



“I promise I didn’t just play with LEGO”
A year of communication, outreach and science history

Emma Hattersley, PPD Science Communication Industrial Placement Student

Journey to STFC

- Physics with Astrophysics
MPhys Student at University
of Manchester
- Science and Technology
Editor, *the Mancunion*
- Freelance researcher and
voiceover artist
- A Cappella and Beatboxing
Society Social Media Manager





Science and
Technology
Facilities Council

Particle Physics

Social Media



X

- X was our sole social media platform
- Launched in 2018
- 2046 followers
- Elon Musk took over in 2022, leading to an overall drop in engagement
- Analytics recently removed from the platform unless you pay for the premium account
- Remains a fairly useful way to communicate with the general public



STFC Particle Physics

[Get verified](#)

@PPD_STFC

We design, build and operate detectors worldwide, analyse data and support the UK particle physics community. [@STFC_Matters](#) [@UKRI_News](#)

[Rutherford Appleton Laboratory](#) ppd.stfc.ac.uk

[Born February 14, 1957](#) [Joined April 2018](#)

1,127 Following 2,046 Followers

Particle Physicist Birthdays

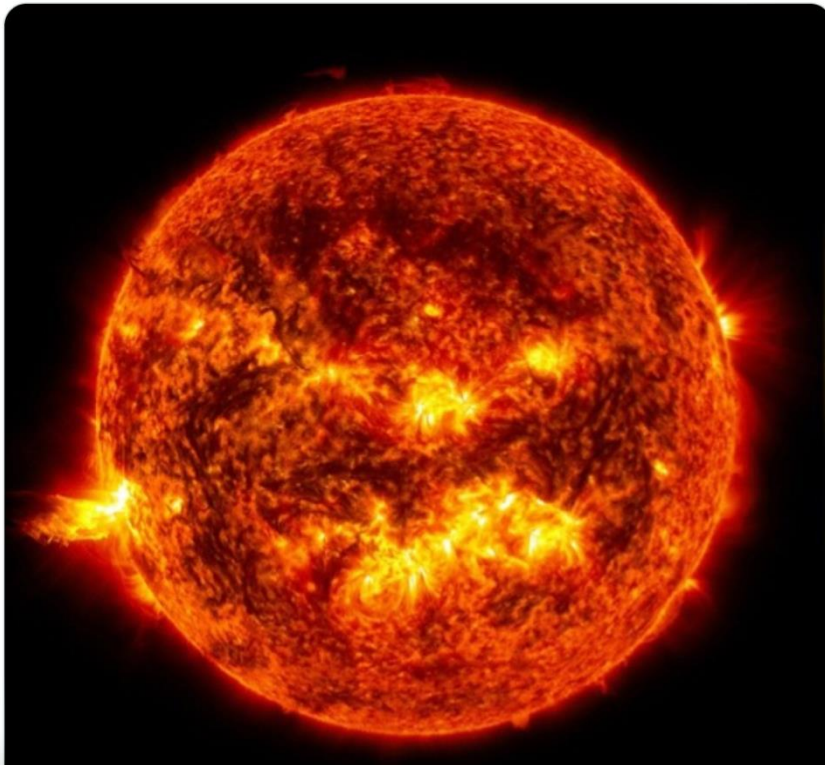


STFC Particle Physics
@PPD_STFC

Raymond Davis Jr was born [#OnThisDay](#) in 1914! 🎂

He's known for his leadership of the Homestake experiment which was the first experiment to detect solar neutrinos. ☀️

This won him the 2002 [@NobelPrize](#) in [#Physics](#), alongside Masatoshi Koshiha and Riccardo Giacconi.

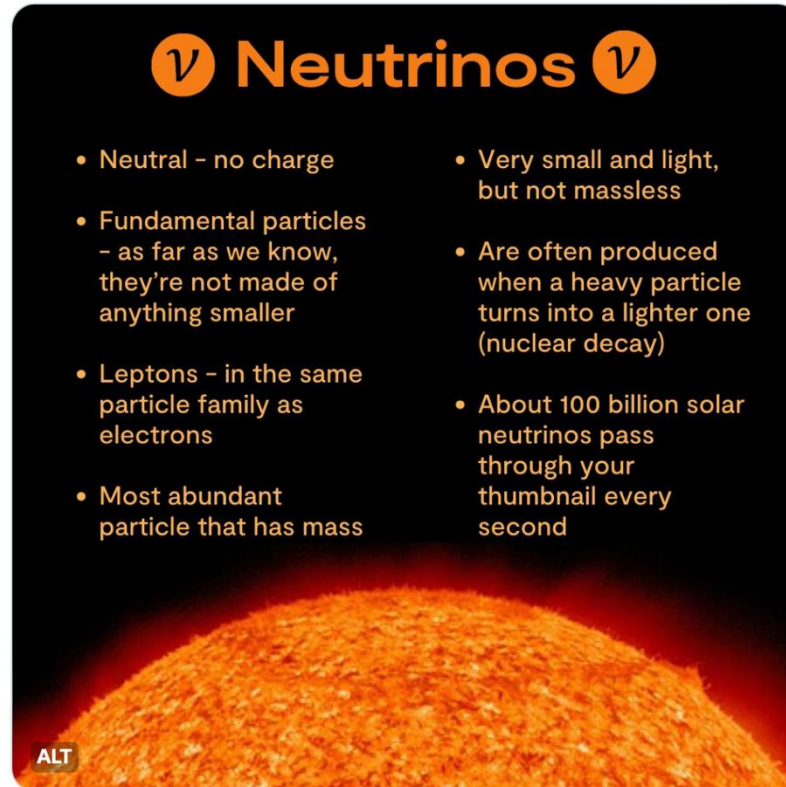


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STFC Particle Physics @PPD_STFC · Oct 14, 2023

The Homestake experiment, which ran from 1967-1994 [@BrookhavenLab](#), successfully detected [#neutrinos](#) in solar radiation.

This helped confirm the multi-step nuclear fusion reaction that goes on within the [#Sun](#) ☀️ that provides it with energy, emitting neutrinos in the process.



1

1

11

897

1

...

STFC Particle Physics @PPD_STFC · Oct 14, 2023

A 380 cubic metre tank of a common dry-cleaning fluid, perchloroethylene, was placed 1478m underground to shield it from cosmic rays. 🇺🇸

The fluid is rich in chlorine, and rarely, a neutrino interacted with a chlorine atom to form an argon atom, which could then be counted. 🇺🇸



Brookhaven Lab

1

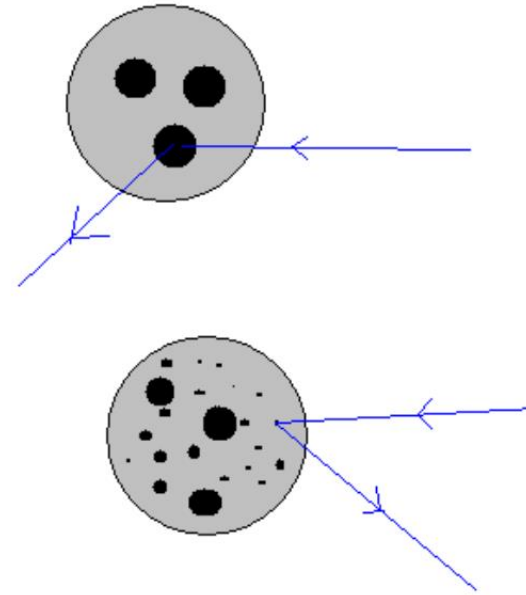
9

52

41K

1

Meme Education



Feynman's
Parton
Pancakes



STFC Particle Physics
@PPD_STFC

It's #NationalComplimentDay! 🎉

Some of our favourites: "Hey @ppd_stfc, your dark matter experiments are so innovative", "Your clean room is so clean", "Your social media accounts are so unbelievably informative and yet hilariously fun"

