



Limit Less

Change the world

Jobs that make a difference

IOP Institute of Physics

Ireland

New technologies

Finance

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Energy

Global inequality

Culture

Design

Data security

Government

Communications

Healthcare

Food security

Artificial intelligence

Climate change

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Shape your future, shape your world



Where do you think choosing physics could take you?

Could it be creating computer models to predict weather events at Met Éireann? Perhaps into education, to inspire the next generation? Or to a hospital, using physics to help to save lives? Maybe even into the arts, using creative problem-solving skills and physics knowledge in a totally different way!

We know that young people are well aware of the challenges the world faces today, and the impact those will have on your future. In response to climate change, poverty and pollution, many of you are already taking action to make a positive difference. **Physics can give you the skills to understand and solve problems.** Not just in theory. Not just on paper. But in the real world, where there are plenty of answers waiting to be found.

There are thousands of jobs to choose from – so where do you start? We've talked to people working in some exciting, rewarding industries to help you understand what their jobs involve, and to see how many amazing, unexpected places doing physics could take you.

However, we know that some people are put off choosing physics because they think it's too hard, or boring or not creative. Others are discouraged from choosing physics because of stereotypes around who they are. Too many young people are made to feel that they can't do physics, or that they just don't fit in.

Physics is for everyone and doing physics could take you anywhere. The people in this booklet may be doing very different jobs in very different places, but they have one thing in common – they all did physics at 16.

Deirdre King

Medical Physicist

I'm Deirdre, the chief medical physicist at Blackrock Clinic in Dublin. My work is focused on diagnostic imaging and radiation safety. I provide scientific support to help with the diagnosis, treatment and care of patients. My job is really varied which I enjoy. Outside of work I love open water swimming and ice swimming.

“There weren't many girls in my undergraduate class but that didn't discourage me.”



Hi, Deirdre! How did you first get into physics?

By accident! I was doing music for my Leaving Cert and realised it wasn't for me. I actually wanted to do chemistry instead, but the class was full, so the only option was to do physics. From the first class, I knew it was the right fit for me.

When I was very young, I was always taking things apart, playing with them and putting them back together. I was fascinated by how things work. I discovered that physics is essentially the study of how everything in the universe works.

Who inspired you when you were a teenager?

As a teenager who was into sport, Sonia O'Sullivan was someone who greatly inspired me. It wasn't just her winning medals; it was her personality. Her passion and determination were clear from the interviews we would watch on TV.

She inspired me to do something that sparked an interest, something I enjoyed, then to work hard to be the best I could be. Having a strong female role model like Sonia helped me follow my interests even when they led down different paths to the typical ones girls my age took.

Did you face any challenges in taking that different path?

In college I chose to do physics and biology in my undergraduate science degree – and I was the only one in my year to do so! Everyone told me to take maths or chemistry but that wasn't where my interest lay. Then in fourth year of college, I discovered Medical Physics and my unusual subject choice was the perfect combination for this. **There weren't many girls in my undergraduate class but that didn't discourage me.** In my outreach work now, it's so nice to see girls embracing physics – the skill set allows you to work in so many areas.

How did you get into your current job?

In the fourth year of my undergraduate degree, I read an article in Physics World about the field of medical physics. I knew absolutely nothing about how to become a medical physicist, so I volunteered in a Dublin hospital to gain experience. As soon as I started, I knew this was the area I wanted to work in. There are a number of sub-specialities within medical physics. I found diagnostic imaging and nuclear medicine really interesting. I've trained and worked in the USA, the UK and here in Ireland. I now lead the medical physics team at Blackrock Clinic.

What's your favourite part of your job?

The work is very diverse and every day there's a new problem to solve or project to develop – all with the aim of improving our patient care. I could start my day meeting with doctors to introduce new technologies and end it reviewing building designs with architects to make sure radiation protection measures are in place. Every day is different!

What advice would you give an aspiring physicist?

Follow your interest, get involved and speak to people who work in the field. You never know who you might meet and where it might lead you! Find someone who's excited about the work they do and aspire to be like them.

Deirdre got interested in diagnostic imaging while gaining experience in medical physics.

Can you find out how machines like X-ray machines and MRI scanners allow us to photograph the inside of the body?

Eoghan Mason

Product Technician

My name is Eoghan, I'm 23 and I work as a process technician. Working in manufacturing often means long days, but you do get a lot of time off in return. I spend most of my time off either at a gymnastics club or gaming. Nothing clears the head better than a bit of exercise, a few somersaults and hanging out with friends.

I've also recently built a gaming PC for myself, and it was a fun but stressful experience. I enjoy playing story rich single-player games for a bit of chill time and to explore a new world, and I play high action rogue-like games for the adrenaline and a challenge.



Hi Eoghan! Can you tell us how you first got into physics?

I first got excited about physics in my engineering class, actually. We were doing a class on forces and their effect on different materials & structures, and our teacher showed us a video of the Tacoma Bridge failure. Here was a bridge constructed with the strongest materials, made by great minds, wobbling about like it was made of jelly. It was due to the resonance of the wind blowing against the bridge matching the resonance of the bridge causing it to vibrate and twist and turn. Like how an opera singer can break a glass with their voice. I remember thinking it was incredible something so strong could be broken by something so simple.

Is there a physics memory that really stands out for you?

I always enjoyed physics most when it was being used practically. I vividly remember a lesson where we were making batteries out of coins, washers and tissue paper. It was awesome to see electricity created out of seemingly nothing, not created by a turbine and stored in a battery but from inside the materials themselves.

Do you use that practical physics in your role now?

Yes! As a technician I am constantly working with various different mechanical parts which are all subject to the laws of physics. Working with pneumatics you have to be very careful with the amount of pressure that's being used lest you launch your product across the factory. Electronics is also a major part of working as a technician. You have to take care with the voltage being provided to different components to prevent them from burning out. Using and understanding a multimeter is really useful. It's great for finding where a fault is in a circuit and for testing if a component is working before

installing it. We also use UV light as a method for hardening plastic, which has to be carefully monitored.

So, lots of elements of your studies come together in your job!

It's all connected. There's a quote that says biology is just applied chemistry, chemistry is just applied physics, physics is just applied maths and maths is just philosophy. I always liked that.

Was there anyone who really inspired you as a teenager?

