

The Invisible Universe: An online masterclass

Jeanne Wilson

For the KCL EPAP and Outreach teams

11/9/2026

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In a nutshell

- A five week programme, of weekly online webinars
 - Spring term
 - One 75 minute session per week
 - Scheduled after school 17:30 – 18:45
 - Zoom webinar with audience interaction
- Targeted at young people (16-18) from diverse and underserved backgrounds across the UK
- Enables researchers to connect with hundreds of young people around the country showcasing experimental particle physics

Limited run, after school slot. Live interaction to maximise consistent engagement

Young people are 'digital natives' comfortable engaging online

97% of teenagers (aged 13-15) own a mobile phone

Equitable access, informal welcoming, atmosphere

Advertising

- Website
- Social media
- Emails to our 'teacher' mailing list
 - Reaches over 600 teachers across science, maths, computer science
- Registration form to sign up
 - Collect basic demographics



The Invisible Universe - Online Physics Masterclass Series

Please note: this event has passed

Join us to discover the Invisible Universe!

Through this five-week, online programme of masterclasses, you'll discover cutting-edge research in particle physics and cosmology, and meet other people interested in physics. Together, we'll examine questions like:

- Why are we made of matter not antimatter?
- Should we believe in dark matter?
- Can we study space without telescopes?
- What lies beyond the Standard Model of particle physics?

We'll also talk about what it's like to study physics at university, and give you some top tips on how to make a strong application.

Apply now to unpick the secrets of the universe!

Fill in [this registration form](#) to apply by Monday 21 April.

Event details

24 April 2025 17:30 to 22 May 2025 18:45

Related departments

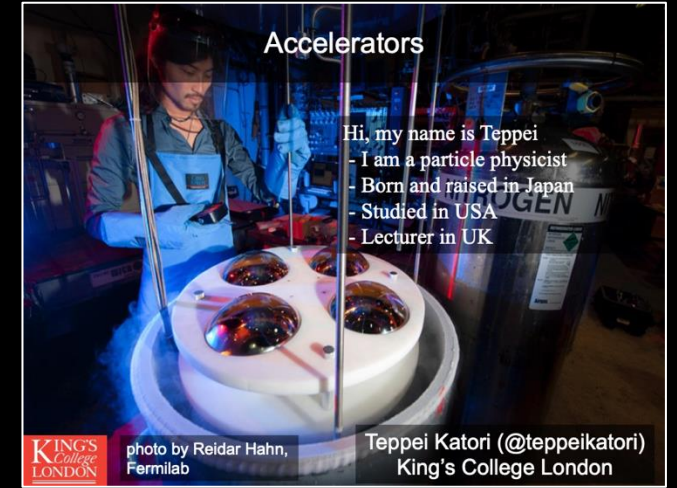
Department of Physics
Faculty of Natural, Mathematical & Engineering Sciences

Goals

- Reach young people (mostly aged 16-18) from diverse and underserved backgrounds across the UK.
- Direct interaction between young people and researchers.
- Develop young people's understanding and appreciation of particle physics research.
- Support young people to feel positive about physics in general and particle physics in particular.
- Encourage young people to find out more about science beyond the scope of the course.
- Engagement across career stages (UG, PGR, RA, Academic)

Topics

- Introduction to Particle Physics - Dr Kathryn Boast
- Accelerators - Dr Teppei Katori
 - Including a live-streamed on-site tour at J-PARC
- Catch me if you can - Prof Francesca Di Lodovico
- How to Weigh a Neutrino - Prof Jeanne Wilson
- Dark Matters - Dr Jim Dobson
- Applying to University – Dr Kathryn Boast



How to weigh a Neutrino



Neutrino-less Double Beta Decay: $0\nu\beta\beta$

Prof Jeanne Wilson

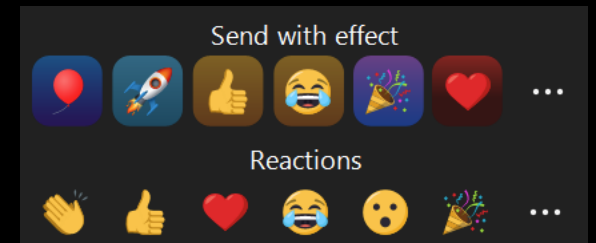
KCL Particle Physics Masterclass $0\nu\beta\beta$ Jeanne Wilson