4:55 PM · Jan 24, 2024 · 513 Views



Dolly
Parton
Pancake



DUNE neutrinos

cool



travel
underground



co-starring
with Timothée
Chalamet



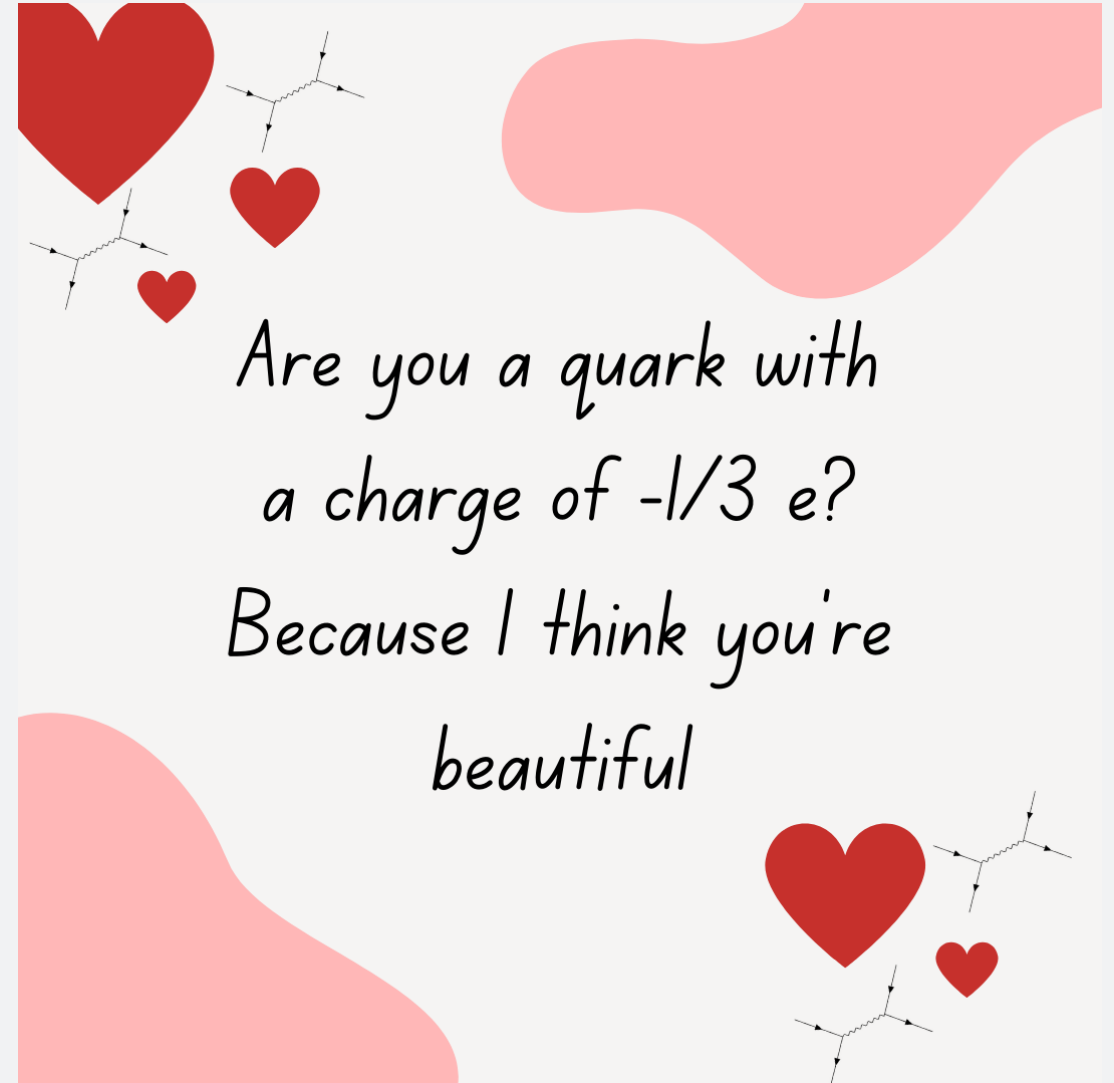
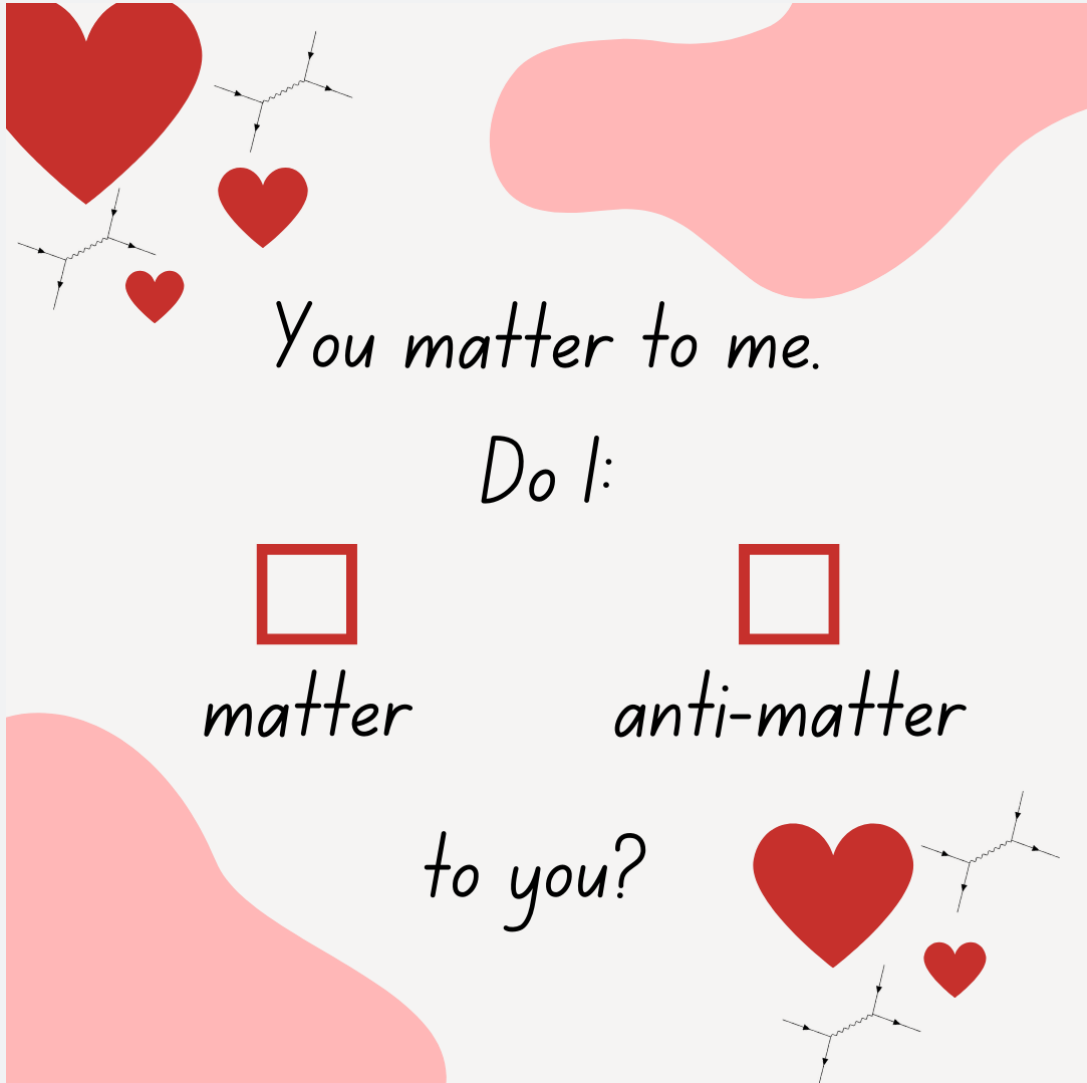
ok to be stuck in
a lift with



DUNE sandworms

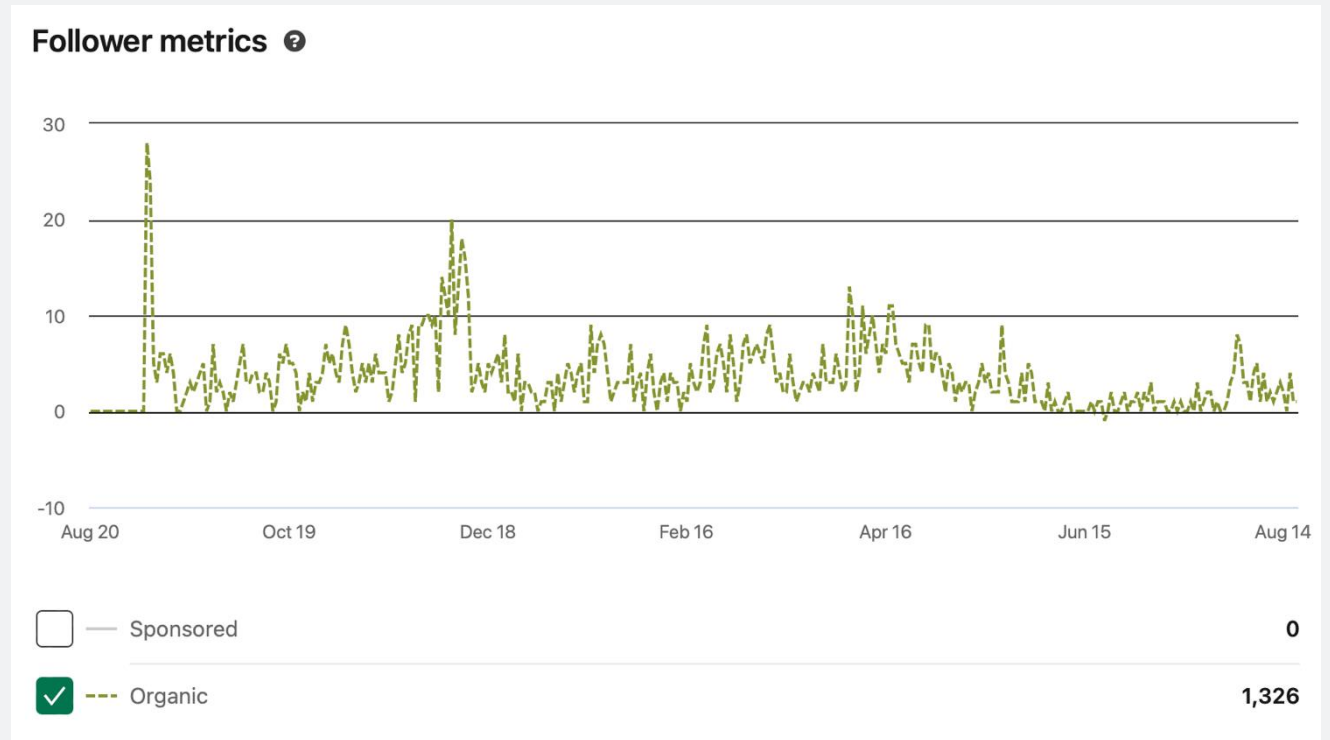
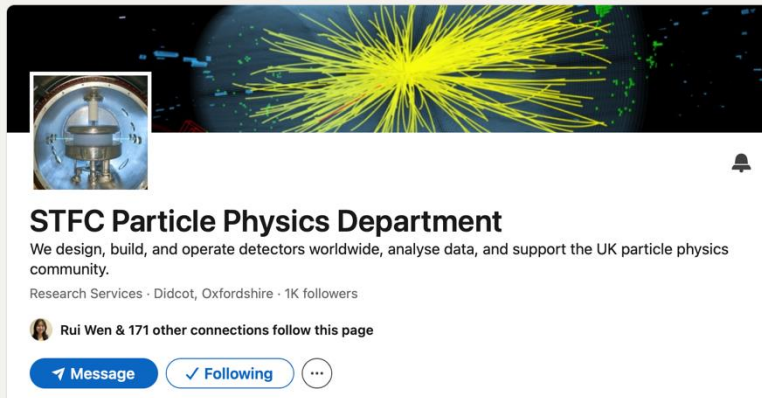