My dad. He was an engineer working on constructing manufacturing plants across the world. He had what seemed like an encyclopaedic knowledge of engineering and would help me out with my physics homework where he could.

What is the one thing that helped you most in your studies?

Mind maps were my best friend throughout school. I'm a person who can be easily distracted when doing something monotonous like rereading notes. Mind maps helped me be a bit more creative with my study which held my attention longer and helped retain the information. It also meant that when it came to exams, I had all my notes in one place I could skim through easily.

Eoghan mentioned that resonance caused trouble on the Tacoma bridge.

Do you think an opera singer can really break glass using just their voice?

Saoirse Anton

Touring & Projects Officer,
Company Manager, Writer

I am a writer, producer and theatre critic. I'm also a feminist, optimist, enthusiast, opinionated scamp and human being. I currently work as Touring and Projects Officer with National Dance Company Wales, and Company Manager of Richard Chappell Dance, as well as maintaining an active writing career spanning poetry, theatre and film.



Hello, Saoirse! What gets you excited about physics?

I've always had a fascination with understanding how things work – whether that's in the mechanical sense of an object, an understanding of the world around me more generally, or even now, understanding the systems that govern the industry I work in. **I love the breadth of things physics covers – from mechanics to nuclear physics.** It always felt like a subject that had an immediate real-world application and could help fulfil my curiosity about the world.

Do you have a favourite physics memory?

I remember visiting an exhibition about CERN, the world's largest particle accelerator, on a school trip. It was fascinating. I still have the t-shirt I bought at the exhibition!

But my favourite memory is probably when, left to our own devices during an experiment on determining the focal length of a convex lens, myself and two friends realised we could do much more fun things than just focus an image, and so began creating stories across the screen with various objects we found whose images we could project.

Who did you look up to as a teenager?

Lots of people – from Irish politician, Mary Robinson, to Jane Goodall, who studied chimpanzees, to the poet, Maya Angelou. One strong thread through was an admiration of **women who defied expectations!**

Did that inspire you to become someone who defied expectations?

Well, the four of us who studied physics at Leaving Cert had to go over to the boys' school next door three times a week because the girls' school didn't even offer a physics class. So, maybe!

“Who could have imagined a knowledge of electrical circuits would become the basis for a love poem?”

You work in the arts now – do you still use your physics skills?

My job involves a lot of creative problem solving and planning, and the big picture logical and creative thinking involved in physics (and science in general!) definitely helps with that. While opportunities for practical applications are fairly minimal, I have found that my physics knowledge appears in unexpected places, particularly informing the poems I write. **Who could have imagined a knowledge of electrical circuits would become the basis for a love poem?**

What would you tell your teenage self if you got the chance?

Study what you love. If you get that excited buzz as you learn that makes you want to dive further into a subject and that leaves you thinking far beyond the hour of a class. **If it's the thing that sets your mind and imagination alight, then that's the thing for you.** And that might not be just one thing. You don't have to stick squarely to one path. Explore, investigate and enjoy!

Saoirse used her knowledge of electrical currents to write a love poem.

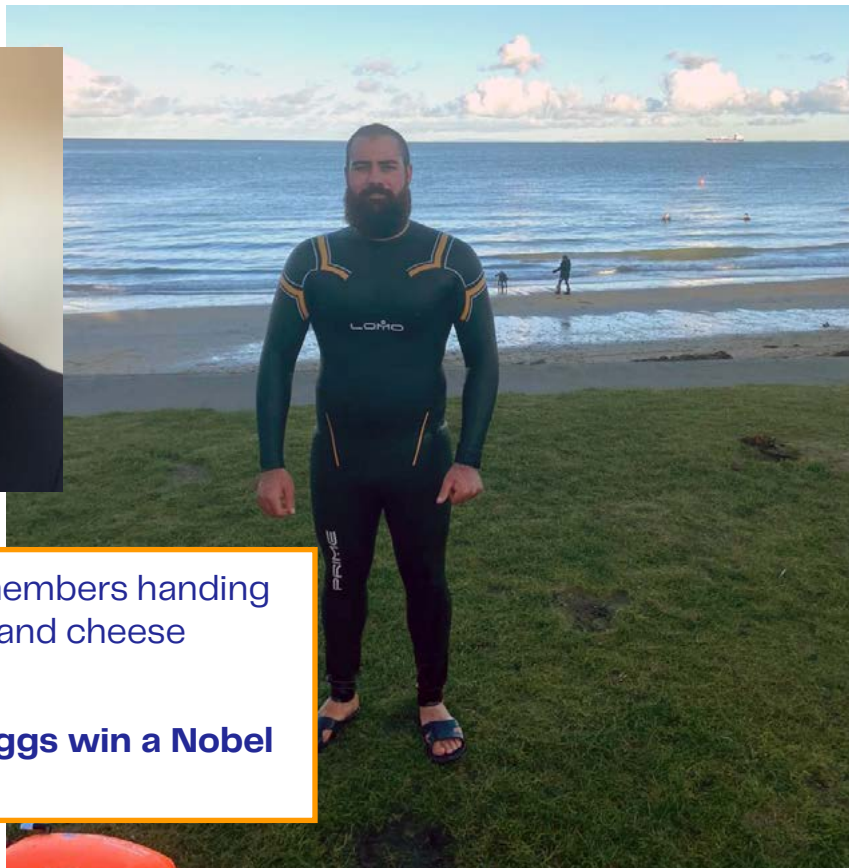
Can you use your physics knowledge to do something creative today?

Andrew Mooney

Planning and Project Engineer

Hi, I'm Andrew and I am a mechanical engineer from Monaghan, currently working as a project engineer in a power station outside of Belfast. I went to university in Edinburgh to study mechanical engineering and have worked on power stations ever since.

Currently I manage large refurbishment projects and projects that improve the efficiency on the generating units. I chose a physics-based degree as it gave me the building blocks to understand how all the clever things in our daily lives work. Outside of the office, I really enjoy outdoorsy things like open water swimming, paddle boarding and hiking. When all of that gets too cold, I like to cook.



Andrew fondly remembers handing Peter Higgs a ham and cheese sandwich.

What did Peter Higgs win a Nobel Prize for?

Hi, Andrew! Can you tell us what first drew you to physics?

