



# EPSRC CDT in Aerosol Science Annual Conference 2024

30<sup>th</sup> April & 1<sup>st</sup> May 2024





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Annual Conference 2024

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Please view our conference [Code of Conduct](#) to ensure all delegates have an enjoyable and fulfilling experience during our event.



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# Welcome

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Welcome to our fourth annual conference!

Bringing together the CDT's students, academics and industrial partners, our annual conference provides an exciting opportunity to discover and discuss the latest developments in the CDT's research.

This year is an exceptional year as we will be celebrating the recruitment of our 5th cohort of students, currently undertaking our training. We will also say congratulations and farewell to our 1st cohort of students who will have graduated and be starting their careers as aerosol scientists.

Our students will give updates on their progress, whilst our plenary speaker and panel line-ups will bring fresh perspectives to the community. We hope that this will be an insightful occasion for our multi-disciplinary network of aerosol scientists, researchers and partners to catch up and ignite further collaboration!

By attending the 2024 conference, you will learn more about the training, mentoring, resources and opportunities available within the CDT.

We wish you an interesting and enjoyable conference.

The Core Team, Aerosol Science CDT



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## Plenary Speaker

### Professor Buttini Francesca

Food and Drug Department, University of Parma (Italy)

### **Formulation of Micro- and Nano- Engineered Particles for Pulmonary Delivery**

This talk will present a series of research results aimed at developing innovative inhaler products capable of efficiently delivering drugs to the lung. Inhalation administration represents the method of choice for the treatment of local pathologies but also a possible alternative route to parenteral for the administration of molecules with systemic targets.

The presentation will show data on inhaled antibiotic powders for the treatment of infections in patients with cystic fibrosis or tuberculosis. Instead, the development of a lidocaine respirable powder has been proposed for the suppression of chronic cough. Thanks to the addition of sodium hyaluronate, this powder would allow bioadhesion of the particles to the epithelium and a prolonged release of the drug.

In a further work, calcium phosphate nanoparticles inserted in mannitol microparticles were used to deliver a mimetic peptide capable of restoring the contractile activity of the myocardium to the cardiomyocytes. Finally, inhalation powders containing lactobacilli were developed for the first time to modulate the lung microbiota and provide an antibacterial effect against pathogens.

All the results and projects were designed keeping in mind the ease of administration for the patient and selecting inhalation devices suitable for the therapies.

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# Thank you Conference Sponsors

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Plenary Speaker Sponsor:



Dragons' Den Sponsor:



Poster Award Sponsor:



# Thank you Tier 2 Partners

## Building National Capability

Tier 2 partners (all employees) receive access to the following for just £5K/year: Access to training resources covering topics such as size distributions; aerosol mechanics; nucleation; optical properties and more • 50 hours of lectures from leading experts in aerosol science • Multiple choice problems and interactive smart worksheets to test learning • Detailed lists of further reading in aerosol science • Access to webinars from leading experts around the world • In-person training working on real-world aerosol science problems in multidisciplinary teams (pre-booking necessary).



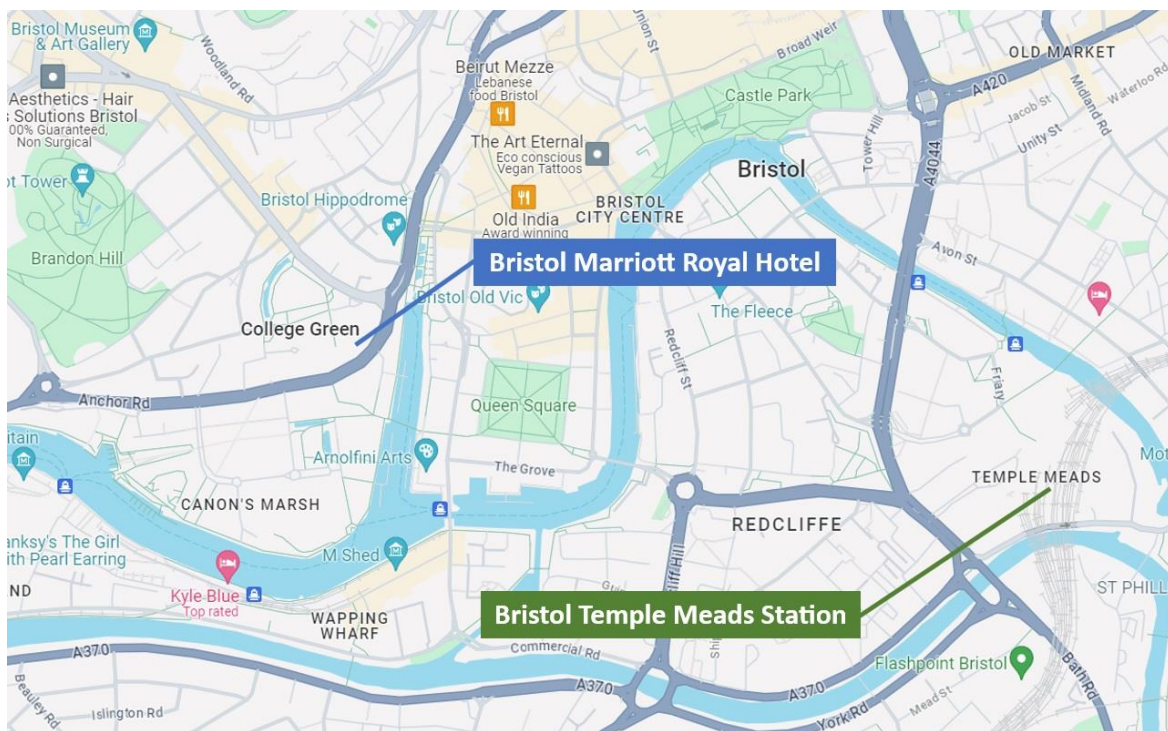
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## Venue