Particle Physics Valentine's



LinkedIn Launch

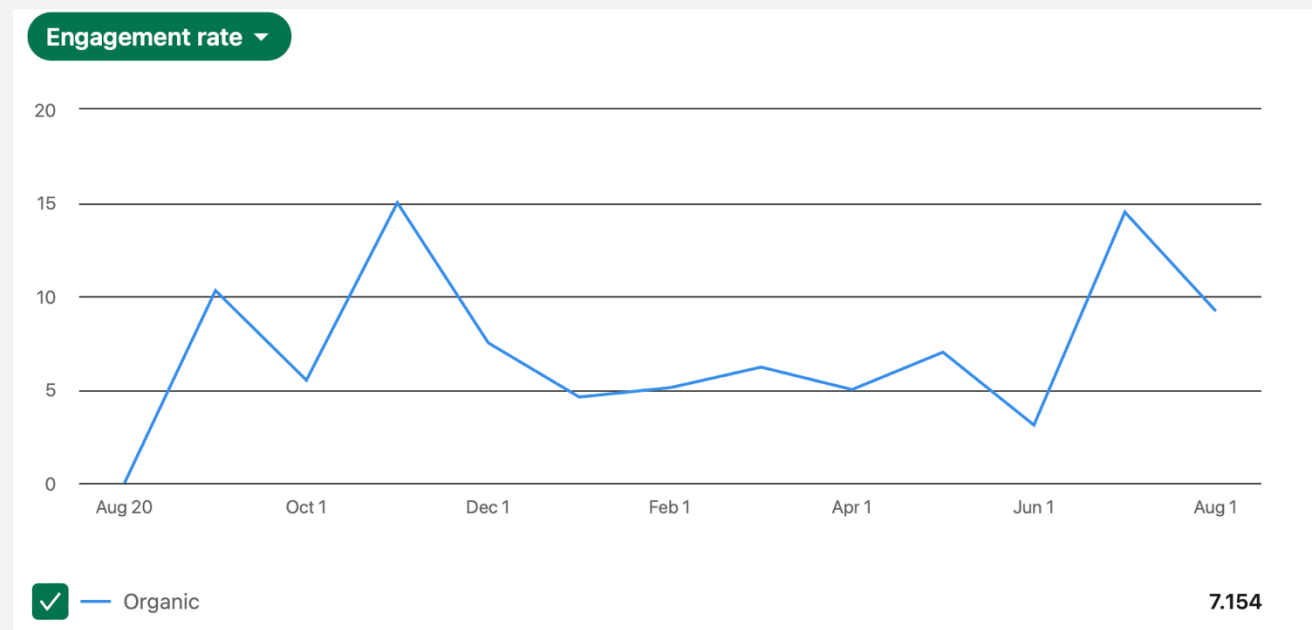
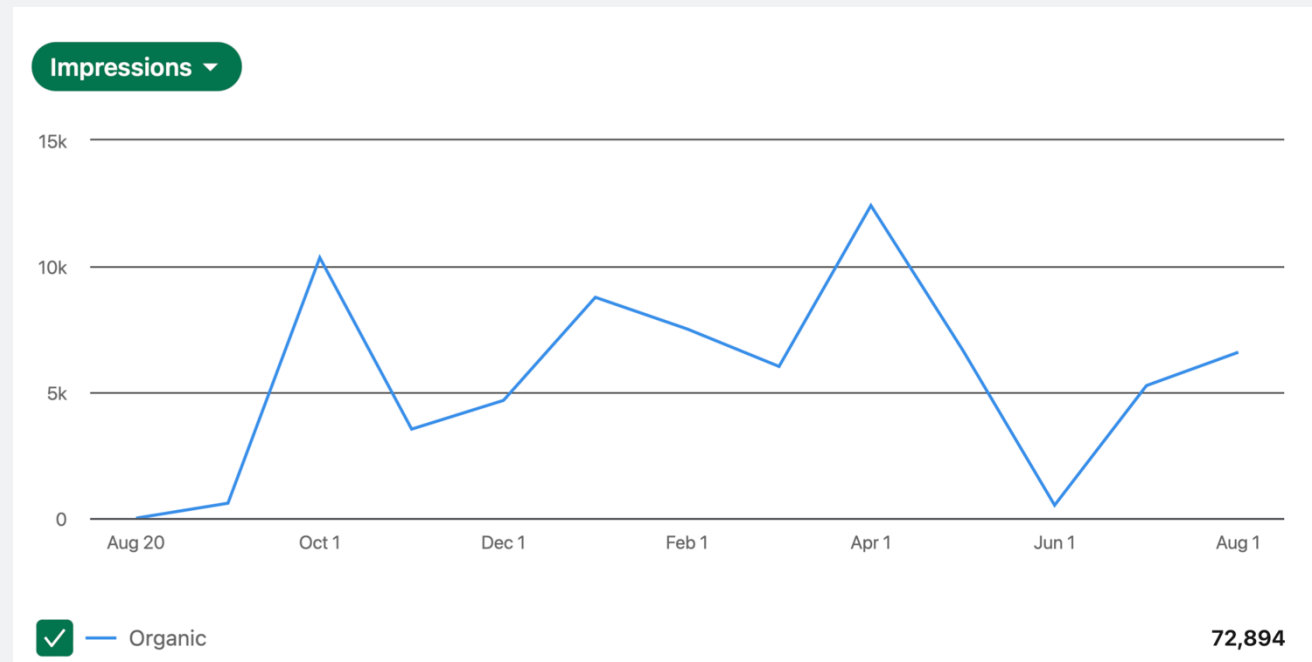
- Pitched and launched August 2023
- Now reached 1,337 followers – despite election restrictions



Plot showing number of additional LinkedIn followers per day from 20/08/23 to 14/08/24

LinkedIn Analytics

- Impressions: The number of times each post is visible for at least 300 milliseconds with at least 50 percent of the post in view on a signed in member's device screen or browser window.
- Engagement rate - Shows the number of interactions plus the number of clicks and followers acquired, divided by the number of impressions.



Careers and people

- What's it like to work in particle physics?
- How can I work in particle physics?
- What are some jobs in particle physics I haven't heard of?
- Example projects:
 - Day in the life of a comms student
 - Meet the Project Office
 - PhD Project Features
 - Clean room video
 - Summer placement student video



David Celeste



Andra Pirvu

Project Office

#MeetTheTeam



Kate Richards



Sandeep Rao Gopalam



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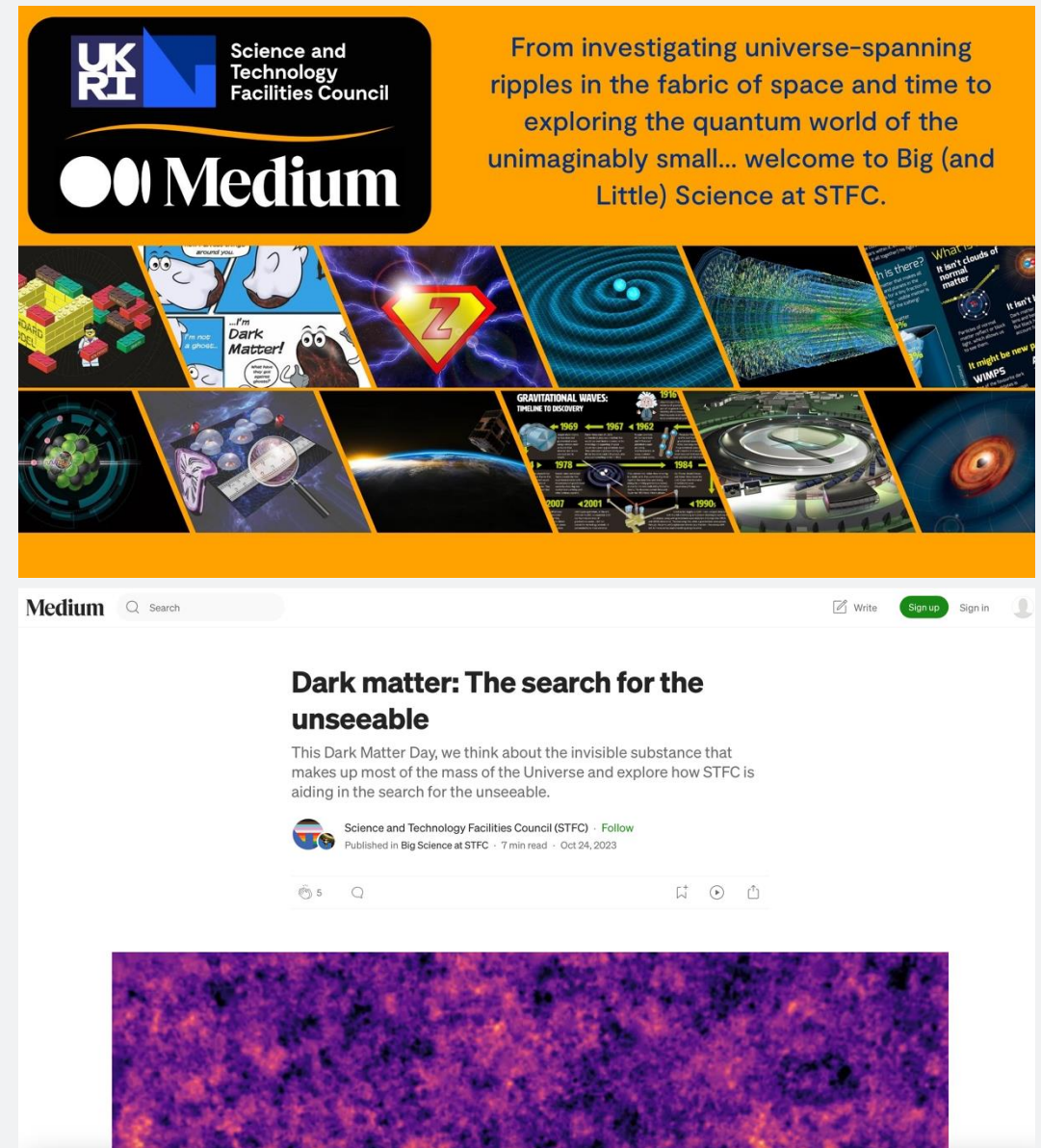
Particle Physics