As a child, I always gravitated towards toys like Lego, Meccano and Knex. My favourite TV programmes were Robot Wars and Scrapheap Challenge, both of which involved making things. As I grew older, I started learning about bigger and more exciting things – cars, planes, JCBs! Once I got to secondary school and discovered physics and chemistry as subjects, I realised they gave me the building blocks to understand how everything I was interested in worked – from internal combustion engines, to how planes stay in the air.

Do you still use those building blocks now?

Everything on a power station requires knowledge I learned in secondary school. Electricity is obviously a big one, but I leave the complicated bits of that to the electrical engineers. As a mechanical engineer, I deal with the things that move and create heat. To generate electricity, we need to spin the turbines. To spin the turbines, we need to generate a lot of steam which means we burn a lot of fuel in the form of coal, oil or gas. I look after the tanks that contain pressurised steam, air or gas, the pumps that transfer all of these and the water treatment plant that provides the water for the boiler. Having a good knowledge of physics helps you to diagnose problems when the process or equipment fails.

How did you get into your current job?

After completing a Masters in Mechanical Engineering at university, I got into a graduate scheme as a mechanical engineer with one of the largest electricity companies in the UK. There, I had the chance to work with lots of different technologies, from wind and solar to coal and gas power generation. One of

my favourite placements was at a gas storage site where they stored natural gas in caverns the size of St Paul's Cathedral over 1.5km underground.

After the graduate programme I became responsible for delivering the shutdowns of power stations, managing multi-million-pound budgets and hundreds of maintenance staff.

What do you like best about your job?

One of my favourite things is the sheer scale of some of the projects I get to work on. All of the critical work when a power plant breaks down requires a lot of coordination and a lot of input from a lot of people. It is always great to see that level of teamwork. It's also a good feeling to know that the work we do every day contributes to keeping people's lights on.

Do you have a favourite physics memory?

I handed Peter Higgs a plate of sandwiches once. Peter Higgs won the 2013 Nobel Prize in Physics for figuring out a problem that had confused physicists for many years and I handed him a ham and cheese sandwich!

Do you have any advice for someone at the start of their journey?

Do a job you enjoy and it won't seem like work. I was really lucky – my interests led me to a job I really like. Studying engineering at university opened up a lot of opportunities and I met a lot of great people during it.

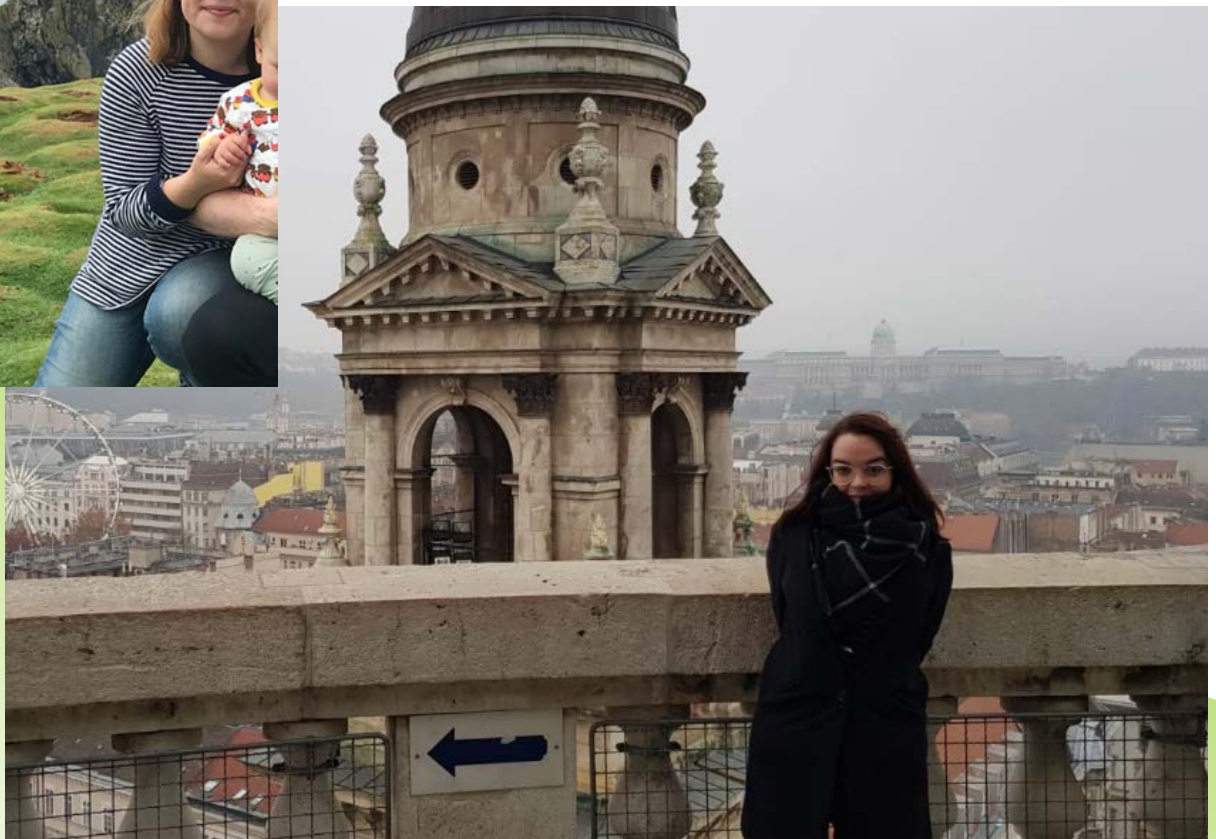
But don't be afraid to change direction! If your subjects aren't for you in school, speak to a guidance counsellor. If you decide that your university course isn't a good fit for you, don't be afraid to speak to your course tutor or careers counsellor.

Aoife Carson

Financial Analyst

I'm Aoife, 26, from Derry. I graduated from KCL with a degree in Physics in 2018. Since then, I'm moved slightly away from physics to work as a finance analyst – there are a lot of fields of work that value the lateral/logical thinking skills that come from studying physics.

When I'm not working, I can usually be found chasing a toddler, swimming/freezing on local beaches, baking or travelling and seeing as much of the world as I can.



Hi, Aoife! What first got you excited about physics?

From when I was very small, it just blew my mind that we were just one tiny component of a huge collection of moving parts. There was space! Planets! And I had the most amazing physics teachers in school.

Do you still use the physics you learned in school?