1



Setup

- Zoom webinar format
 - Only hosts can speak and share screen
- Introduction and ‘house-keeping’ by a member of the outreach team
- Camera and screen share by presenter
- UG Student Ambassadors (2) monitoring the chat
- PhD / postdocs (2) monitoring and responding to the Q&A
 - Feed most up-voted questions to presenter, typed responses to others
- Attendees cannot speak or share video but interaction via:
 - Chat blasts
 - Polls
 - Emojis
 - Q&A
- Sessions recorded and shared with those registered after each session

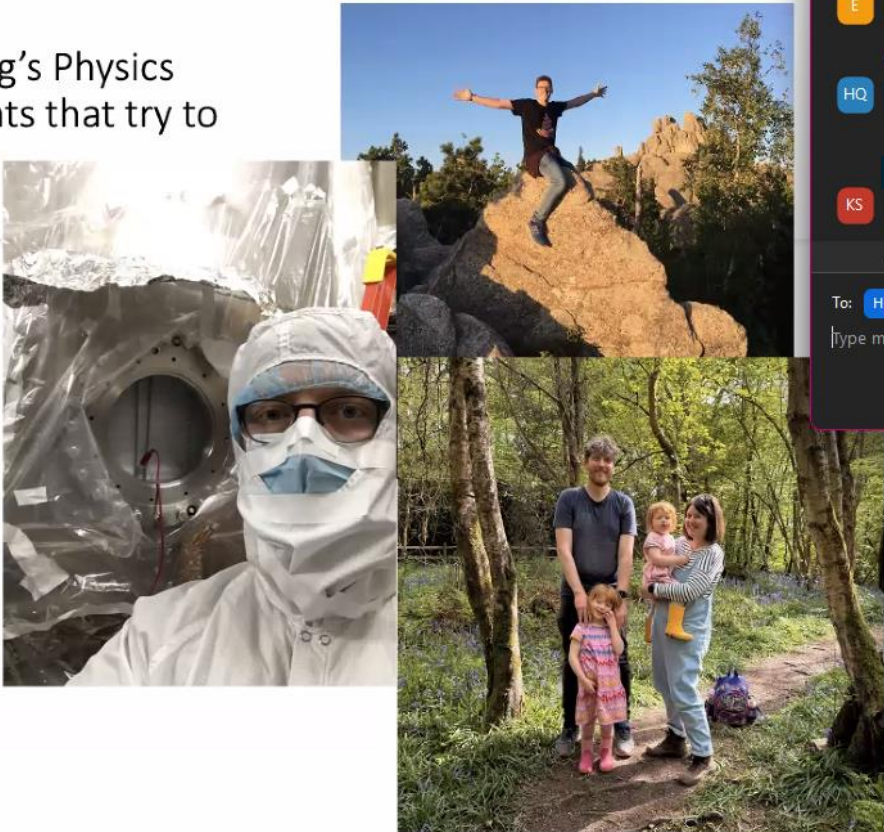


Introduce the academics

bson's screen

King's Physics
ments that try to

Es
of



2

Webinar chat

to Everyone

KS no problemo good sir

to Everyone

E I do those a levels too!

to Everyone

HQ I love those photos—they're so wholesome:)

to Everyone

KS big rock

Who can see your messages? Recording on

To: Hosts and panelists

Type message here...

Jim Dobson

Chat blast

First a question for you:

What do you think of when you hear the term “Dark Matter”?