### Bristol Marriott Royal Hotel

Marriott Royal is a precious restored Grade II listed Victorian building, it is located perfectly in Bristol city centre and sits adjacent to the Bristol Cathedral. It is a short walking distance from Bristol Temple Meads train station.



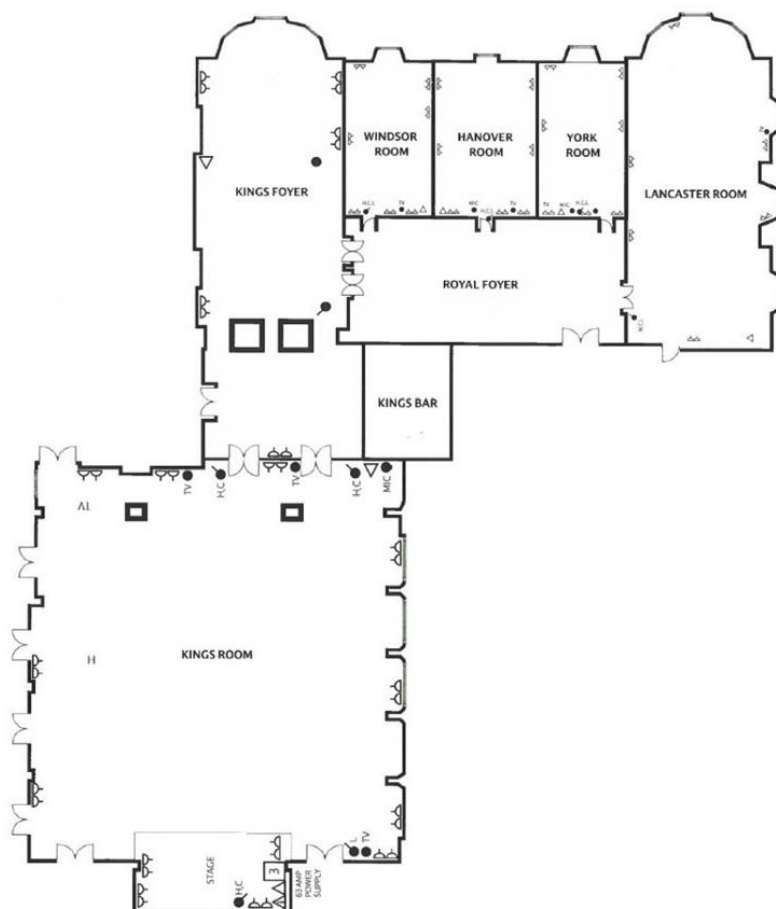
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## Venue

# Bristol Marriott Royal Hotel

## Floor Plan





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## Agenda

### Tuesday 30th April 2024

Time	Activity
10:00	Arrivals, Registration and Workshop by <b>Presspart</b> : Next generation inhalation drug delivery devices (10:30 start) 
11:00	Welcome
11:05	Cohort 3 Oral Presentations - Fundamentals and Microphysics
 11:05	<i>Presentation by Conference Sponsor <b>Cambustion</b></i>
11:10	Evaporation kinetics of multicomponent aerosol droplets by Barnaby Miles (University of Bristol)
11:25	First-principle models to predict the evaporation and crystallisation of a saline droplet by Benjamin Mignot (University of Leeds)
11:40	Droplet surface tension measurements on microsecond timescales from single picolitre droplets and collisions of aged droplets by Isabel Quant (University of Bristol)
 11:55	<i>Presentation by Conference Sponsor <b>Nanopharm</b></i>
12:00	Microdroplet Surface Impact Dynamics: Exploring the Stick-to-Bounce Transition by Jamie Mclauchlan (University of Bath)
12:15	Development of a constant concentration particle source by Kelvin Risby (University of Cambridge)
12:30	Lunch