Definitely! I don't use the specific formulae I learned but I constantly use the logical thinking and problem-solving skills a physics qualification gives you. I love using the maths and logical concepts I learned in physics to problem solve in my job. Physics teaches you to be creative while still applying logical rules, and you pick up the ability to learn new things really quickly. Not coming from a traditional finance background is definitely an advantage in doing my job – having a new way of looking at things really helps!

How did you get into your current job?

When I finished university, I still didn't know what I wanted to be when I grew up! So, I applied for lots of different internships and graduate schemes and picked the one that felt like the best fit. I've been in finance ever since.

“Not coming from a traditional finance background is definitely an advantage in doing my job.”

Have you ever felt discouraged from pursuing physics?

I think in physics and in science, there can still be a chilly environment for women and girls. You do find yourself outnumbered. But to anyone thinking about pursuing physics, I'd say go for it! It's a brilliant step onto lots of future paths, so explore all of your options.

What advice would you give your teenage self?

Structure your studying! I found uni difficult because it's a totally new way of studying. You need to work much more on your own than you do at school, so it really helps to know how to make a study plan and stick to it. But it's all worth it – the day I handed in my final year project at uni is one of my favourite physics memories.

Also, be nice to your teachers (and graduate students and lecturers when you get to uni!). Ask them loads of questions – they're a priceless resource.

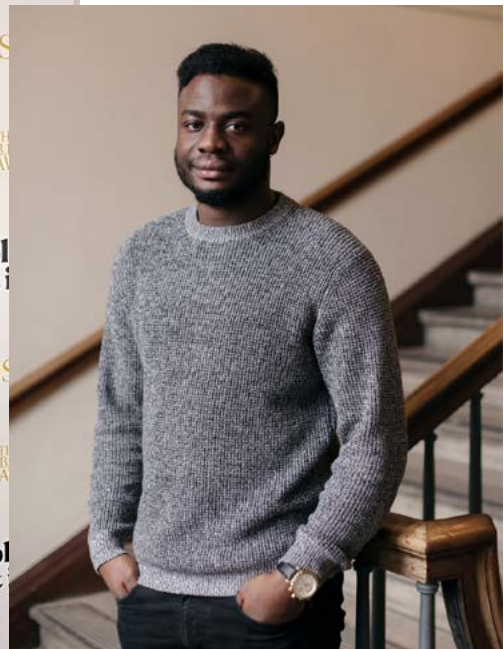
Aoife mentions realising that we were just one tiny component of a larger universe – **but just how tiny can you go?**

Can you find out what the smallest things in the universe are? What's the largest?

Femi Bankole

IT Risk Management Consultant

I'm Femi Bankole and I'm an IT risk consultant. I work as a manager within Ernst & Young's business consulting practice in Dublin. My job is based around governance, risk and compliance of IT assets for some of the largest companies in the world. I'm a football fanatic and I enjoy gaming and playing sports in my spare time.



“I was happy to be an example to break down the stereotypes associated with studying physics and science subjects – anyone can do it.”

Hi, Femi! What first got you interested in physics?

I like learning new and non-traditional things. I really enjoyed getting an in-depth understanding of the world around me – and beyond!

Do you have a favourite physics memory?

It was really fun to watch the movie *Interstellar* and to actually understand all the theories and concepts. I remember reading and watching videos for months afterwards about space theory, time travel and relativity.

Who was your role model as a teenager?

I was really inspired by Barack Obama. He demonstrated that it was **possible to break barriers in new places**.

How did you get into your current job?

During my final year of college, a few professional service firms came in to give talks around choosing management consultancy as a career and my interest was piqued from there. I like that **the role is extremely technical but mixed with lots of soft skills** that I use on a daily basis.

Do you use your physics skills on a daily basis too?

I do! Physics equips you with great critical thinking and problem-solving skills. I need these skills every day in my current role, which is client facing and requires versatility and flexible thinking.

How do you overcome challenging situations?

I've always overcome challenges by knowing that with enough hard work and study, I'd eventually figure things out and work through the problem. I've definitely felt discouraged at times as my personality isn't one that is stereotypically associated with someone who does physics. But **I was happy to be an example to break down the stereotypes associated with studying physics** and science subjects – anyone can do it.

Do you have any advice for someone who's thinking of pursuing physics?

If you're an inquisitive person who constantly finds yourself asking questions about how things work, physics is the subject for you. It **equips you with the skills to ask great questions**, but even better – it equips you with the tools to explore and understand the answers to these questions too.

Femi mentioned applying his physics knowledge while watching the movie *Interstellar*.

What can physics tell us about time travel?

Aoibhéann Bird and Phil Smyth

Science Communicators

We both studied applied physics in DCU and have gone on to do a whole host of things weird, wonderful and impactful in the world of science communication and engagement.

With vast experience in live events, TV production and socially responsible activities, we like to think of ourselves as two of the most approachable and helpful scientists around. We even took the time to marry each other.



“When I found out that physics is used to describe what happens in the world, I knew it was for me.”

So – what do you do?

Phil: Lots of different things! No one day is the same. Basically, we’re physicists who ended up in science communication and public engagement, owning our own business, promoting Irish research, creating TV and radio segments, hosting live events and building huge amounts of Lego.

Aoibhéann: We’re also always chasing funding to pay for buses to bring children from disadvantaged areas to STEAM workshops so they have the same opportunities as everyone else. We care deeply about inclusion and sustainability, so we try to weave them through everything that we do. We’ve also never given up on our dreams of going to space and both recently applied to be astronauts!

What’s it really like working in TV?

Phil: To be honest, it’s great. We’ve produced or starred in about 400 different shows over the years and it still feels surreal. There’s a strong balance to be struck between entertainment and education and accuracy is key. We don’t fake anything and it takes a lot of research to make sure things still make sense when you’ve simplified language – or to justify why you’re blowing something up. The best thing is going on location. We’ve travelled around Europe and even did some filming lately as we SCUBA dived off the west coast.

Scuba diving? That’s not something anyone can just do

Aoibhéann: It is actually. Most colleges and universities have sub aqua clubs that students can join. You can learn a huge amount of physics during the course and the clubs usually provide the gear. I started diving as it was the closest environment on Earth to being weightless in space. I’ve always wanted to be an astronaut and doing a PhD and SCUBA are great things to do if you want to end up in space.

