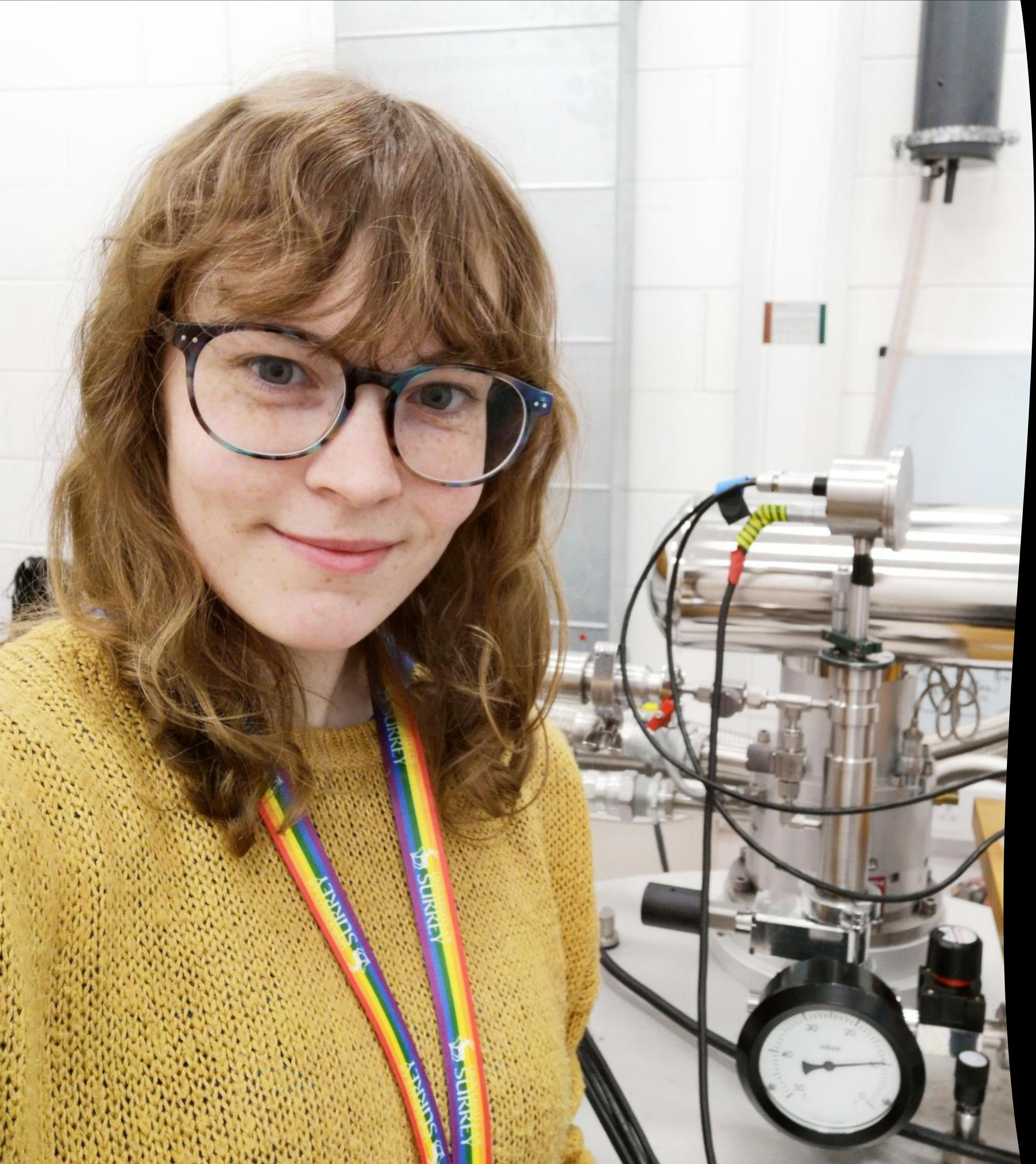
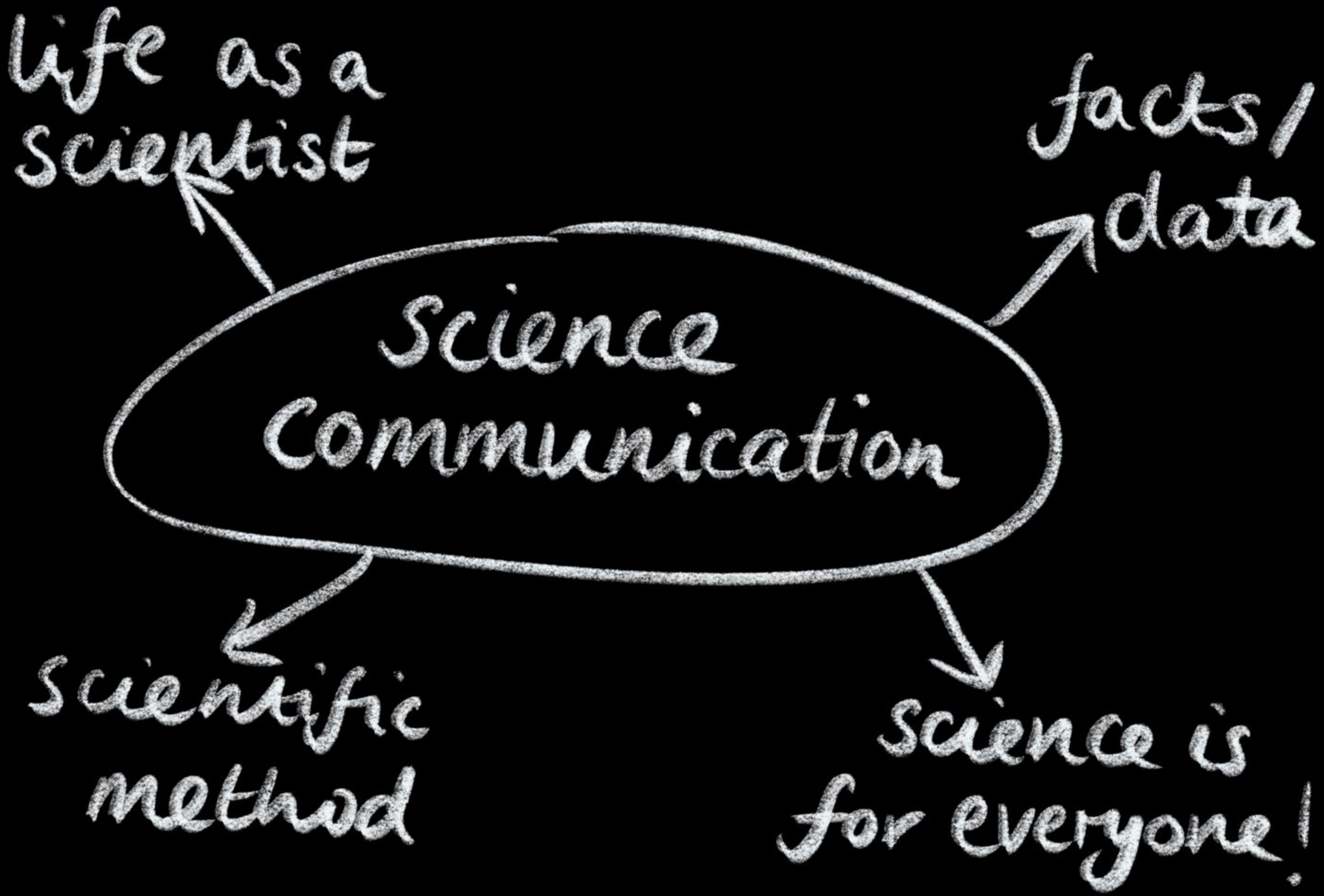
Finding comfort in physics and embracing my neurodivergent mind



