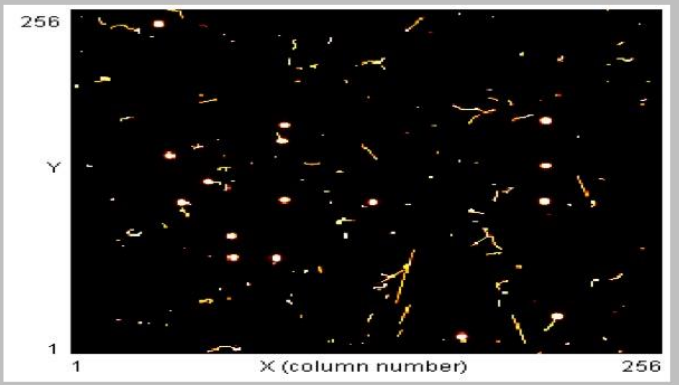
There is clear proof of the angular dependence in our results, but this is hard to explain. Simple mathematical models we have tried show this is possible if the radiation has a preferred angle around 40-50º. This needs further investigation.

Evaluation

We are still in the analysis stages, and so far our results are inconclusive. We plan on looking further into angular dependence by testing the detector with a radioactive source so we can control the direction of incident radiation.



10 minute sample from Larkmead School, Abingdon showing several high energy particle tracks



Ten minute sample from a house in Port Isaac, Cornwall showing 15 alpha particle events

What is going well:

- Hands on experiments
- Collaborative work
- Research and publication experience