So is that why you both chose physics?

Aoibhéann: Not initially. As an electronic engineer my dad would always be fixing things. I loved being his apprentice, watching him open up dishwashers and test Christmas lights. Being given mini-jobs to help out with really grew my passion for hands-on experiments and of course, the joy and achievement of making something work again!

Phil: I was always curious about the world and everything in it that I could play with. I’m curious in a pick-things-up-and-poke-them-probably-put-them-in-my-mouth kind of way. So, when I found out that physics is used to describe what happens in the world, I knew it was for me. Because it was describing what I was doing naturally anyway – testing things through play. The great thing about it was that I wasn’t limited to one area. Physics is as useful in sports as it is in hospitals.

What’s the most memorable thing from your physics studies?

Phil: Apart from winning the DCU Physics department indoor soccer tournament, I’d probably say building a radio telescope on the roof of the building with Prof. Brian Lawless. I loved the hammering, making, wiring and the feeling that we were doing something outrageous by being up on the roof. It was great but it was also the first



time I presented my work. Not my research or thoughts on somebody else's effort, but something I made. That stuck with me and it hammered home that if you can work on something you like then your natural passion and enjoyment will shine through.

Aoibhéann: Apart from repeatedly stealing the ball off Phil in the indoor soccer tournament...it would be successfully receiving live video signals showing the curvature of the Earth. Our team built the device from scratch and sent it up on a weather balloon with the Florida Space Authority at Cape Canaveral. It was a real sense of achievement and I still have a rope burn scar on my finger from the launch which makes me smile! Studying physics just gives you opportunities you don't expect.

Who do you think was your biggest influence?

Phil: My folks. Not necessarily in terms of the subject matter but more in "do what makes you happy" inspiration. Allowing me to be me was glorious and it allowed me to relax and figure out what made me happy through experience, mistakes, and adventures.

Aoibhéann: My parents – a mother who was a whiz with numbers and DIY, and my dad – the tinkering engineer. And I think Star Trek had a big influence on my inspiration to seek out new outdoor adventures with the scouts, to work in a team environment that championed cultural differences, and to boldly go into a career area where not many women traditionally have gone before.

Did you face any challenges during your studies?

Phil: The support I received at DCU was fantastic but I am a horrible studier. I'm not built to sit down and absorb learning from books. I need to play, dismantle and experiment. Some of my subjects weren't suited to this but I worked hard, got through them and then focused on what I enjoyed. Work on the necessarys to get to them niceties.

Aoibhéann: Only three of us took Physics for the Leaving Cert in my school and I am very grateful they still ran the subject with such low numbers, not all schools would. My teacher was surprised I wanted to study physics at undergrad and even though I didn't do as well as I wanted to in the exam, I knew that the subject was for me. That passion and interest pushed me forward and I excelled at DCU where the support was immense.

Do you still use things you learned in your undergrad today?

Phil: Er, yes! I'd use the basic formulas for figuring out the forces involved in experiments or estimate how things will go when we put things together.

Aoibhéann: Similar to Phil, learning the skills of testing and experimentation, getting reliable results, and plotting graphs are all things that assist me in my everyday work life. Also, the basic physics principles of light and the gas laws are something I use and teach every week when I explore the underwater world with my SCUBA diving club!

What's the best skill for a physicist to have?

Aoibhéann: Curiosity and communication skills are paramount for success in all aspects of life, work, and relationships. If you can communicate your knowledge, understanding, ideas, decisions and

needs effectively then you can bring your colleagues with you along the path to success.

Phil: It's the same for any industry in my opinion. Effort. No success ever came without it. Matching it with talent and teamwork gives the project the best chance of success. Also puns – major skill plus point.

What advice would you give?

Aoibhéann: Don't get bogged down in job titles and preconceptions about working in a particular area. Follow your passion. It is possible to earn a living in so many different ways that are not listed on career guides, and a career is much more fulfilling if you enjoy it.

Phil: Try everything. The biggest challenge out there is choice. Too much choice can lead to inactivity. The only way to figure out what you like and what you're good at is to get involved. Think of how you discovered your favourite biscuit. You had to try loads before you found the one.

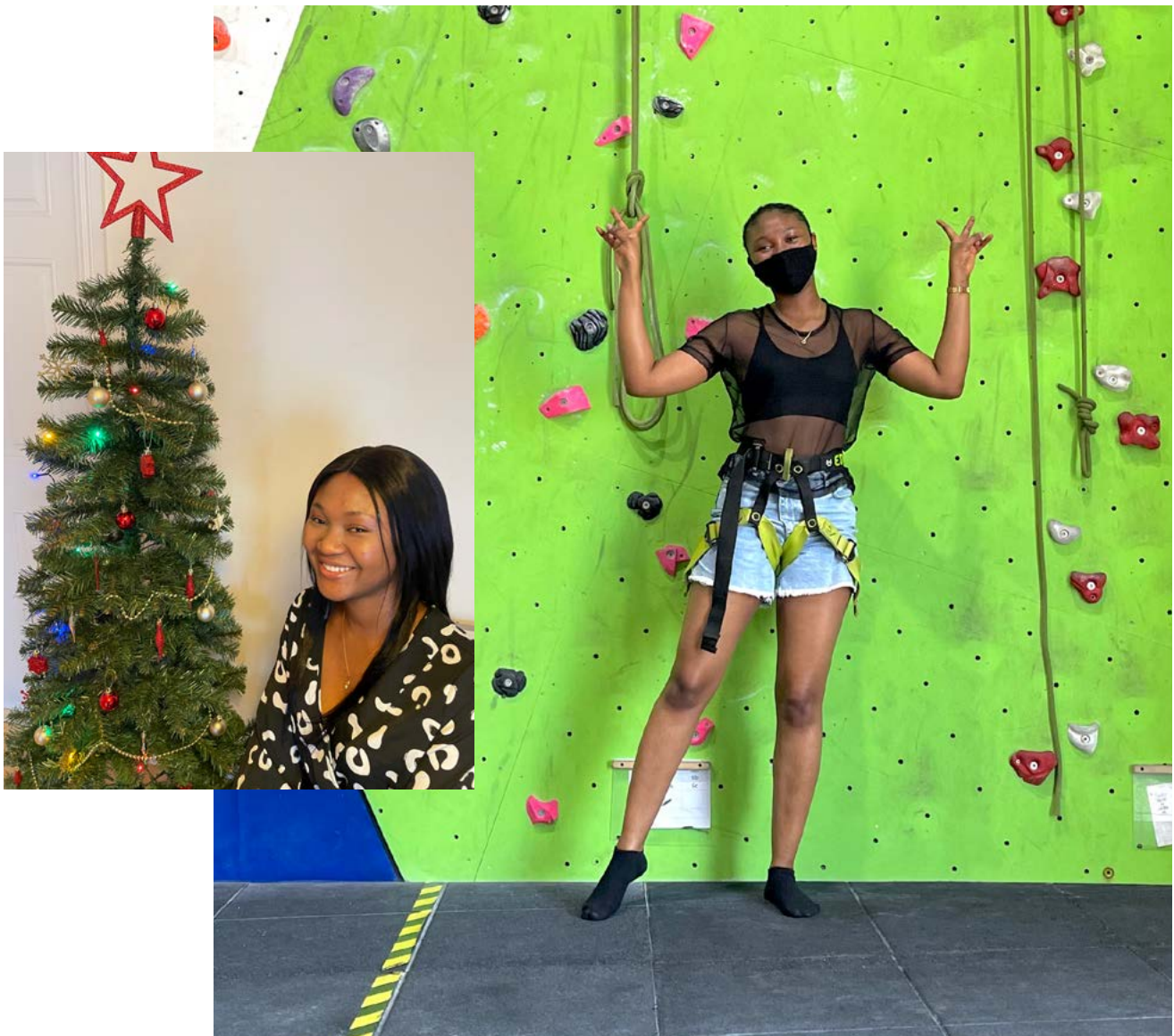
Aoibhéann is a keen scuba diver.