Internal Collaborations



Medium

- Known for being ‘read deeply’ – focuses on the amount of time readers spend on the site rather than the number of viewers
- [STFC](#) began publishing on the site in 2023
- Lead by Ben Gilliland, STFC Senior Science Writer
- ‘Big Science at STFC’ – feature length articles aimed at making our science accessible to the general public
- [My first article, marking Dark Matter Day, discussed the history of dark matter and current PPD research](#)



UKRI Science and Technology Facilities Council

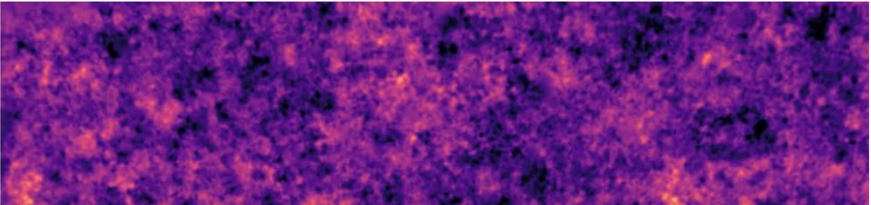
Medium

From investigating universe-spanning ripples in the fabric of space and time to exploring the quantum world of the unimaginably small... welcome to Big (and Little) Science at STFC.

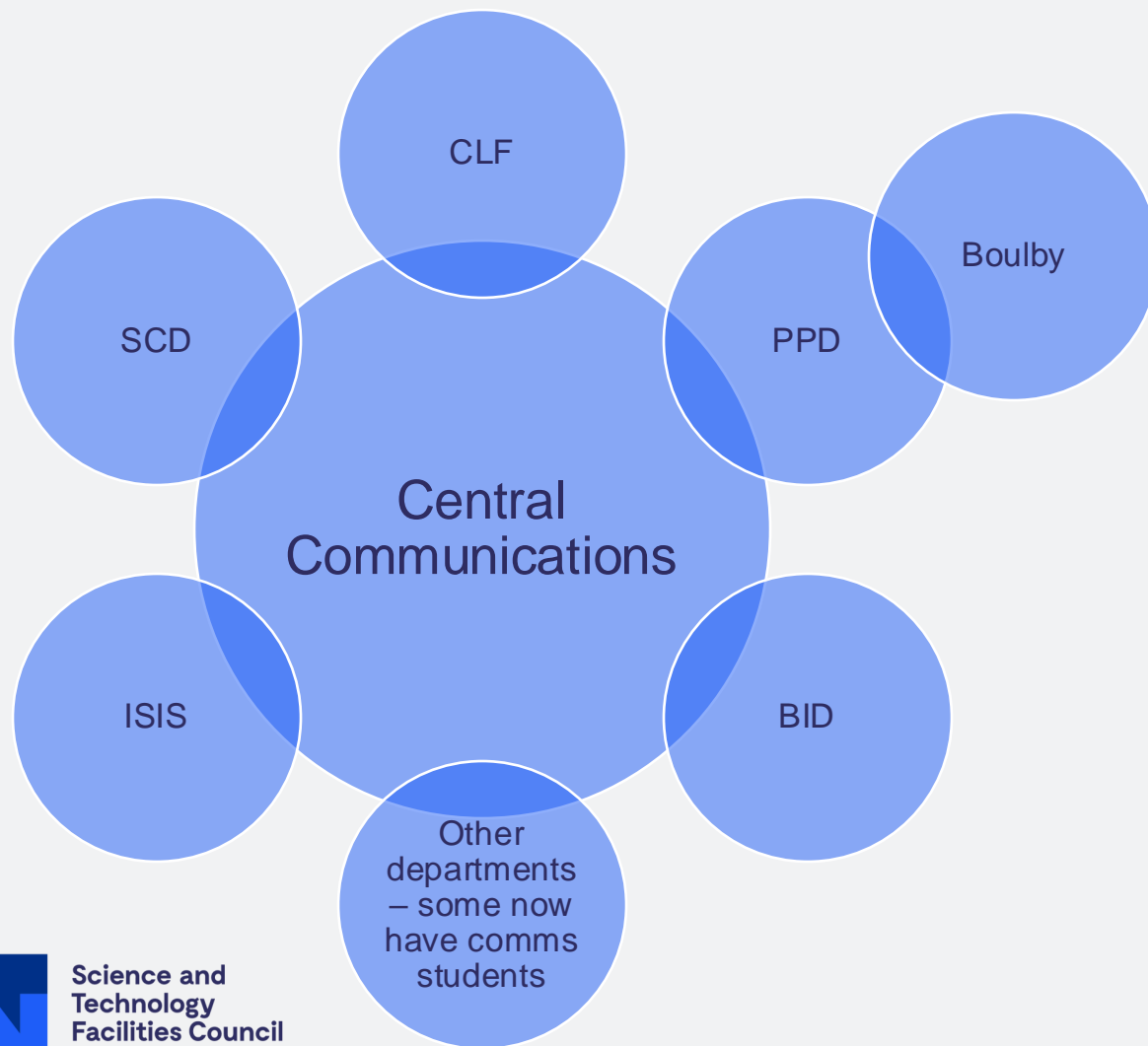
Dark matter: The search for the unseeable

This Dark Matter Day, we think about the invisible substance that makes up most of the mass of the Universe and explore how STFC is aiding in the search for the unseeable.

Science and Technology Facilities Council (STFC) · Follow
Published in Big Science at STFC · 7 min read · Oct 24, 2023

