University of Glasgow

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Schedule

19.40	Alicia Gardiner
19.50	Connor Inglis
20.00	Senthilkumar Subramanian
20.10	*Interval*
20.30	Alan Das Mannoosseril
20.40	Sundas Rafat Mulkana
20.50	Maria Psarra
21.00	*Interval*
21.10	Alban Joseph
21.20	Marina Gladikh
21.30	*Interval*
22.00	Audience votes collected

Introduction

Welcome to our 2024 Science Slam!

Over the years, Science Slam has involved almost 70 PhD students, some dancing, some drawing, some drinking, some sort of vaguely science-related music, puppets, a ukulele, some dinosaurs and one amazing host!

We really are lucky at Glasgow to have such original, creative and skilled research students and it is always especially exciting to hear them talk about their work at this event. The Science Slam is such fun to work on and despite many years' experience delivering this event, it remains impossible for me to ever predict the winner.

I love this event because it gives people new things to talk and think about, because it makes them argue (or debate if you prefer) and because it leaves them knowing a bit more about some often pretty important and actually fascinating stuff than they did before. So I hope you will be very excited to learn about robots, acoustic metamaterials and space dust and much more!

Thanks to: Jamie Gallagher for delivering his always exceptional training for the presenters (and who presented himself in the first ever Science Slam), Sian Bevan - The Amazing Science Slam Host, Jacqui Dunbar, our photographer, Cottiers, and, of course, all the other people who have come together to support our night of science and fun!

Heather Lambie
Graduate School/DTHub Manager

Audience Instructions

A science slam is a mirror of democracy. IIt has a simple voting process that could quite easily go wrong and result in the wrong person winning. The instructions are as follows:

Each table represents a voting cohort. As a table you must become a unified voice and select your top three participants. Your **number 1** choice will get **10 points, number 2, 7 points** and **number 3, 5 points**. We will then add all the points together and hope that this results in an actual winner, rather than 8 people with the same number of points. Please use discussion, persuasion, innovative systems within systems to decide on your group's **top 3**. If this doesn't work, a hastily convened judging panel will take over and use their will to impose an oligarchy instead.

Voting rules:

1. The winner will receive £500 so **use your votes wisely**.
2. **No** resorting to **violence**.
3. **No bribing** your cohort.
4. **No swapping** your votes for cash.
5. **No nepotism**.

A note about our host

Siân Bevan is a writer, performer and producer based in Edinburgh. As well as hosting events for all ages, Siân writes articles, scripts and stories and is currently researching translating data for younger audiences, and creating events for Edinburgh Science. Occasionally she remembers to update her website: **www.sianyb.com** (Twitter: @sianbevan)

19.40

Alicia Gardiner

A journey through Middle-Academia:
The quest to manufacture Acoustic Metamaterials

Good day fair traveller, and welcome to my tavern. Your journey was far, I'm sure, and your legs ever so weary. Allow me to pour you some ale and recount a tale from many moons past. Sit back, relax, and let me take you on a journey across Middle-academia, from the un-ending depths of Literature Lagoon to the barren wasteland of Thesis Plains. You may enjoy a leisurely stroll across Procrastination Peaks, but beware, take a wrong turn in WorkWood and you may find yourself in the fearsome Write-Up Badlands – where grammar corrections can smite you at any moment. I digress, this tale is about a brave adventurer, whose name is known to history only as "PhD student". I implore you to put yourself in this explorer's shoes as I tell you a story most woeful and frightening.

We start in the humble undergraduate shire when a mysterious wizard presents you with a seemingly impossible task. You must deliver the one thesis into a dark and evil place (UofG Graduate School) in order to contribute significant knowledge to the understanding of the additive manufacture of acoustic metamaterials. The voyage will not be easy, traveller, it will be plagued by: failed experiments, burnout, and the most fearsome – reviewer 2 comments! Your journey begins now…