Can you find out how the laws of physics keep scuba divers safe underwater?

Temilade Adegoke

PhD Student

My name is Temi Adegoke and I'm a Ph.D. researcher at the University of Limerick. I'm from Nigeria and I came to Ireland a few years back to study a graduate program. My research is focused on looking at the tiniest objects. Can you imagine looking at atoms? So cool!



Hi, Temi! What first got you interested in physics?

I wasn't at first! But as my high school physics class progressed, my interest grew. I had lots of questions and always wanted to know how everything worked and the subject felt limitless. Then as I got good at physics, I became fascinated with the ways it complimented other sciences, and with the career opportunities.

After that, did you know you wanted to study physics further?

As a young girl who was good at sciences, I was encouraged towards life sciences and health sciences, like medicine, pharmacy and microbiology. But my cousin was a physicist, so when I decided to study physics at university, I knew I wasn't alone! It's a subject I love and I know my strengths. I also knew what I wanted to get out of it in the future and made a rough plan to get there. Choosing a combination of physics and electronics was a great way to keep my career options open.

Have you faced challenges along the way?

Some people still believe that physics is a man's world. In projects and practical work, I was often given minor tasks. If I made a mistake, it'd be excused because I was a woman – and less capable than a man at physics. I've had to prove myself twice as much.

I'm glad I've always had the support of my family, especially my dad. He told me I could be anything I wanted. My confidence carries me through the challenges. I know that all knowledge gained is helpful and I feel proud that I'm thriving in a male-dominated field.

Do you have a proudest moment?

Getting my Master's degree. I walked on cloud nine to get my certificate.

Do you have any advice for someone deciding what they want to study?

Go for what you are passionate about, as your career aspirations may change. Ask all the questions, think it, dream it – and make it happen.

Temi's research focuses on some of the tiniest objects in the universe – like atoms.

But what are atoms, and what can we use to see them?

“Choosing a combination of physics and electronics was a great way to keep my career options open.”

Jade May

Optical Engineer

My name is Jade and I'm an Optical Engineer at Valeo Vision Systems. I'm responsible for the quality testing of lenses and cameras for imaging systems that will eventually be used in self-driving vehicles! In my free time, whenever I can get it, I am a guitarist and a gamer.



Hello, Jade! What was your first experience of physics?

My first experience of physics was failing my pre-exam for Leaving Cert. I went back and read the whole textbook from start to finish – I just had to understand it! It clicked when I reached the section on magnetism. Before that, equations were just something to be learned. But **seeing equations where the variables weren't just interchangeable letters, they represented actual physical ideas... it was satisfying!** It felt elegant to be able to use an equation to describe something that I could actually visualise.

How did you get into your current job?

I worked with Valeo for my work placement in my third year of college. When I graduated, the COVID-19 pandemic was in full swing and there were very few jobs available because of all the uncertainty. But because Valeo knew and trusted me from working with me before, I was able to get a job within six months.

So, your work experience was important!

It made all the difference. It was the only work experience I had, but it was enough. If you graduate and aren't sure what your options are, I'd say **even one bit of work experience can make the world of difference.** Massive bonus points if it's in the same industry you want to work in. And if it's the same company you want to work with, even better.

“There's no alternative to being myself that is worth it.”

Did you ever face any challenges in pursuing physics?

In college, I was surrounded by people constantly making self-deprecating jokes about all physicists having something wrong with them. **Don't believe it!** Putting yourself down to make other people laugh eventually affects how you see yourself and no matter how much it might feel like it, it's definitely not a requirement for having a great college experience.

Now that I'm in the workplace, being openly trans is something that I'm still figuring out. I'm working on being less afraid to dress in ways that make me feel comfortable, regardless of whether people around me know why. I don't really know how I'm going end up saying it but from the experience of coming out to other people, eventually you just do. That's how I overcome the challenge; knowing that it'll pass no matter what because there's no alternative to being myself that is worth it.

What advice would you give your teenage self?

Do what makes you happy. The exact choice you make doesn't matter. What matters is that you know why you made it and that it was what you wanted. That's the single most valuable piece of advice I can give anybody.

Physics first clicked for Jade while reading about magnetism.

Can you find out what a lodestone is, and how ancient civilisations used their magnetism to create the first compasses?

Zain Kenny

Electrical Apprentice

Hello, I'm Zain and I'm a 2nd year Electrical Apprentice with King and Moffatt Building Services. We work all over Ireland and Europe to deliver industrial, pharmaceutical, food and residential projects.

I love food of all sorts a little too much, keeping busy anywhere I go and there's not a weekend that goes by that I am not fixing lights for someone.