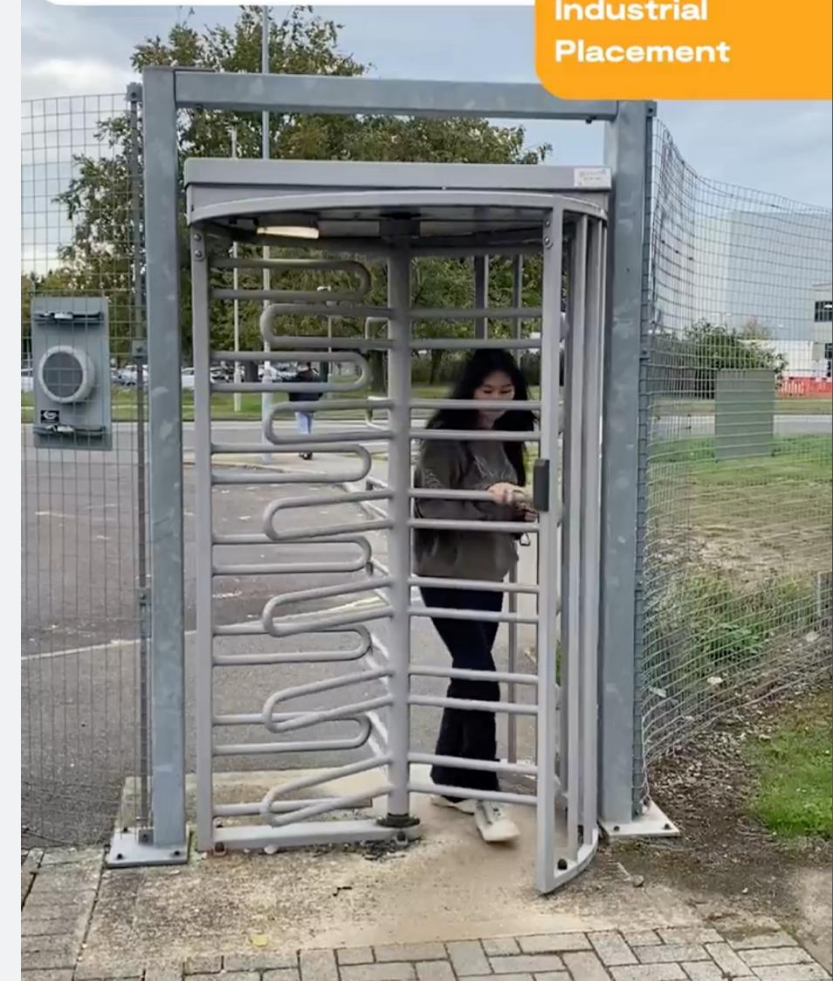


Communications Students



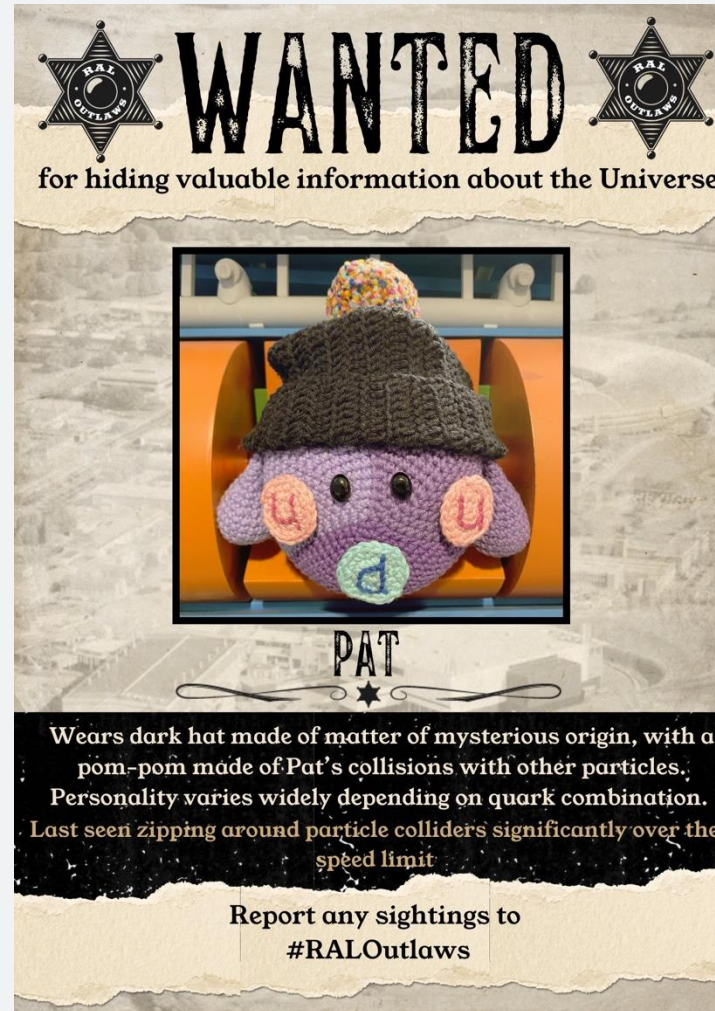
Day
In The Life

Science
Communication
Industrial
Placement



RAL Outlaws

- Coordinated and crocheted by Angelique Pashley
- Ran throughout November/December
- Hid mascots throughout the laboratory for people to find:
 - Monday: post zoomed in picture
 - Wednesday: post picture with more surrounding context
 - Friday: reveal



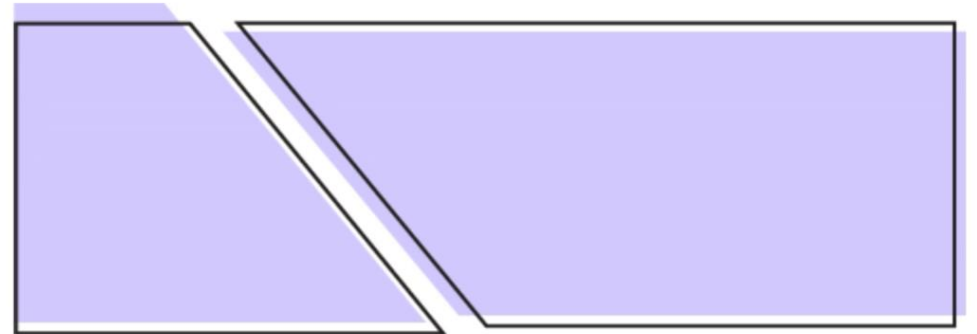
RAL Outlaws

- Pat can now be used for outreach activities, to teach children about how quarks form different particles
- Comic written by me and drawn by Angelique discusses:
 - What are particles?
 - What are quarks?
 - What is the LHC?
 - What do particle physicists do?



THE CROCHET CHRONICLES: QUARKS ASSEMBLE

WHAT ARE PARTICLES?



STEM for everyone

- Women in STEM day
 - PPD: [Lise Meitner](#)
 - Central Laser Facility: Donna Strickland
 - ISIS: Katharine Burr Blodgett
 - Scientific Computing Department: Eleanor Dodson
 - Boulby Underground Laboratory: Vera Rubin
- STEAM – STEM and the arts
 - Collaboration with Business and Innovation Directorate (BID) Marketing Placement Student Ella Peebles
 - How do staff's creative hobbies improve the science of STFC?



Trip to CERN

- Travelled to CERN in November with members of the Strategy, Planning and Communications team
- Pat came with me!
- Produced a Medium article: [Underground Science: Exploring the Large Hadron Collider](#)
- Created this video: Emma's 2:20 tour of CERN (the maximum length of videos on X)



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Particle Physics

Student Media Day

- Invited student science and technology editors to come to tour RAL and hear more about our research
- Toured R115 Clean Room, ISIS, Diamond
- Talks from the graduate team
- Attendees:
 - The Oxford Scientist
 - UCL Science Magazine
 - The Spark-Reading
 - BlueSci-Cambridge
 - The Boar-Warwick
 - Varsity-Cambridge



Particle Physics



Isla Bailey · Feb 13

The Spark's Day Out: Inside the Rutherford Appleton Laboratory

Updated: Feb 22

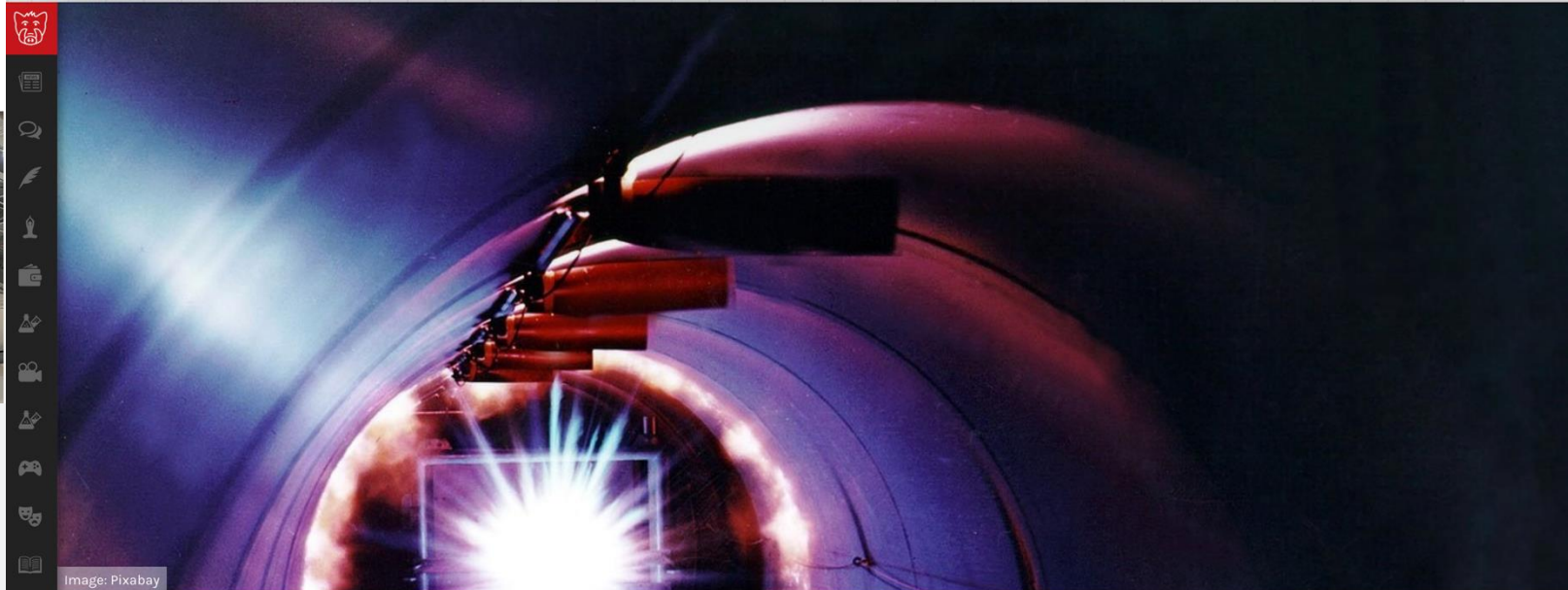


Image: Pixabay

Cosmic Rays, Giant Microscopes and the Works of Van Gogh: A Visit to the Rutherford Appleton Laboratory

By [Maya Sgaravato-Grant](#)

Jun. 17, 2024

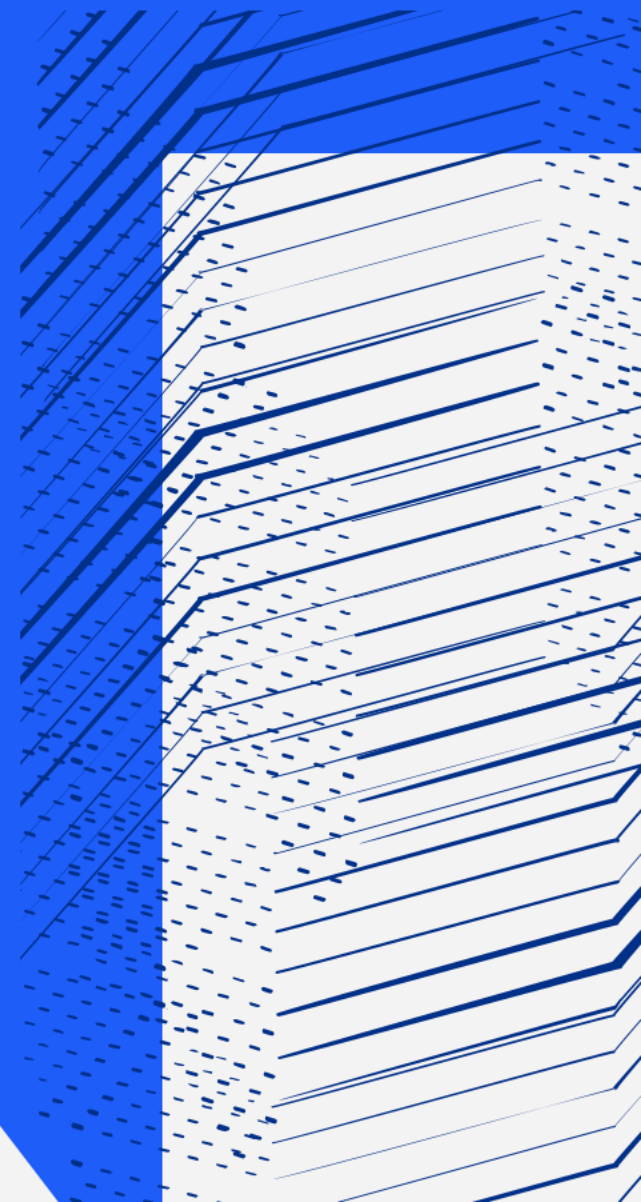
If you were to visit the Rutherford Appleton Laboratory, the first thing you would note would be its scale. Incongruous amid the rolling fields of Oxfordshire, the complex is comprised of a maze of wide, straight roads bounded by imposing, numbered buildings, of which the most impressive is the large disc-shaped