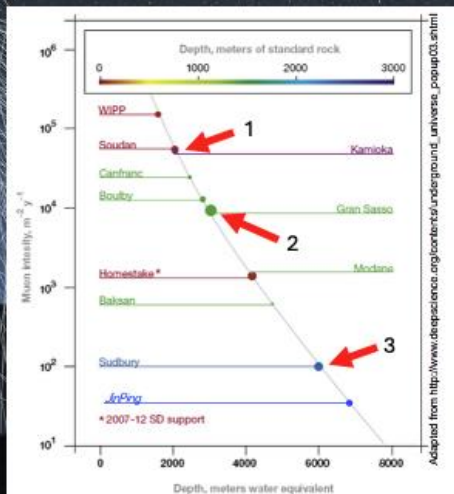
[chatblast, hold off on your response]

Note: don't press return yet. Keep it short, whatever comes to mind



Choose your Location

Particles produced in the atmosphere from cosmic ray interactions = backgrounds



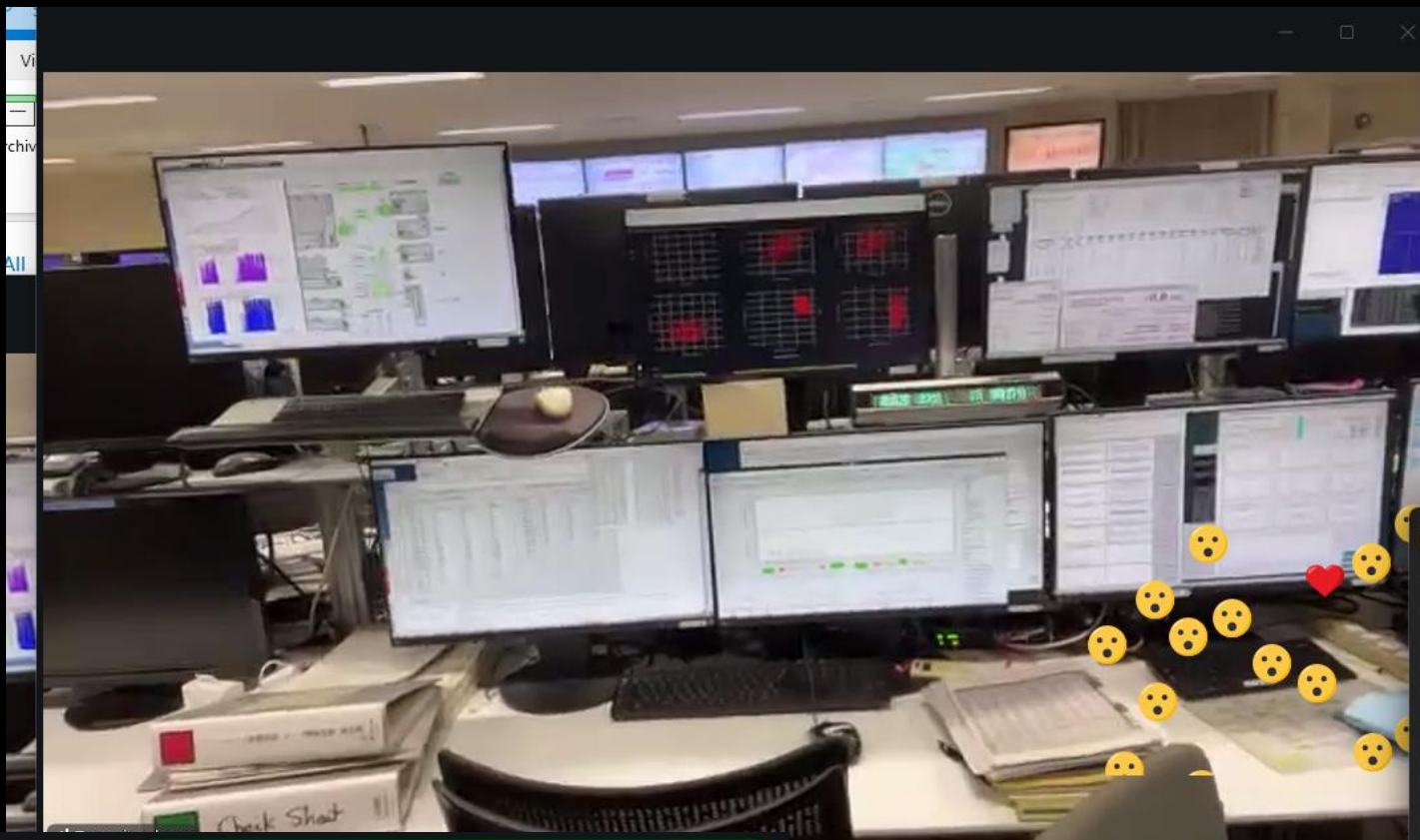
Work underground!