Hi, Zain! Can you tell us what first sparked your interest in physics?

When my twin brother and I were nine years old, we found the Horrible Science Bulging Box of Books underneath the Christmas tree. Twenty of the funniest children's science books, right there. Every night for weeks, I fell asleep with one of these books in my hands – I couldn't get enough of them. I fell in love with the physics books especially. The science behind gravity, time, space and electricity all sounded like magic to me. To a nine-year-old, hearing that a feather and a bowling ball would fall at the exact same time if you dropped them on the moon, blew my mind! From then on, physics had me, and I wanted to learn more.

And you're still learning! Tell us more about your apprenticeship.

Doing an apprenticeship has so many advantages. I'm earning while I'm learning, while also gaining hands-on experience. I'm building a name for myself within a company straight from school, and I won't be under the burden of college fees. When I complete my apprenticeship, I know there are companies out there who can put you through college.

Do you have a favourite thing you've learned?

I remember in secondary school, my physics teacher started talking about solar panels and how they worked. We spent the whole class talking about renewable energy, how it was harnessed, stored and used. I learned that we could produce enough power for our whole country with only 3400 wind turbines! Physics holds the secret to pulling energy from thin air. This is my favourite memory because this is the class that sent the ball rolling in my head when it came to my career. I wanted to be involved in the construction, development and improvement of these systems,

from design to installation, and bring this world slowly into the future, one home or industry at a time.

Who inspired you as a teenager?

My mam was always supportive of anything my twin brother and I wanted to do but talked us through the advantages and disadvantages of each path. She always encouraged us to try our best in school, to always aim high and keep our options open. She showed me what it meant to be a hard worker: I knew I might not always be the smartest in the room or the fastest on the rugby pitch, but there wouldn't be anybody working harder to get what they want. My girlfriend's father also inspired me. He also started off doing the electrical apprenticeship when he finished. He showed me the doors the electrical apprenticeship could open and when I heard that you could apply physics and engineering practically with your own two hands, I couldn't turn it down as an option.

Do you have any advice for someone considering their options?

There are going to be a lot of people telling you what they think you should do. And even though these people have the best intentions, sometimes the advice can get overwhelming. Just follow your passion and do what's best for you. This world is huge, don't confine yourself to anything. There are so many routes into physics and it opens so many opportunities that can take you around the world and into the stars!

Zain mentioned that a feather and a bowling ball dropped on the moon would hit the ground at the same time.

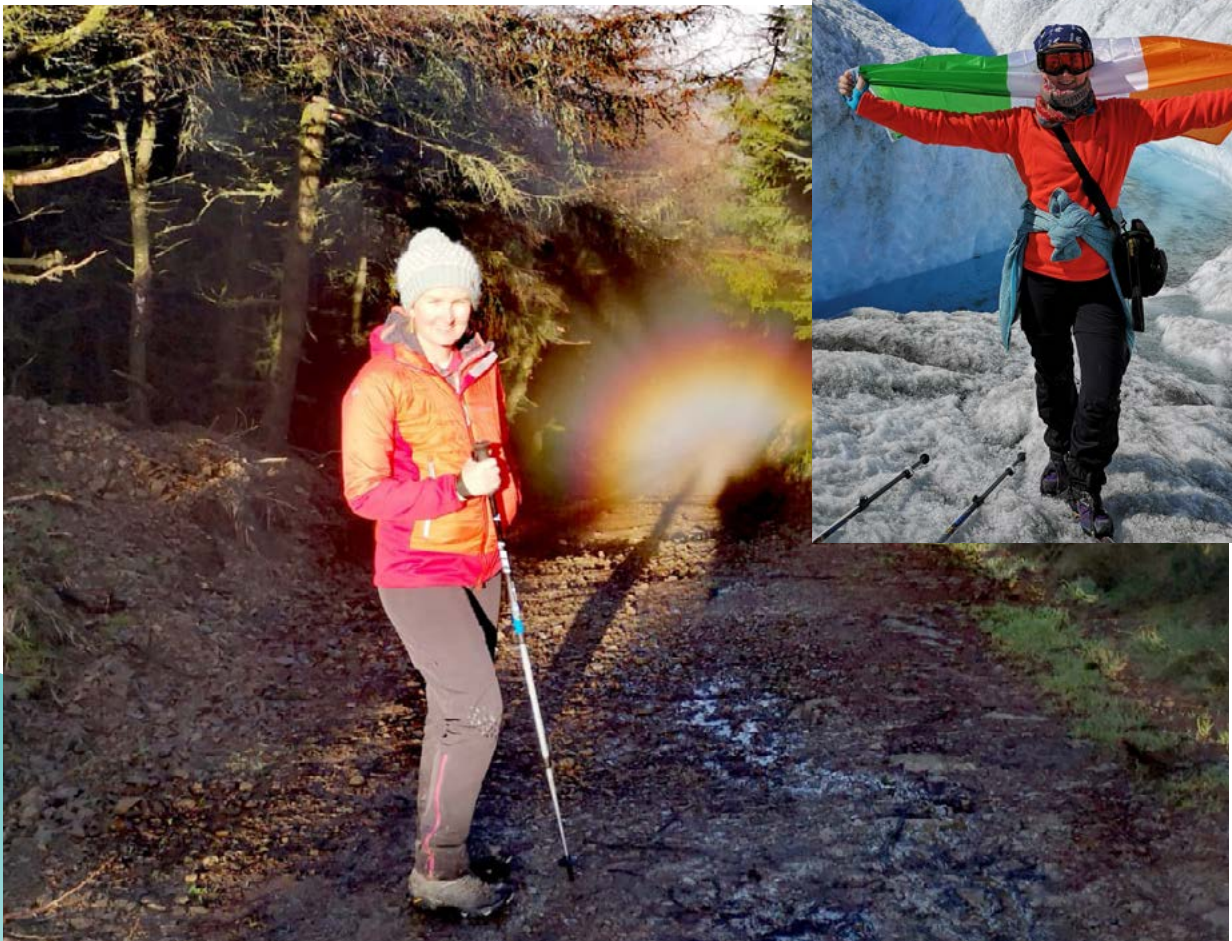
How? Is this different on Earth?

Emily Gleeson

Meteorologist

I'm Emily Gleeson and I'm from Thurles in Co. Tipperary. I went to school in the Ursuline Convent in Thurles and followed this with a degree in Physics and Chemistry from Maynooth University.