Daisy Shearer

Experimental Physicist & Science Communication Enthusiast


Science Communication
life as a scientist
facts / data
scientific method
science is for everyone!

Notes from the physics lab

notesfromthephysicslab

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Daisy Shearer she/her
⚛️Semiconductor spintronics researcher
🧰Experimental quantum physicist
✍️Science communicator
🧠Autistic
♣🤍💜
she/her
linktr.ee/notesfromthephysicslab

Instagram

Hello! I'm Daisy. I'm an experimental physics PhD candidate at the University of Surrey. My area of research is quantum technology, specifically a sub-field called "semiconductor spintronics". This means I'm investigating ways to control the spin state of electrons in semiconductor materials and making devices that utilise electron spin. I also get to use a lot of amazing equipment like a superconducting split-coil magnet and a plasma focused ion beam!

Outside of research I am passionate about science communication and making science accessible as well as raising awareness about mental health, disability and neurodiversity in STEM.

I started Notes From The Physics Lab to help others find their place in physics and quantum technology more broadly. By sharing snapshots of my journey as a physicist, sharing advice and opportunities, discussing equality, diversity, and inclusion topics, and exploring physics concepts in accessible ways, I hope to demystify the world of quantum tech and help make the field more inclusive.

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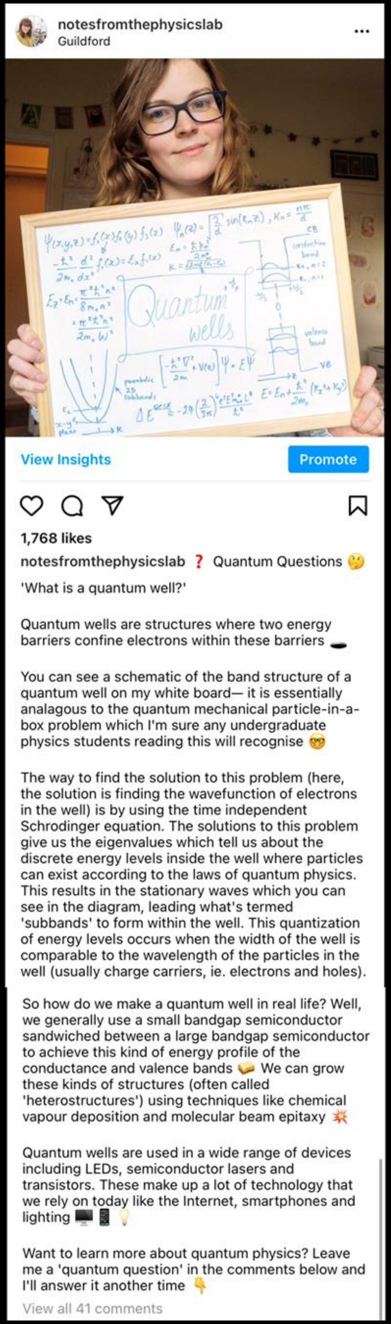
Blog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notesfromthephysicslab ❓ Quantum Questions 🤔
'What is a quantum well?'
Quantum wells are structures where two energy barriers confine electrons within these barriers
You can see a schematic of the band structure of a quantum well on my white board— it is essentially analagous to the quantum mechanical particle-in-a-box problem which I'm sure any undergraduate physics students reading this will recognise 🤓