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## Agenda

### Tuesday 30th April 2024


Time	Activity
13:30	Cohort 4 Posters
14:45	Break
15:00	Cohort 3 Oral Presentations - Health Impact and Measurements
15:00	Air Pollution and Human Health by Samuel Hyman (The University of Manchester)
15:15	Cardiohepatic Impacts of PAH Pollutant Phenanthrene by Joe Morris (The University of Manchester)
15:30	Collection of particles in liquid droplets using Electrostatic Precipitators by Priya Chopra (University of Hertfordshire)
15:45	Adhesion Testing Plasma Treated Inhaler Canisters by Mahmoud Ahmed (University of Bath)
16:00	Transfer learning approach for aerosol particle scattering image classification by Skhathi Mthembu (University of Hertfordshire)
16:15	Phase Shift Photoacoustic Spectroscopy of Light Absorbing Aerosols by Gwen Lawson (University of Bristol)
16:30	Dragons Den pitches (videos – sponsored by Merxin)
16:50	Closing Remarks followed by Networking & Drinks Reception
19:00	Dinner & Dragons Den Award Ceremony

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## Agenda

### Wednesday 1st May 2024

Time	Activity
09:00	Arrivals, Registration
09:30	Cohort 3 Oral Presentations - Environmental Aerosol
09:30	Jet aircraft lubrication oil droplets as contrail ice-forming particles by Joel Ponsonby, Imperial College London
09:45	Ice-nucleating ability of Icelandic dust by Polly Foster, University of Leeds
10:00	Using explainable machine learning to better understand source and process contribution to atmospheric bio-aerosol by Hao Zhang, The University of Manchester
10:15	Clearing the Air: Unveiling the Impact of Indoor Air Quality on Human Health by Prem Kumar Perumal, University of Bristol
10:30	Investigating radical processes at the surface of secondary organic aerosols by Abi McConnell, University of Leeds
10:45	Break
11:15	Cohort 5 Posters
12:45	Lunch & Workshop by <b>TSI</b> at 13:15: Aerosol Dynamics: Conditioning, Transport and Losses 

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## Agenda

### Wednesday 1st May 2024

Time	Activity
13:45	Plenary Speaker: Professor Francesca Buttini Formulation of Micro- and Nano- Engineered Particles for Pulmonary Delivery
14:45	Panel Discussion: Aerosol Science in the Context of Global Challenges  Aerosol science is at the forefront of addressing some of the most significant global challenges, from COVID-19 to pandemic preparedness and vaccine delivery, through to climate change and the potential of geoengineering, net zero and indoor air quality, and sustainability and the manufacture of new materials. In addressing any of these challenges, we must ensure that the "solution" doesn't become our next global challenge by innovating responsibly. We will explore how aerosol science can work with society to make a cleaner, greener and more healthy world, informing policy and deliver innovation.
15:30	Break
15:45	Panel Discussions: Global challenges in CDT Thematic Research Groups
16:45	Poster Award (sponsored by NPL) and Closing Remarks
<b>End of Annual Conference 2024</b>	
<b>NEW CDT 2024 LAUNCH EVENT</b>	
18:00	Drinks reception in Palm Court
19:00	New CDT launch banquet dinner

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## Agenda Partners' Workshops

Tuesday  
30<sup>th</sup> April  
Hanover Room

10:30-11.00

Next generation inhalation drug  
delivery devices - Presspart



H&T PRESSPART

Wednesday  
1<sup>st</sup> May  
Hanover Room

13:15-13.45

Aerosol Dynamics: Conditioning,  
Transport and Losses - TSI



**Next generation inhalation drug delivery devices** by Dr. Anselm Ebert,  
Business Development Director

Even though no major changes in regards to devices were foreseen for the inhalation space, the upcoming introduction of lowGWP propellants has lead to a detailed look at all components needed for the MDI. Taking the propellant discussion in consideration, Softmist device developments have surged and will establish themselves stronger in the current inhalation device portfolio. Last but not least, DPI devices will play a significant part, not only because of the lowGWP discussion, but also because of new spray dried molecules establishing themselves in the inhalation space. The talk by H&T Presspart will touch upon all these topics and give insights into new developments, current hurdles and actions to overcome those. H&T Presspart is a market leader in the manufacture of respiratory drug delivery components and devices and has 4 European manufacturing sites in Germany, Spain, Switzerland and the UK.