I won a scholarship to do a PhD in physics where I specialised in submillimeter astronomy. I worked on a project that involved designing radiation detectors for the European Space Agency Planck Surveyor satellite, which measured remnant radiation from the Big Bang.



I thought this would be the end of my formal education but it's true that you're always a student! When I started working as a meteorologist with Met Éireann, I went to UCD to study for a Masters Degree in Meteorology and more recently, I completed a diploma in Statistics in TCD and am on my second course of professional Irish. My hobbies include travel, especially to the Arctic, theatre, escape rooming, learning the drums in the National Concert Hall and hiking around Ireland.

Hi, Emily! Can you tell us what first got you interested in physics?

Learning science in secondary school! I always liked maths and then got into science and physics. The school I went to had great labs and all the equipment. My teachers definitely inspired me to study science.

How did you get into your current job?

Another student told me about jobs in Met Éireann. I love extreme weather, so I applied. And here I am!

Do you still use the physics you learned in secondary school?

Of course! Physics is problem solving, so the methods can be applied to any scientific or technical task. **I now lead a team in Europe who develop the physics of the weather model that we use for operational weather forecasting.** I specialise in solar radiation, radiation-aerosol interactions and surface physiography – so both surface and upper-air physics. My job requires lots of different skills. Problem solving, definitely, but also communication, adaptability, teamwork and patience.

“Every day is different and there are so many different aspects to the job.”

How did you get into your current job?

Another Ph.D. student told me about jobs in Met Éireann and I love extreme weather, so I applied. And here I am!

What do you like best about your role?

I love my job because it's also my hobby. **Every day is different** and there are so many different aspects to the job. And so many opportunities within the organisation! I work with so many fantastic people in Ireland and all over Europe.

Do you have any advice for someone who's considering studying physics?

To steal a line from Dr Seuss, **you can steer yourself in any direction you choose!** I've gone from submillimetre astronomy, to engineering in Intel, to weather forecasting, to climate change modelling, to short range numerical weather prediction model development. There are so many different paths.

How can physics explain extreme weather events, like hurricanes or drought?

Pathways to jobs

How to find your way

School and Higher Education

By choosing to study physics at Leaving Certificate, A-Level or International Baccalaureate you will discover how physics shapes our world. Physics encourages you to ask questions like: how do ships float or why is Jupiter so stormy?

If you decide to study physics at a university, institute of technology or college you will dive deeper into the physics introduced in secondary school. You will further develop your valuable problem-solving skills and logical thinking, all while having the opportunity to explore fascinating new areas like astrophysics, geophysics, materials and medical physics (to name a few)!

Further Education and Training

Further Education programmes are designed to give you a solid foundation in your area of choice. These courses are often designed in collaboration with industry, to ensure they're equipping you with skills employers value. A technical or science programme will provide you with the knowledge, skills and confidence necessary to prepare you for your next steps towards a career in science.

Choosing this route doesn't mean saying goodbye to physics. There is a growing demand for further training in the science sector and further education centres are providing courses to reflect this!



Apprenticeships

Apprenticeships are real, paid jobs with training programmes attached. They provide the opportunity to earn while you learn. There's a great range of apprenticeship options to choose from including – physics, engineering, laboratory technician or metrology!

Apprenticeships are designed by industry professionals, so they help you to develop valuable work-ready skills and knowledge. Your qualification and work experience will help you stand out to future employers and support your career progression.

All these options allow you to carve your own path to limitless possibilities. Choosing physics opens doors to a variety of career opportunities thanks to the skills and ways of thinking it teaches. You will not be limited to any one industry, and you will have the ability to solve to real life problems that you care about. Employers are often looking for transferable skills, not specific qualifications. You might have noticed from this booklet that finding your way is rarely a straight line. It is ok to change your mind and try other options. There is a route that will be right for you!

Supporting young people on their journey

As a family member, teacher, friend or mentor, you have a huge role in influencing your young person's choices and opinions. Every young person should have the chance to build their future and to change their world for the better. Now, more than ever, we need to support young people to tackle global challenges and make a positive difference.

Doing physics equips young people with an amazing range of skills – skills that can take them further into physics, or in another direction entirely.



Did you know that:



1 in 20 (or 1.85 million!)

jobs across the UK and Ireland make use of physics skills and knowledge.



Demand for physics skills

is widespread across critical industries, in **engineering, construction, manufacturing, energy** and **transport**, as well as in **business** and **finance, digital, teaching, health**, and the **public sectors**.



Physics skills and ways of thinking are

valuable to a wide variety of careers

and are valued and recognised by employers. In a **survey** commissioned by the IOP in **2020**,

78% of employers

across the UK's professional sectors, including **legal, sales, media** and **marketing** said that they have a positive impression when they see a candidate has studied physics to A-level or above.



Jobs related to physics are well paid



Demand for physics spans all skill levels

In fact, more than half of all jobs that demand physics do not typically require a university degree. Many require qualifications such as **A Levels, Highers, Leaving Certificate, apprenticeships** or **technical qualifications**.

Physics opens doors to some of the most exciting, cutting-edge, rewarding jobs in the world. From cancer treatment to tackling climate change, gaming, robotics, and artificial intelligence, physics and physicists are on the front line, helping to shape the future.

Top tips for encouraging enthusiasm:

- **Do be positive** and engage with your young person's interests.
- **Do take time** to look for role models and interesting information with them.
- **Do be mindful** when talking about subjects like physics that you're not falling back on stereotypes. Physics is for everyone – and it's about so much more than a solitary genius working through a page of equations.
- **Do help** your young person to find communities and connect with like-minded friends and mentors.
- **Do empower them** to be confident in their choices.



To:

**the teachers who show us,
the mentors who guide us &
those who dare to achieve their dreams.**

**The Institute of Physics would like to sincerely thank
all of our contributors for sharing their stories, journeys
and advice.**



iop.org/LimitLess

Limit Less is the campaign to encourage and support young people to change the world and fulfil their potential by doing physics. It seeks to challenge the misconceptions and stereotypes about the subject and remove the barriers to young people doing physics beyond the age of 16.

Parents, carers and teachers: sign up as a Limit Less supporter to receive more information and updates on the campaign by visiting: iop.org/strategy/limit-less

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