The way to find the solution to this problem (here, the solution is finding the wavefunction of electrons in the well) is by using the time independent Schrodinger equation. The solutions to this problem give us the eigenvalues which tell us about the discrete energy levels inside the well where particles can exist according to the laws of quantum physics. This results in the stationary waves which you can see in the diagram, leading what's termed 'subbands' to form within the well. This quantization of energy levels occurs when the width of the well is comparable to the wavelength of the particles in the well (usually charge carriers, ie. electrons and holes).
So how do we make a quantum well in real life? Well, we generally use a small bandgap semiconductor sandwiched between a large bandgap semiconductor to achieve this kind of energy profile of the conductance and valence bands 🧈 We can grow these kinds of structures (often called 'heterostructures') using techniques like chemical vapour deposition and molecular beam epitaxy 💥
Quantum wells are used in a wide range of devices including LEDs, semiconductor lasers and transistors. These make up a lot of technology that we rely on today like the Internet, smartphones and lighting 🖥️📱💡
Want to learn more about quantum physics? Leave me a 'quantum question' in the comments below and I'll answer it another time 👇
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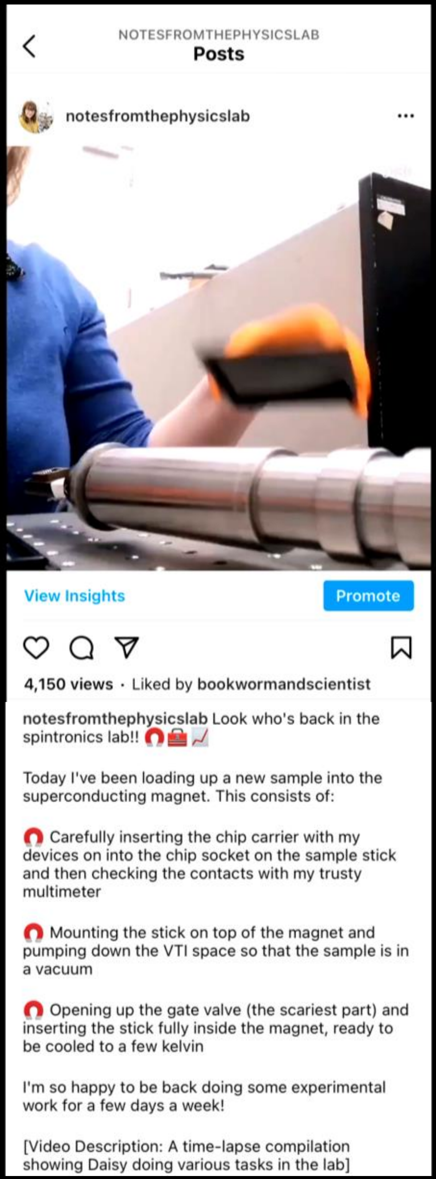
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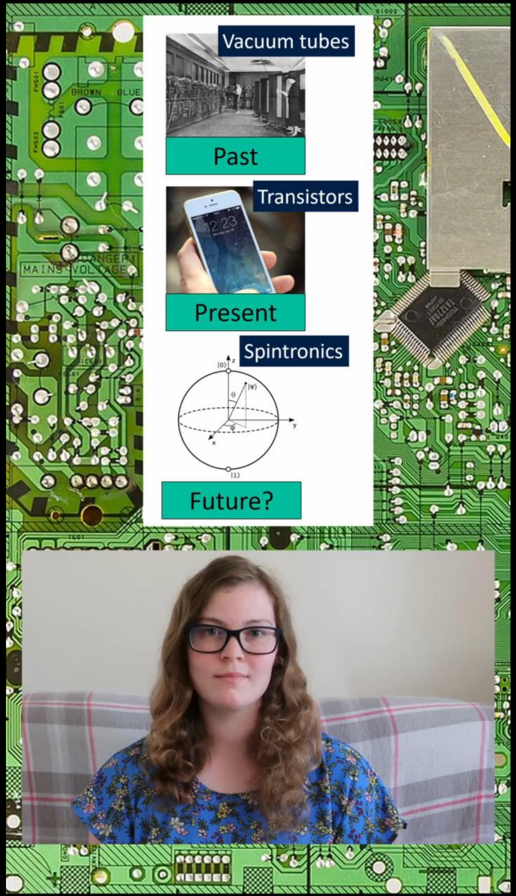
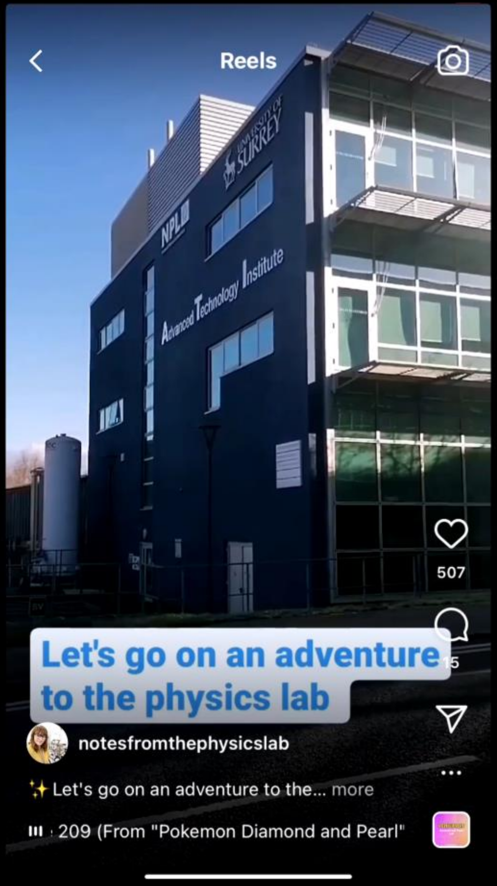
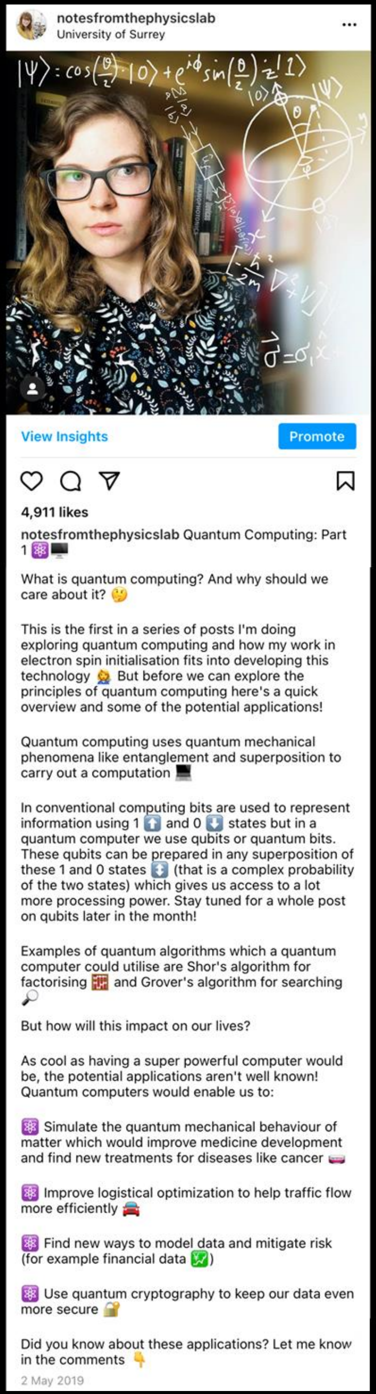
4,150 views · Liked by bookwormandscientist
notesfromthephysicslab Look who's back in the spintronics lab!! 🧲🧰📈
Today I've been loading up a new sample into the superconducting magnet. This consists of:
🧲 Carefully inserting the chip carrier with my devices on into the chip socket on the sample stick and then checking the contacts with my trusty multimeter
🧲 Mounting the stick on top of the magnet and pumping down the VTI space so that the sample is in a vacuum
🧲 Opening up the gate valve (the scariest part) and inserting the stick fully inside the magnet, ready to be cooled to a few kelvin
I'm so happy to be back doing some experimental work for a few days a week!
[Video Description: A time-lapse compilation showing Daisy doing various tasks in the lab]


