



Engaging with the invisible : Communicating science to the visually impaired and Tactile Collider

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Visual Impairment



Visual Impairment (VI) is a broad term, with a huge range of impairment and implications.

**UK has > 2M visually impaired
Only 4% of registered VI have no light perception!!**

300M world wide (that we know)

These people are not engaged with our science, and we are losing out on a massive pool of talent

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How do we communicate with, and engage with, and recruit, this audience with, and for, our science?

(Or how to we make all our communication better by relying less on visual tools and developing more empathy for our audience?)



Tactile Collider has developed new models and ways of science engagement and communication for underrepresented audiences.

We have worked with visual impairment (VI) experts and consultants to make new approaches, new materials and a touring event on the LHC and the Higgs boson.

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Tactile Collider toured Europe, reaching 20k audience members in schools and festivals between 2017 and 2020, giving over 500 VI students small group interaction on the LHC and the Higgs Boson.

We published our approach and outcome:

“Tactile Collider: a new approach to the communication of fundamental science to visually impaired people”, R.B. Appleby et al, Research for All, 4 (1): 16–32. (2019).

event on the LHC and the Higgs boson.

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The model : Development Pathway

- Audience engagement
- Training
- Event development
- Testing and listening



We did no physics until we were training and experience in CI issues!

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The guiding principles: The Tactile Collider model



“Tactile Collider: a new approach to the communication of fundamental science to visually impaired people”, R.B. Appleby et al, *Research for All*, 4 (1): 16–32. (2019).

Authenticity

Multi-mode communication

Interactivity

Diverse audience needs

Excessive training and testing

Design and preparation

Not just the kids : CPD and public

Science in fun! Even for us

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The guiding principles: The Tactile Collider model

The bedrock of the model: The social model of disability



A way of viewing the world which says that people are disabled by barriers in society, not by their impairment or difference.

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The Tactile Collider experience



Schedule:
Introductions
1. Particles
2. Magnets
Embodied learning

CASSIE exploration
3. Acceleration
4. Higgs
Conclusions
(+ CPD, public)

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The particle station



- Everything is made out of a set of very small fundamental particles.
- These particles interact with each other through forces
- We have a theory – the standard model - that describes these particles and their interactions.



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The magnet station

- The concept of a magnet, magnetic poles and attraction/repulsion of magnets.
- Controlling a beam with a magnet, bending (dipoles) and focusing (quadrupoles).
- Building a ring with magnets.



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The acceleration station



- Everything is made out of a What is acceleration : linear (and ring)
- Accelerate using waves of energy.
- Create waves of energy with radio frequency accelerating cavities.



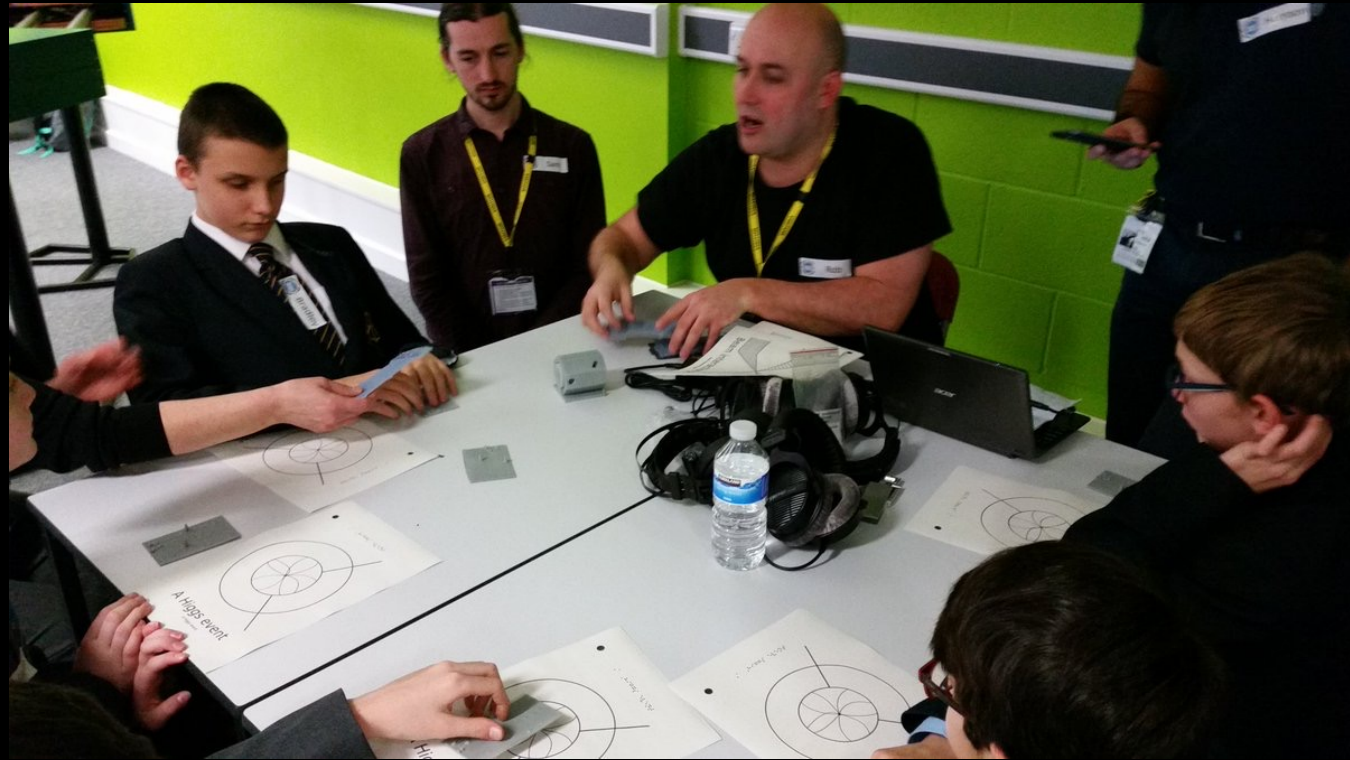
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The Higgs station