19.50

Connor Inglis

Frustrated under pressure
and how to keep cool

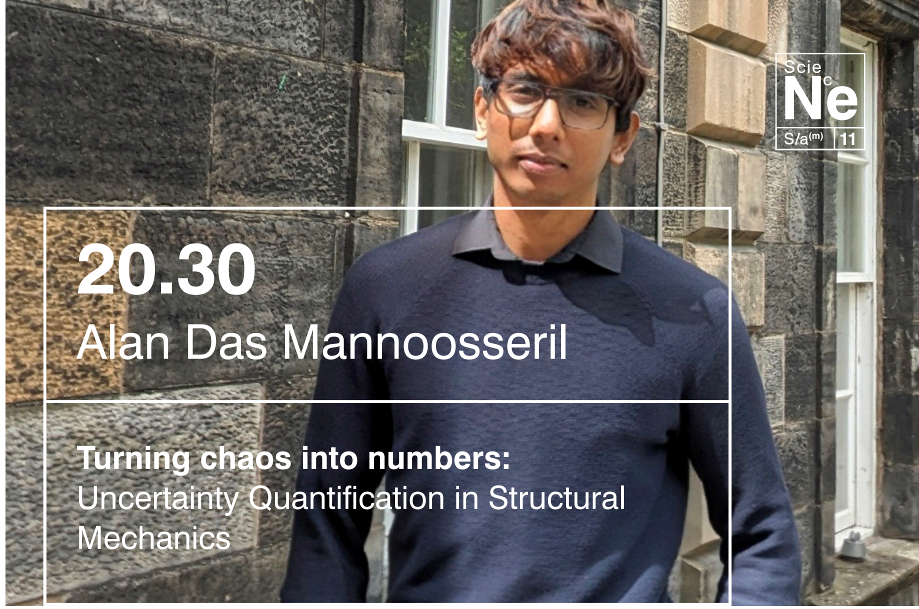
Refrigeration plays an integral role in our daily lives, although we may often forget it's importance.
Fridges condense gas into a liquid and vaporise them back into a gas hundreds of thousands of times to keep our food cold. But as amazing as these devices are, they are also a contributor towards greenhouse gas emissions. The refrigerant gases are toxic to the environment and can leak into the atmosphere if not disposed of correctly. What if instead of using gases, we used a solid instead? A solid that can heat and cool just like a gas but without all of the nasty risks. In this talk, let's go on a journey and imagine how we can make this a reality – and possibly change the world!

20.00

Senthilkumar Subramanian

Space dust is unromantic

In recent decades, we've developed methods to reach nearby planets in splendour. But one thing is still unknown, which is crucial for safe and sustained planetary missions! That is the dust behaviour on a planet during a rocket landing. Rocket exhaust hits the planet surface upon landing, ejecting soil particles as dust clouds. On Earth, flying dust isn't a problem. Why does it matter on Mars and the Moon? The explanation is in the planet's composition. First, Mars and the moon have less gravity than Earth, therefore less force to dampen floating dust. They have little or no atmosphere. Ejected dust particles may travel far. The dirt particles were sharp due to the dry atmosphere. This sharp particle travelling at bullet speed across long distances might injure everything in its path. Hence, for a safe and viable planetary mission, ejected dust particle behaviour must be understood. To study dust behaviour, I reproduced the planetary landing in a massive vacuum chamber and used powerful laser devices to track the ejected dust. The massive plume-regolith facility vacuum chamber is meant to examine lunar and Martian dust behaviour. I used simulants to replicate planetary dust. A scaled rocket mimics the lander. Laser imaging tracks and maps ejected particle paths. This experiment can assist in reducing landing dust and its influence on lander instrumentation. This will improve forecast models and rocket landings for future planetary missions.



20.30

Alan Das Mannoosseril

Turning chaos into numbers:
Uncertainty Quantification in Structural Mechanics

Ever wonder how engineers ensure cars, planes, ships, or any structures work safely?

I'm one of the researchers diving into the nitty-gritty of this problem to make sure they are reliable and safe. Apart from prototypes or experimental testing, we usually rely on fancy computational methods to predict how things will behave, using high-resolution models and even supercomputers to up our game. However, we've got these pesky uncertainties or unknowns—from geometry, material properties, or several other physical conditions to sometimes just plain imperfect modelling. It is essential to evaluate, manage, and quantify these uncertainties carefully to make reliable predictions.
I'm tackling this with some next-level math—stochastic finite element analysis, statistics, and probabilistic methods.
We're crunching data to figure out where we can afford some imperfections without everything going berserk. And it gets spicy: we're bringing in random matrix theory to really nail down these uncertainties, especially for tricky stuff like large complex structures, such as an aircraft. But why, you ask? Join me, and I'll enlighten you about this matrix world.
And who knows, maybe one day, you'll thank a mathematician for your safe flight! Because we're not just making stuff that works; we're making stuff you can trust with your life.