Vacuum tubes
Past
Transistors
Present
Spintronics
Future?


Reels
507
Let's go on an adventure to the physics lab
notesfromthephysicslab
✨ Let's go on an adventure to the... more
209 (From "Pokemon Diamond and Pearl"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University of Surrey
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4,911 likes
notesfromthephysicslab Quantum Computing: Part 1 ⚛️🖥️
What is quantum computing? And why should we care about it? 🤔
This is the first in a series of posts I'm doing exploring quantum computing and how my work in electron spin initialisation fits into developing this technology 👩‍🔬 But before we can explore the principles of quantum computing here's a quick overview and some of the potential applications!
Quantum computing uses quantum mechanical phenomena like entanglement and superposition to carry out a computation 💻
In conventional computing bits are used to represent information using 1 ⬆️ and 0 ⬇️ states but in a quantum computer we use qubits or quantum bits. These qubits can be prepared in any superposition of these 1 and 0 states ↕️ (that is a complex probability of the two states) which gives us access to a lot more processing power. Stay tuned for a whole post on qubits later in the month!
Examples of quantum algorithms which a quantum computer could utilise are Shor's algorithm for factorising 🧮 and Grover's algorithm for searching 🔎
But how will this impact on our lives?
As cool as having a super powerful computer would be, the potential applications aren't well known! Quantum computers would enable us to:
⚛️ Simulate the quantum mechanical behaviour of matter which would improve medicine development and find new treatments for diseases like cancer 🧪
⚛️ Improve logistical optimization to help traffic flow more efficiently 🚘
⚛️ Find new ways to model data and mitigate risk (for example financial data 💹)
⚛️ Use quantum cryptography to keep our data even more secure 🔐
Did you know about these applications? Let me know in the comments 👇
2 May 2019