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Outreach



Masterclasses

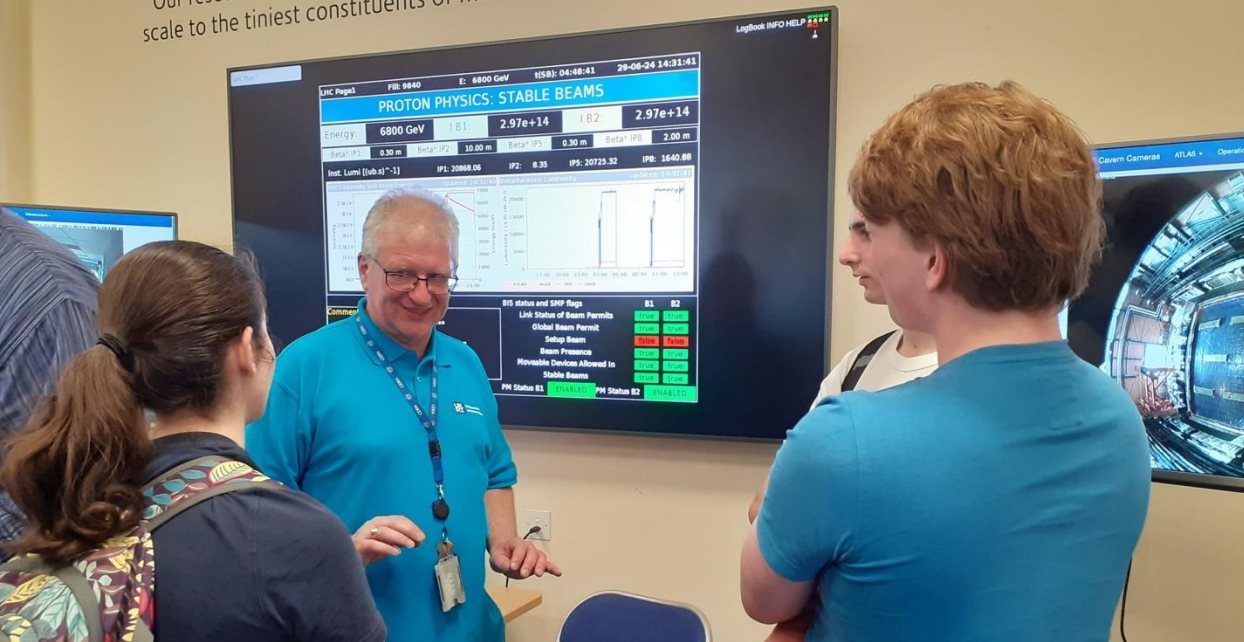
- RAL hosted the original particle physics Masterclass in 1998
- 3 in person days, 1 online day
- This year slightly reduced numbers due to Harwell Open Week
- About 600 students attended online and over 400 attended in person

Harwell Open Week

- Last Harwell Open Week in 2015
- Over 10, 000 people attended HOW
- 1 UKRI day, 2 schools days, 1 staff day, 1 public day
- PPD based in visitors centre



Our research seeks to understand the universe, from the largest scale to the tiniest constituents of matter, yet creates impact on a tangible level.

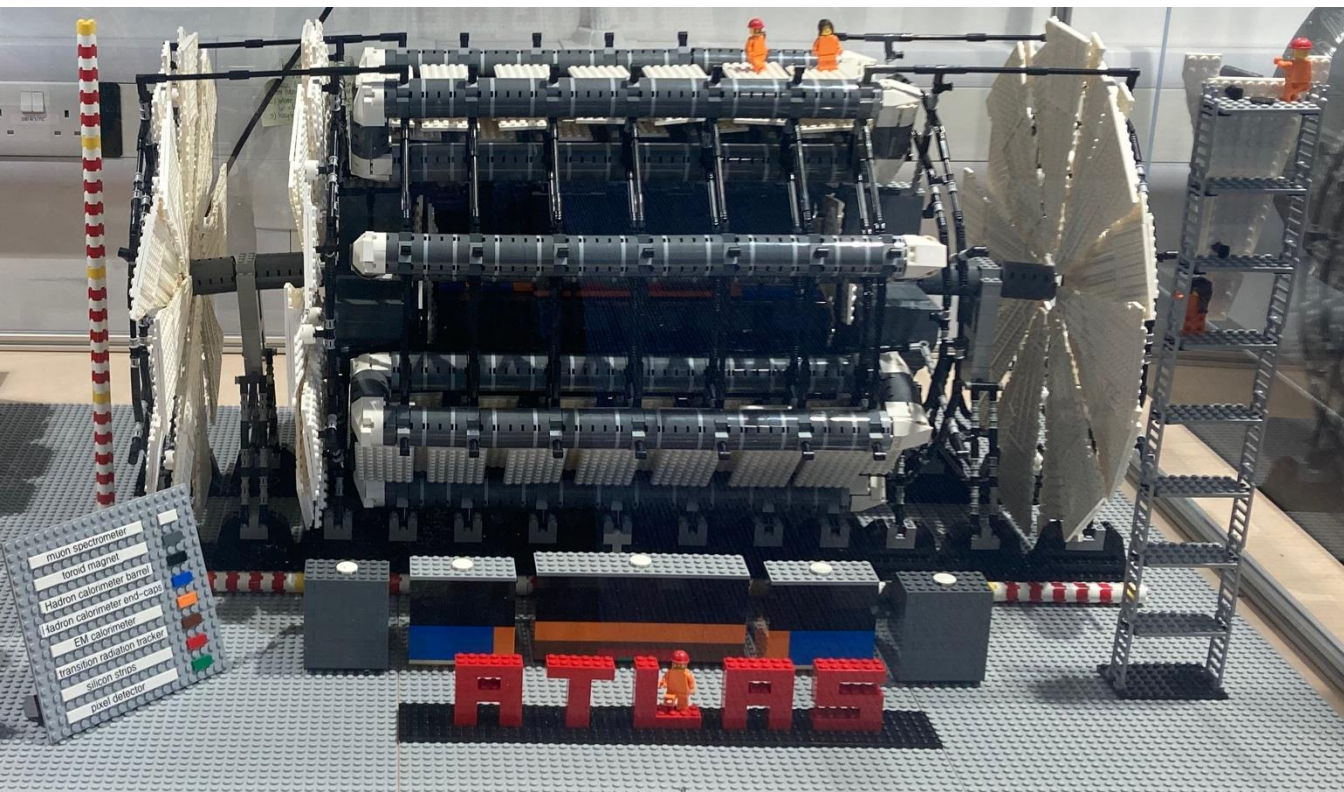


LEGO

- Models of CMS and ATLAS
- Roughly 20,000 pieces each
- Scale LEGO person: real person
- Designed by ATLAS and CMS physicists from around the world
- [Build Your Own Particle Detector](#)



LEGO ATLAS



LEGO CMS



CASSIE

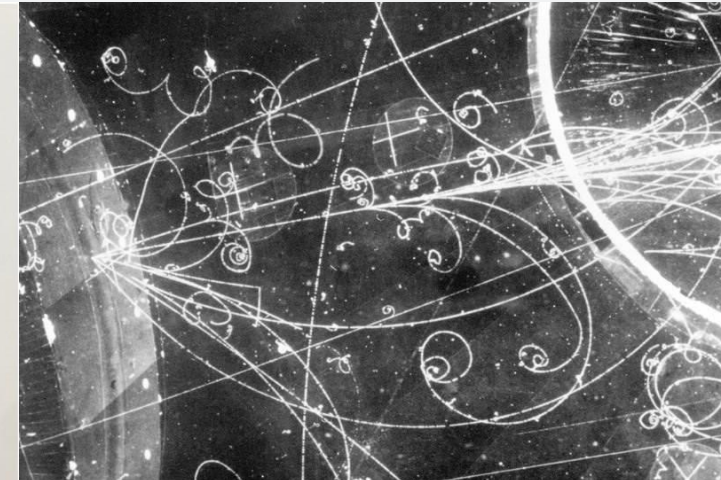
- Conceptual Accelerator Supporting Scientific Inclusive Education - otherwise known as the 'Tactile Collider'
- Aims "To remove barriers that can prevent blind and partially sighted learners from engaging with science."
- Joint project between Manchester, Liverpool, STFC, Cockcroft Institute and schools/support services for the visually impaired