20.40

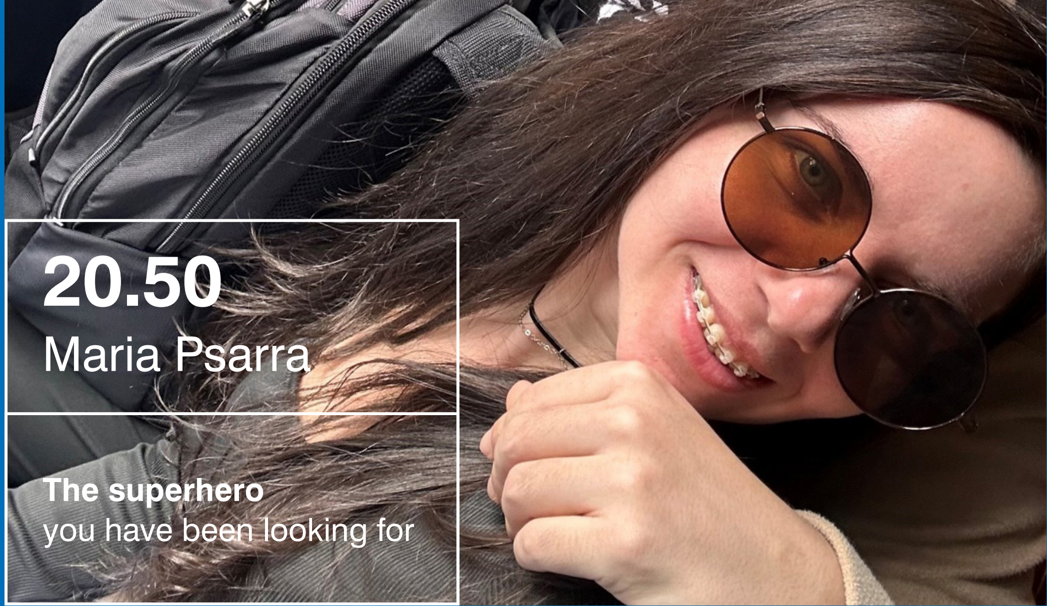
Sundas Rafat Mulkana

Robots Among Us: Crafting Safe, Collaborative Companions

Imagine a future where robots aren't just stuck in factories following strict rules, but can work alongside us in our homes and public places. These advanced robots learn from their experiences and have shown great potential in labs. However, putting them in real-life situations raises alarming safety concerns. We need to ensure they don't accidentally harm us physically or mentally.

To tackle this, we're developing new ways to keep robots safe around humans. These methods ensure robots are aware of how close they are to us and move in a way that won't cause harm. We also want to see how these safety measures affect how well robots do their tasks and how easy it is for us to work with them. By getting feedback from people interacting with these robots, we aim to refine their behaviour.

Our main goals are to create safety methods that don't hinder robot performance, teach robots to adapt to human actions in real-time, and find out which robot movements people prefer when working together. The results of this research will help bring safe, collaborative robots into our social lives, healthcare, and workplaces. By focusing on safety and natural interactions, we hope to make human-robot teamwork safer and more effective.



20.50
Maria Psarra

The superhero
you have been looking for

What if I was to tell you that there are superpowers in things that initially seem ordinary?

Bruce Wayne was just an ordinary kid, but after seeing the murder of his parents in front of his eyes, he swore vengeance against the world of crime in the name of justice. He does not have superpowers apart from his thirst for revenge, which motivates him to constantly stay fit physically, and mentally sharp. He embraced his fear of bats and made that fear his biggest strength. And so, he became Batman. But even superheroes have their low moments... And that is when our loved ones will stay by our side to help us rise.

Let's consider a specific scene from the movie 'Batman Begins'... Young Bruce Wayne is playing in the garden of his father's mansion, but while Bruce and his friend Rachel were looking for an antique arrow, Bruce falls into a well full of scared bats, causing him to freak out, but also fracture his arm. Luckily, his friend Rachel was still outside the well, and she rushes to Bruce's father Dr Wayne to inform him of the incident, and he comes along to the rescue along with butler Alfred Pennyworth. Alongside with Alfred, Dr Wayne, helps young Bruce out of the well, and while he is carrying Bruce to his bedroom he asks Bruce this question: 'Why do we fall, Bruce?'. He then then proceeds to answer his own question: 'So we can learn to pick ourselves up'...

That phrase is all I want you to remember. Now let's see how that can combine with Singlet Fission...

21.10
Alban Joseph

Spin there, done that:
putting a spin in
Quantum Computing

People have been saying that quantum computers are the greatest thing since sliced bread, and it's easy to see why.

These incredible machines are predicted to have a profound impact on society, revolutionising everything from drug discovery to cryptography. But what exactly are quantum computers? Well, instead of using classical bits, these devices harness the properties of quantum particles to perform calculations! One of the coolest ways to achieve this is by using the spin of atoms or subatomic particles.

In this talk, we'll explore what spin actually is. We'll discuss how to control it, using electromagnetic waves, and how controlling spin can help quantum computers work their magic. Hopefully, by the end, you will understand a little more about the vast potential of quantum computing and the core concepts behind this revolutionary technology.

21.20

Marina Gladikh

How Chemists are Solving Decade-long Challenges with Automation

Have you ever wondered how chemists manage to roll out new materials, drugs, soaps and detergents, plastics, you name it; faster and better than ever done before? How can we do thousands of reactions in mere hours? And then carry out complex analysis that allow us to garner knowledge which serves man's every need.

Over the last 100 years, the technological take-over tip-toed behind us, levelled with us…Finally sprinting ahead, leaving no part of our daily lives untouched. We too, as chemists, have reaped the rewards. Intricate robots and machinery seamlessly ran by algorithms and AI tools, help us streamline our workflows and achieve our goals more efficiently.

However, I am an inert chemist, I spend my days fighting against the things we don't pay attention to. In my lab, air and water are my biggest enemies. To an inert chemist, the awesome dispensing robots that can accurately prepare hundreds of reactions in the blink of an eye and automatic columns which can purify your compounds with the click of a button are the forbidden fruits one can only dream of. Those working at indetectable levels of air and moisture still heavily rely on manual techniques, slowing them down.

Join me in exploring how I, with others from my group, design, develop and test automation technologies that tackle problems and solve challenges beyond our reactive atmosphere.

22.00

Audience votes collected