Neurodivergent in STEM

Who we are

We are a project increasing the visibility of neurodivergent people in STEM (science, technology, engineering and mathematics) and STEM-related fields. By our stories, we hope to show that we have a place in STEM. This is a space to share experiences, advice and opportunities.

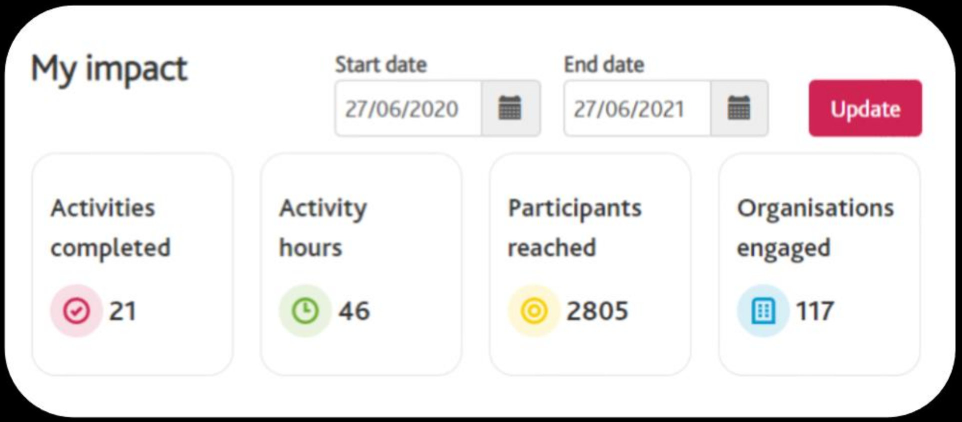
Our mission

We want to provide the next generation of neurodivergent people considering STEM careers with role models they can relate to, facilitate connections, and share best practice to help make STEM more inclusive for neurominorities.

Share your story

Neurodivergent in STEM is a community-driven project so we rely on contributions from you! If you identify as neurodivergent and work (or study) in a STEM or STEM-related field, please consider sharing your story. Go to the 'contribute' page to find out more.

STEM AMBASSADOR



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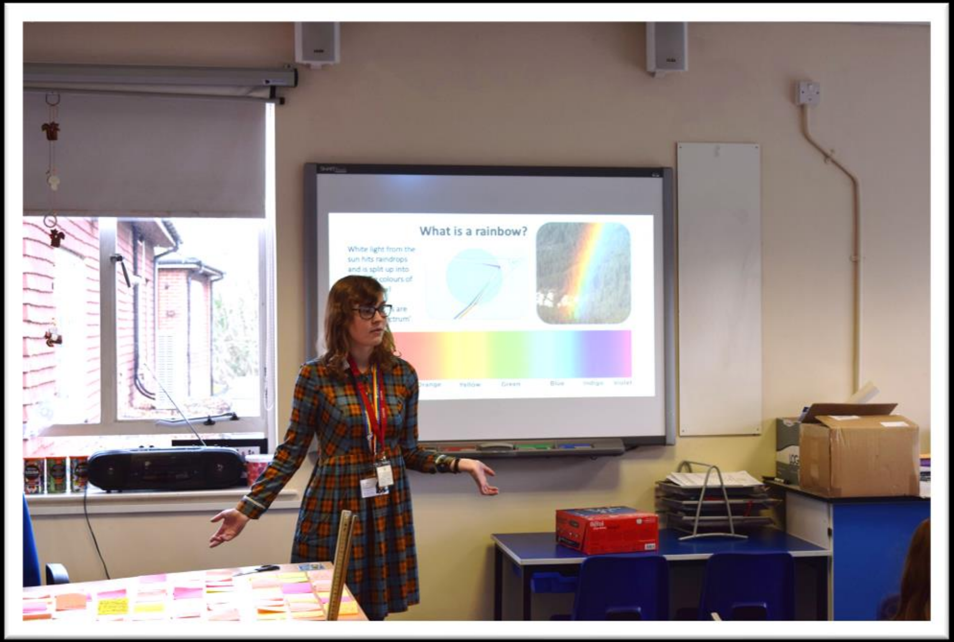