<https://tactilecollider.uk>

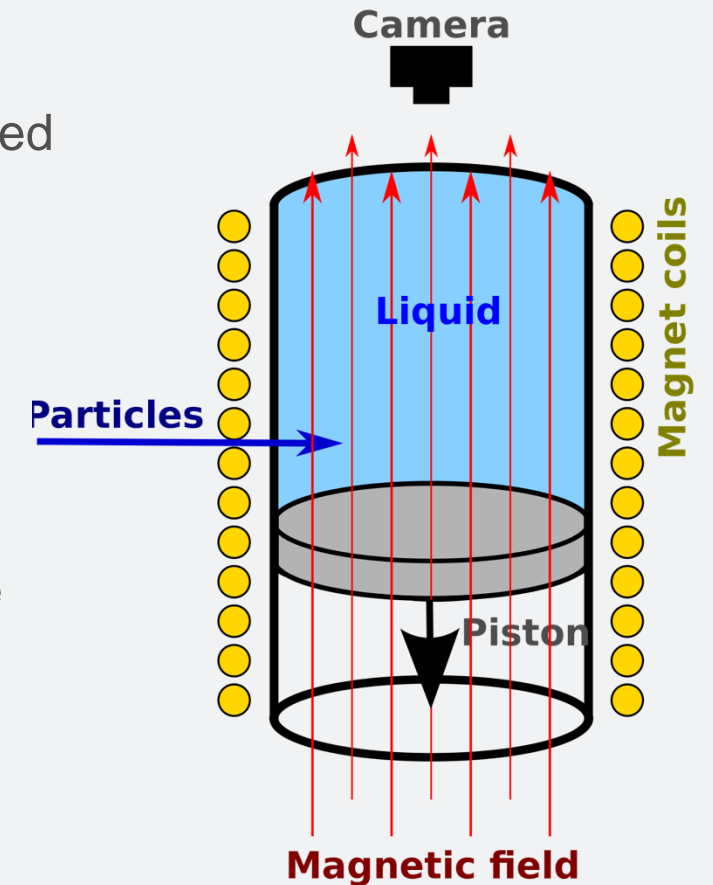
Bubble Chamber

- Bubble chambers are an earlier form of particle detector which allow you to view the paths of electrically charged particles.
- They were invented by American physicist Donald A. Glaser in 1952, winning him the 1960 Nobel Prize in Physics.
- The Nimrod accelerator at RAL operated from 1964-1978 and produced many beautiful pictures of particle interactions in bubble chambers.



How does a bubble chamber work?

- Normally filled with liquid hydrogen
- Liquid put under intense pressure to allow it to be superheated – heated hotter than its boiling point without boiling
- Piston drops to release pressure - leaves the liquid in a very unstable state, so almost anything will cause it to boil
- Charged particle then enters the chamber, ionizing a hydrogen atom (separates the electron from the proton)
- Electron and proton then recombine, releasing energy that causes the liquid to boil at that point and produce a bubble
- Particle moves across the chamber and interacts with different hydrogen atoms to form a visible path, which is then photographed by the camera

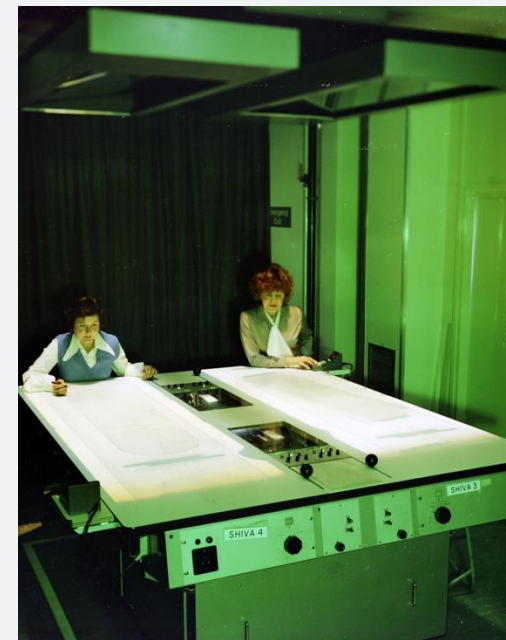


Scanning Group

- Each experiment captured hundreds of thousands of photos, which all needed to be scanned and analysed to digitally reconstruct the paths of the particles
- The high levels of concentration the work required meant the shifts could only be 4 hours long
- This made it ideal work to fit around childcare commitments
- Very few records of the scanners remain, but I found these photos through the internal network
- I was then able to use them to find scanners Janet Smith and Pamela Delaney on a local Facebook group
- I also spoke to George Kalmus, former leader of the bubble chamber group and PPD Director
- Medium article to be released soon

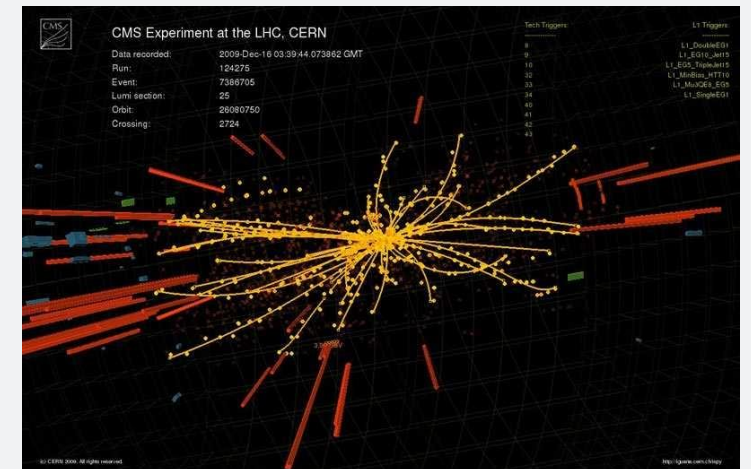


Scanning Group



Outreach Exhibit

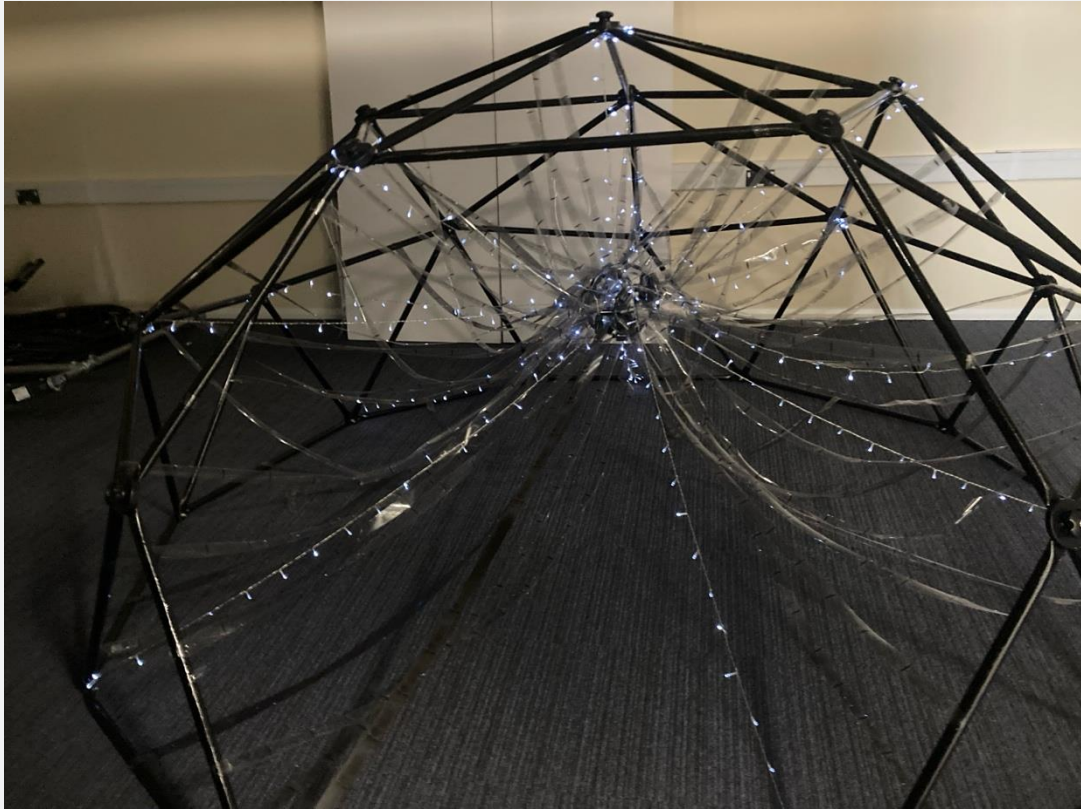
- PPD had lots of old reels of bubble chamber film in storage
- Exhibit needed to be interactive and artistic
- Decided the general public would build a modern representation of a collision event out of the photographs of old particle collisions
- Used topiary ball to suspend mini reels of film from the centre
- Members of the public unwound the reels and stuck them to the edge of a painted geodesic dome climbing frame



Outreach Exhibit

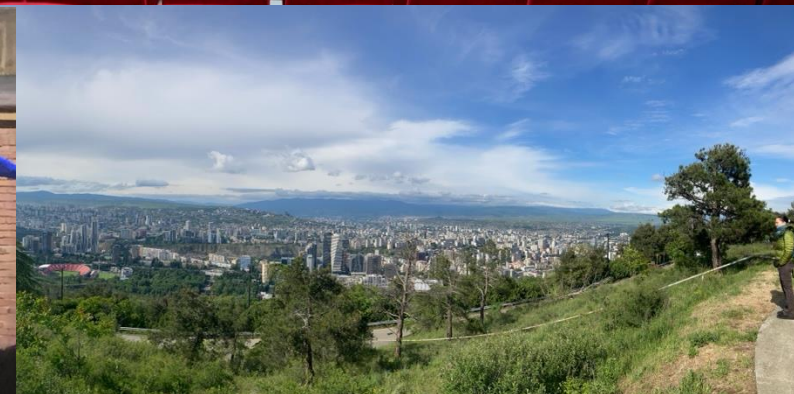


Outreach Exhibit



European Science Engagement Association Conference

- EUSEA brings together public engagement professionals in the fields of research, innovation and education.
- This year's conference hosted by Ilia State University in Tbilisi, Georgia in May