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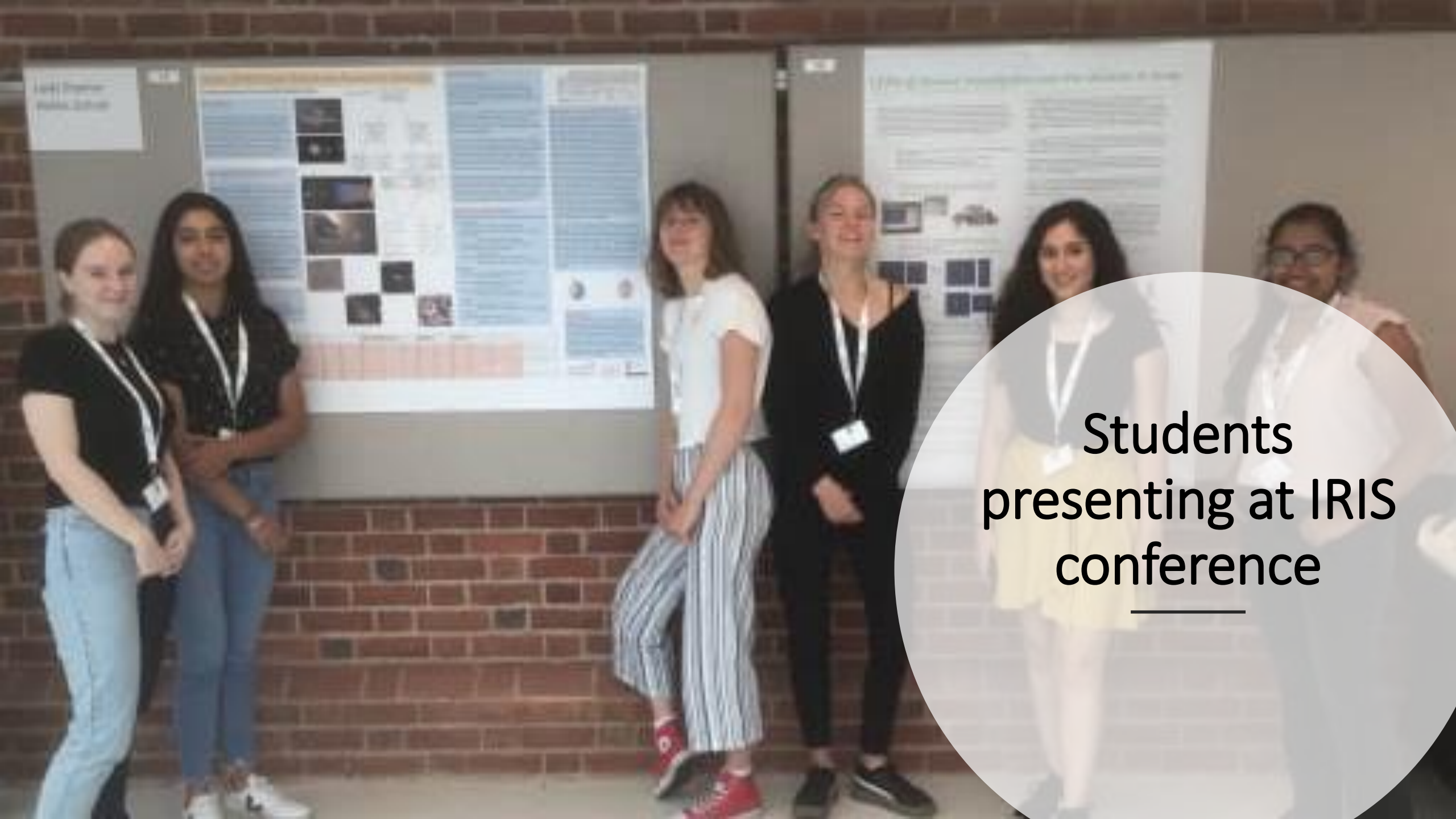
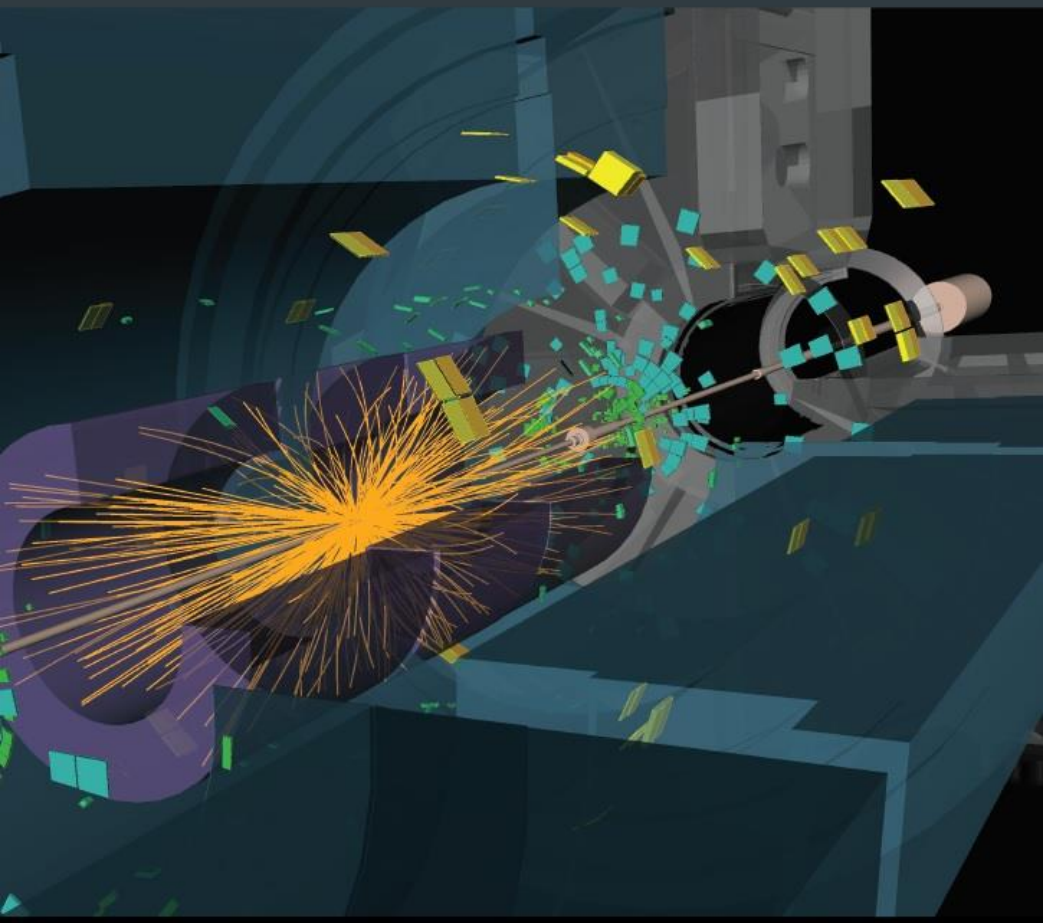


Students presenting at IRIS conference



Higgs Hunters - Edinburgh

Helping teachers, students and departments

- *The CERN@school detector has transformed the way I teach and the way the students can conceptualise and understand radiation.*

- *To me the project was inspirational and made scientific research seem more achievable. It showed me that physics research is happening and can be an exciting job.*

- *It really opened my eyes to what students are capable given the right circumstances. This view spread through the department and contributed hugely to getting the ball rolling with STEM work we do today.*

What next?

CERN@school in school laboratories across the world? Member states as a start?

Thank you and any questions?

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www.researchinschools.org

@ResearchInSch

@ProfBeckyParker

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