+ Deeper = lower muon flux & lower backgrounds

- Mines can be harder to access

Zoom Quiz

Live Tour of JPARC accelerator control room



Question and answer

Open (33) Answered (40) Dismissed

Most recent

they are used for these applications

1

Answer live Type answer

E 06:27 PM

Is the neutrino detector in Saitama or Gunma prefecture?

Answer live Type answer

Anonymous attendee 06:27 PM

Webinar chat

to Everyone

A yooo

to Hosts and panelists

PB WOWIE

to Everyone

M wow

to Everyone

P Woahhhh

to Everyone

KT OH MY GOSHH WOW

to Everyone

M That's actually really cool

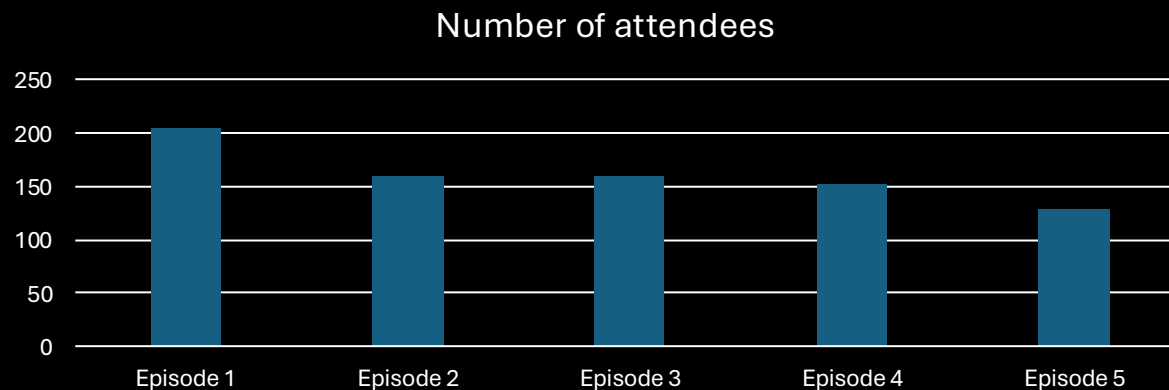
Who can see your messages? Recording on

To: Hosts and panelists

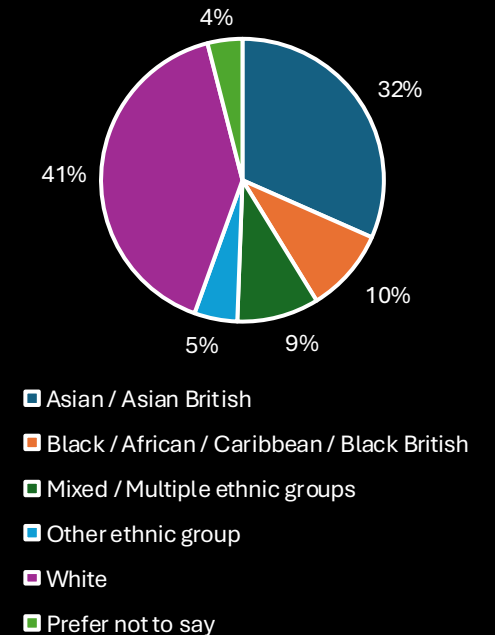
Type message here...