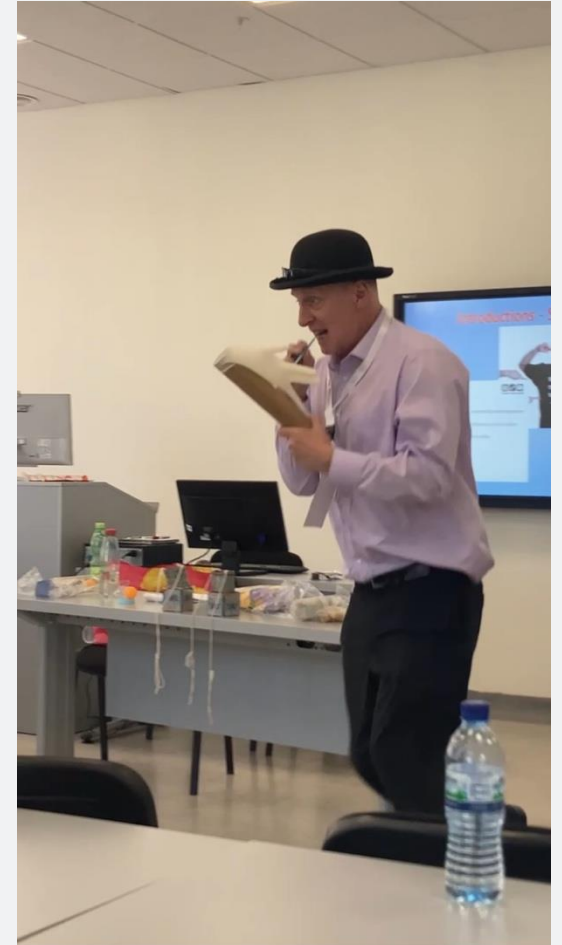


Dialogue workshop: Bridging Divides Through Science: A Dialogue on Peacebuilding

- Denis Naughten TD, Inter-Parliamentary Union, Geneva
- Maurizio Bona - former science advisor, CERN, Geneva
- Top 3 Takeaways:
 - Science can “bridge gaps between nations”
 - Science is a universal language which can be used to tackle global challenges through evidence-based policymaking and collaboration
 - Inter-Parliamentary Union Science for Peace Schools: “established to bridge the worlds of science and politics by initiating dialogue and to help create a community of parliamentary experts to address challenges together under the neutral umbrella of science.”

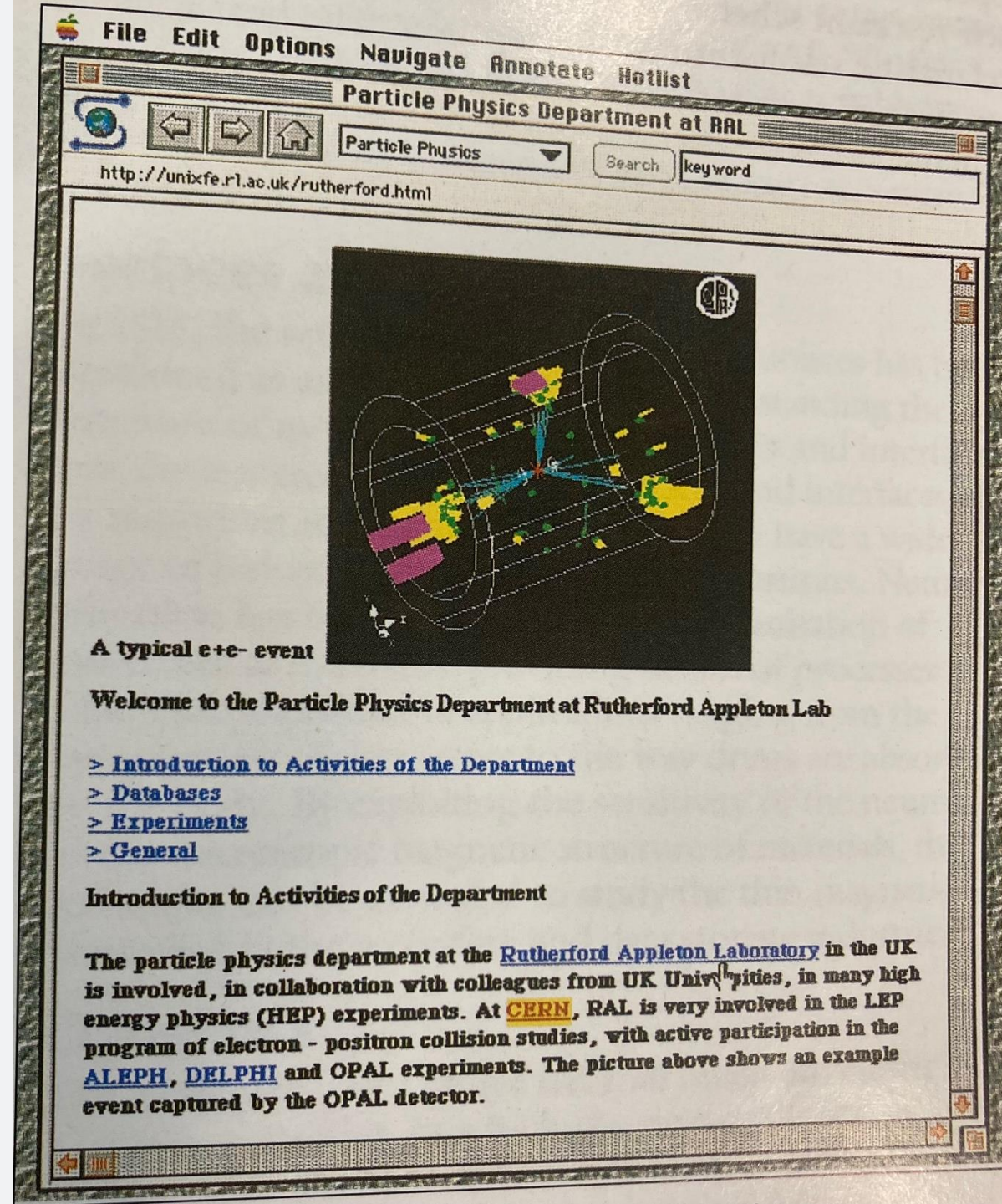
How to get a lot for not a lot (subverting economic, physical and social barriers in STEM communication)

- David Price, Science Made Simple, United Kingdom
- Michael Gregory, MyFavouriteExperiments, France
- Top 3 Takeaways:
 - Effective outreach does not need to be expensive!
 - Narrow the focus of your outreach activity to one key science concept you want people to learn
 - The most important thing is that people leave your event with a positive impression of science



Web history

- Tim Berners-Lee invented the World Wide Web in 1989 whilst working at CERN
- It was opened up to the public in 1991
- Particle physicists globally were early adopters – we'd heard a rumour we had made the first website
- I wasn't able to firmly confirm or deny this but have narrowed it down to us, Leeds or Durham





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Questions?



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Additional slides



RAL Outlaws

WANTED
for hiding valuable information about the Universe




PAT

Wears dark hat made of matter of mysterious origin, with a pom-pom made of Pat's collisions with other particles. Personality varies widely depending on quark combination. Last seen zipping around particle colliders significantly over the speed limit

Report any sightings to
#RALOutlaws

WANTED
For not completing risk assesment forms



RILEY

Extremely efficient multitasking robot. Enjoys tinkering on a wide variety of projects using their multiple arms. Often described as an extrovert. Last seen exiting the Cryogenics clean room

Report any sightings to
#RALOutlaws

WANTED
For not following clean room protocol




ANDROMEDA

Likes to get involved with all stages of space missions, except for the launch part. Also enjoys pushing spacecraft to their limits but insists he isn't trying to break anything. Last seen fixing their antenna

Report any sightings to
#RALOutlaws

WANTED
For storing too much data in the data centre

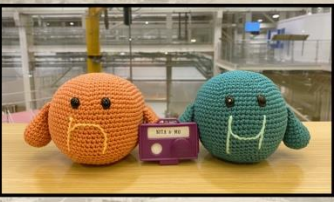


ALF

The infamous superhero computer. Never without their cape and ear defenders to protect against the whirr of data. Last seen flying around scientific computing headquarters

Report any sightings to
#RALOutlaws

WANTED
For stealing samples from scientists



NITA & MO

This mischievous pair of subatomic particles have gone missing in ISIS. Potentially carrying a purple dosimeter for their protection these particles are typically non-destructive but approach with caution. Last seen tailgating onto campus.

Report any sightings to
#RALOutlaws

WANTED
For recreating the universe's most powerful phenomena



PIP

Extremely bright particle of light travelling at very fast speeds. Capable of a variety of colours and carries laser goggles for protection against radiation. May also be seen as a wave. Last seen probing targets using microwaves.

Report any sightings to
#RALOutlaws



Influencers

- Previous successful collaboration in 2022 with Simon Clark, a YouTuber with 535k subscribers. STFC has 12k subscribers.
- His video [“The Slice of Mars 1km Under Northern England”](#) has received 184k views
- Collaborations becoming more important as social media sites prioritise individuals over organisations
- We have tried to bring influencers on site, but have faced issues with
 - Payment
 - Scheduling
 - Consensus on video ideas