- Squeezing of the beam, beam envelopes.
- Detectors and collisions
- Higgs and Higgs events.

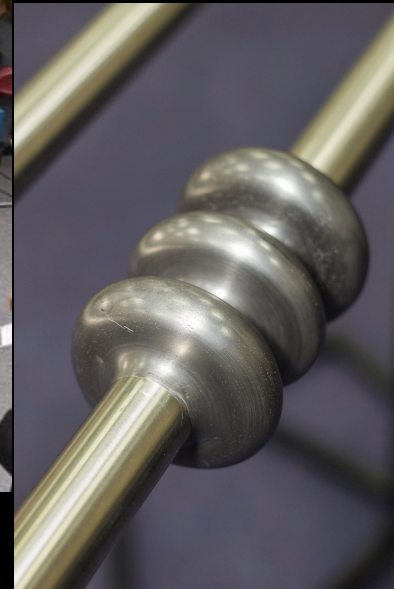
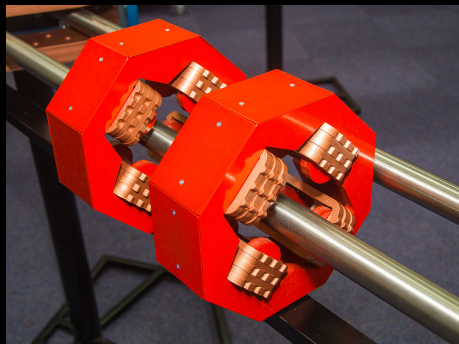
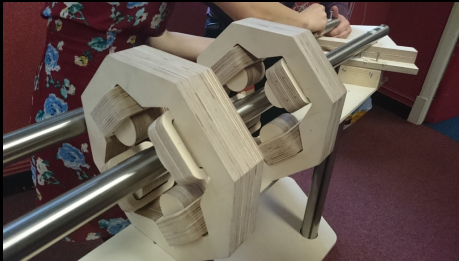


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CASSIE : our tactile teaching collider



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The real fun...the drama*!



*embodied learning





Evaluation : The learning outcomes

The first primary audience of Tactile Collider is young people who are blind or visually impaired with aged 12 to 18.

- To feel science is for them.
- To feel more confident and empowered and knowledgeable about science.
- To feel more confident and empowered and knowledgeable about particle and accelerator physics.

The next primary audience parents, carers, teachers and / or teaching assistants.

- To believe that science is a valid option for young VI people.
- They are more open to trying new ways of engaging young people with science.
- They have the skills to do this.

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Evaluation : The learning outcomes

Another important audience is the scientists involved in delivering the project.

- To feel more confident and positive about making science accessible.
- To developed more accessible ways of engaging people with science.

The final primary audience is non-VI audiences at festivals

- To feel science is for them.
- To feel more confident and empowered about science
- To feel more confident and empowered about particle and accelerator physics
- To think more positively about people who are blind or visually impaired and how they interact with them.



The Evaluation

- Carried out by external group over 5 events in schools
- Pre/post questionnaire (Likert scale (for recording people's attitude to a topic (e.g. agree, strongly agree)))
- One-to-one interviews
- Observation



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Evaluation

- 75% of students left with positive attitude towards science
- 73% of students felt they learnt something new about physics



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Evaluation Outcomes: YP

“I really loved talking to the scientists, it was the high spot for me. They were really easy to talk to and encouraging”



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Conclusions : Tactile Collider



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