Attendance 2025

- 2025 (5 sessions April – May):
 - >420 young people registered
 - 280 attended at least one of the workshops
 - 118 attended at least four of the five
 - Nearly 360 views of the recordings (across the 5 workshops)
 - 45% of participants identified as female

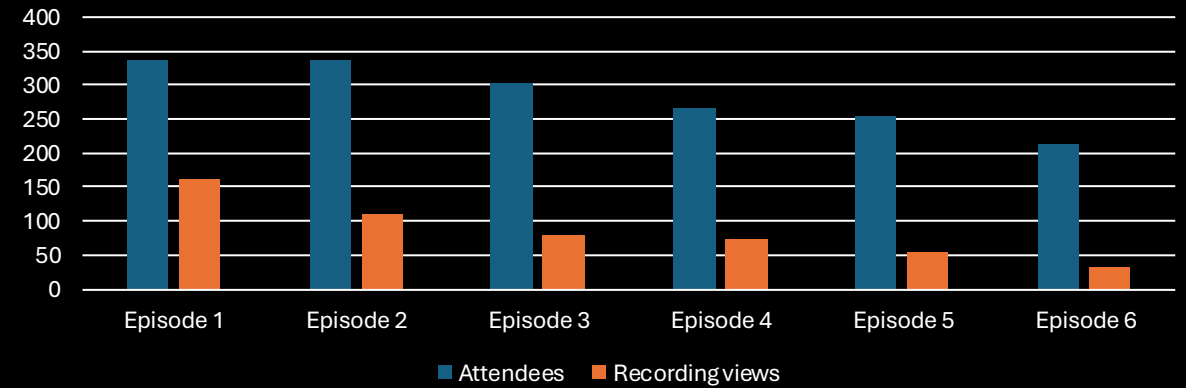


Participant ethnicity



Attendance 2026

- 2026 (6 sessions Feb – April)
 - 515 young people registered
 - 414 attended at least one session
 - 291 attended at least four of the six
 - Over 500 views of the recordings
 - 44% of participants identified as female
 - 55% of participants identified as from an ethnic minority
 - 1/3 of participants coming from the 40% most socio-economically deprived areas of UK



Feedback - 2025

- Collected at the end of the final session
- overwhelming majority (98%, n=100) enjoyed the sessions
 - all respondents (n=97) felt that they learned something new with 88% strongly agreeing.

What did you enjoy most about the sessions?

- 22 of the 76 responses said they enjoyed the interactivity of the sessions most

How much new content there was!! I enjoy learning and expanding my knowledge (especially in particle physics) so I really loved these sessions :) thank you so much

SO MUCH REAL LIFE CONTENT, AND ACTUAL SCIENTISTS???

The specialist guest speakers and their clear passion for the subject of their lectures

How we were able to dive into one of the newest fields of physics and how every session felt as though they were all linked together and told this big story about our discoveries about the invisible universe.

I liked how the sessions were well structured and informative but easily adaptable by the chat room questions. I liked that the material in the course explained the a level content then went on to stretch us, with polls, and questions to keep interactive.

Feedback- 2026

- overwhelming majority (97%, n=80) enjoyed the sessions, with 56% strongly agreeing.
- Almost all respondents (99%, n=80) felt that they learned something new, with 85% strongly agreeing.
- Participants appreciated:
 - Interactivity and being allowed to participate through the chat
 - Being able to ask questions during the sessions
 - The passion of the academic speakers
 - Contact with researchers and access to their expertise
 - The breadth and depth of material covered
 - Access to recordings

It has taught me more about what life as a physicist is and motivated me to pursue that field.

It has satisfied and re-ignited my curiosity for physics.

I enjoy physics even more now, and I feel confident when I hear terms such as neutrino or god particle.

I deepened my interest in particle physics, which wasn't previously on my radar. It will be great to talk about my new interest in this topic in university interviews.

(2026) How do you feel about particle physics?



A



B



C



D



E



F

A. Bored

B. Happy

C. In awe

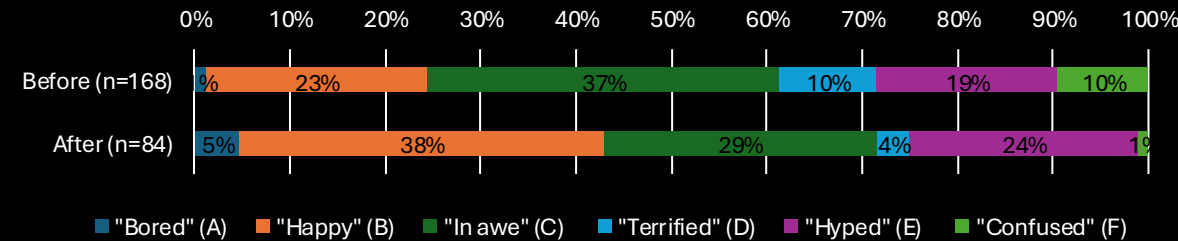
D. Terrified

E. Hyped

F. Confused

20% → 5%

Which gif describes how you feel about particle physics?