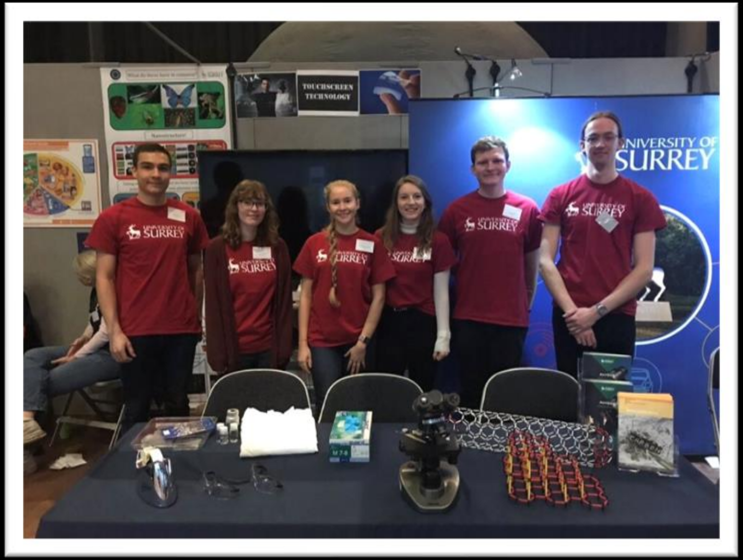

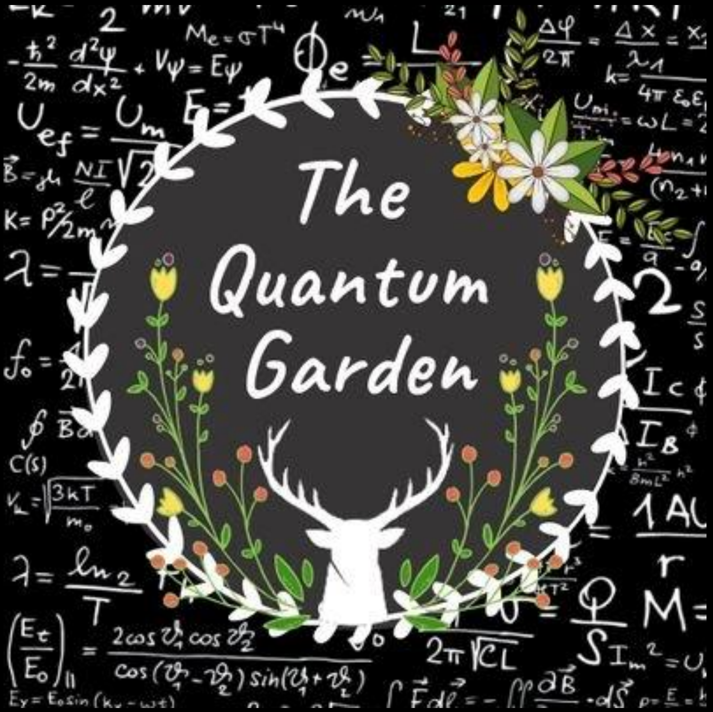
The Quantum Garden


Welcome to the Quantum Garden
-the University of Surrey Student Garden Showcase entry for Guildford in Bloom 2019. The garden is themed around Quantum Computing and its applications, celebrating its relevance to today's society and remembering past achievements. Explore, take a seat and enjoy a unique place where physics and flowers combine into a magical Quantum Garden!
How many plants do you know?
The garden is designed by Daisy – an experimental quantum physicist and PhD student in the photonics and quantum sciences group at the University of Surrey.
Scan me
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Thank you for listening