Suggested Improvements

- 2025: We asked participants what improvements they would like to see if we were to run the programme again
 - “more” - Ten asked for more sessions in the programme, and eight asking for more content or topics to be covered
 - Sharing of follow-up resources
 - Add introduction (implemented in 2026)

Expanding the scheme

- Increase participant numbers
 - Targeted marketing to reach underserved audiences across the UK
- Partnership with Boulby Underground Laboratory
 - Virtual tour element extremely popular
- Develop asynchronous online resources connected to the live sessions
 - Co-created by the young people and UG physics students

Funding
Dependent

Spring 2027
6 webinar for up to 500
participants

Additional
targeted
marketing

Collect feedback,
Recruit testers for
development

Summer 2027
UG projects
create additional
resources

Spring 2028
6 webinar for up to 700
participants

Additional
targeted
marketing

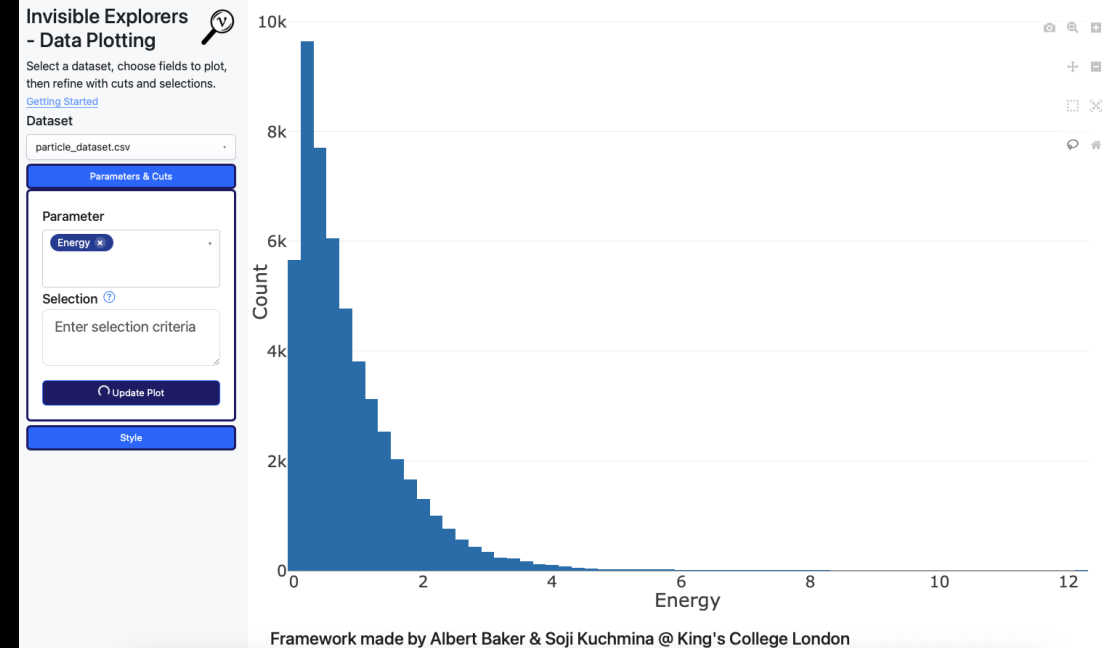
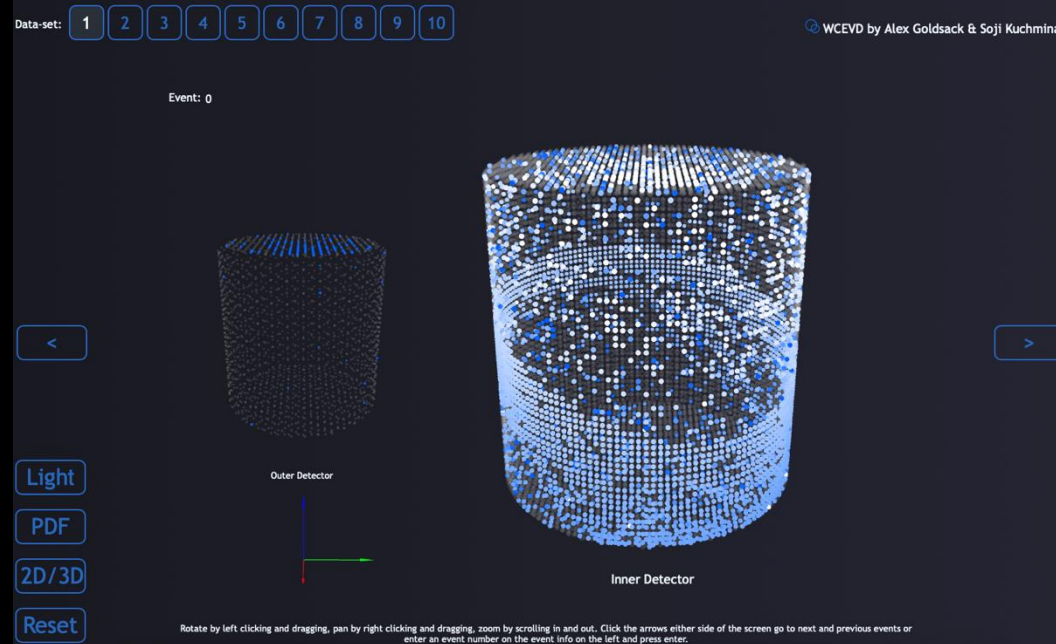
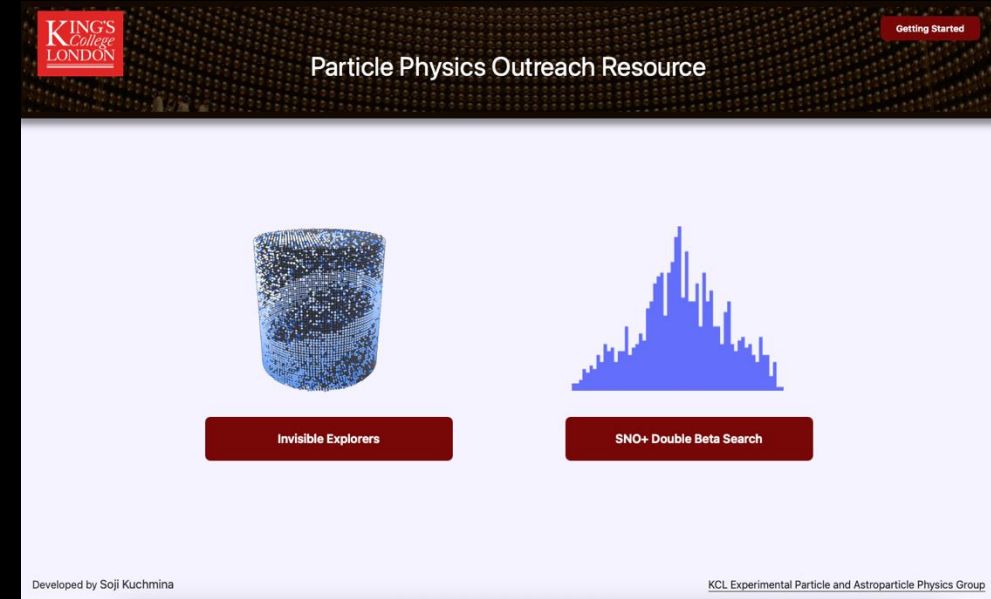
Collect feedback
on resources

Summer 2028
UG interns
improve
resources

Spring 2029
6 webinar for up to 1000
participants

Online Resources

- <https://invisible-explorers.sites.er.kcl.ac.uk>
- Aim to improve and expand this offering
 - Useful repository for other outreach activities
 - Add access monitoring



Any Questions!