**Aerosol Dynamics: Conditioning, Transport and Losses** by Dr Agnieszka Carvalho and Dr Carsten Kykal

Understanding what happens with aerosol before it reaches the measuring instrument is just as important as selecting the right measurement technique. In this workshop, learn about aerosol behavior, how to setup your experiments, avoid common pitfalls, optimize the sampling line and more.

# Panel discussion

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Topic

Wed 1<sup>st</sup> May

Room

## Aerosol Science in the context of Global

Challenges panel discussion and Q&A

14:45 – 15:30

Main Kings Room

Chair: Prof Adam Boies



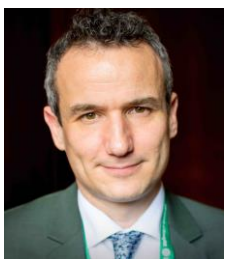
**Prof Francesca Buttini** - Francesca Buttini is currently holding an Associate Professor position at the Food and Drug Department, University of Parma (IT) and where now she is leading the unit dedicated to design of pharmaceutical products for inhalation. In 2014, she was appointed as Visiting Lecturer at the Institute of Pharmaceutical Science of King's College London (UK). Combining her background in pharmaceutical technology, regulatory aspects, and device design, she is executing research programs aimed to deliver medicinal products that take into consideration the patient, industrial and regulatory requirements. Up to date, she has published more than 90 original papers and as a result of her research achievement she obtained in 2017 the DDL Emerging Scientist Awards from the UK Aerosol Society. Francesca Buttini is a founder of PlumeStars, an innovative SME, dedicated to development of orphan drug products to treat lung and systemic disease by inhalation therapy.



**Viv Kuh** - Vivienne Kuh is a Lecturer in Responsible Innovation at the University of Bristol. She has been working on RI within a diverse range of disciplines in science and engineering since 2016, in EU and EPSRC funded projects, and has a particular interest in engaging publics in the co-imagining of desirable futures with science and technology. Recently, Viv has been leading the Aerosols in School project, working with Aerosol Science students and children at St Werburghs Primary School in Bristol to explore air quality in inner city Bristol through the lived experiences of the children living there.



**Rachael Smith (UKHSA)** - A biophysicist by background, I have led the Toxicology Department's Experimental Toxicology Programme within UKHSA's Radiation, Chemical and Environmental Hazards Directorate since 2022. I previously led the Nanoparticle Inhalation Research Group, managing the development of the nanoparticle inhalation facility. Key research interests include: the deposition, clearance, translocation (toxicokinetics) and toxicity of inhaled particles; the development and use of 'alternative' (in vitro) testing approaches using aerosol exposure to air liquid interface (AE-ALI) systems; and regulatory testing requirements for nanomaterials.



**Prof Francis Pope** - Professor Francis Pope (School of Geography, Earth and Environmental Sciences, University of Birmingham) is an expert on the causes and effects of air pollution, climate change, and resilient cities. He draws together and synthesises evidence from multiple disciplines, including the natural, medical, and social sciences. A key component of Francis' research is the understanding of aerosol processes and how they relate to the causes and effects of air pollution and climate change. His work is global in scope with projects in the UK, Europe, Africa and India.



**Dr Asher Lawrence-Cole** - Asher Lawrence-Cole is the Head of Science Response at DfT, jointly leading the Resilience Science team and ensuring that DfT has the right scientific advice in a crisis. Asher previously led DfT's science cell from the start of the pandemic in 2020, working on all aspects of COVID-19 transmission on transport. Previously he has been a government scientist working in natural hazards and national security.

## Cohort 4

### Posters

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The Structure of exhaled droplets and aerosols

by **Faizan Ahmad** (University of Leeds)

Towards a better understanding of the lifecycle of the pesticides in the atmosphere

by **Ujjawal Arora** (The University of Manchester)

Digital Microfluidic Lab-on-a-chip for multiplex detection of biomarkers in exhaled breath

by **Daisy Ashton** (University of Hertfordshire)

Microbial surface and genomic effects following aerosol transport

by **Simon Bate** (University of Bristol)

Identification and quantification of plastic polymer compounds via Pyrolysis Gas Chromatography Mass Spectrometry

by **Henry Blake** (Imperial College London)

Time-resolved Photochemistry of Organic Solutes in Aqueous Microdroplets

by **Conlan Broderick** (University of Bristol)

Field Effected Aerosol Assisted Chemical Vapour Deposition (FE AACVD) of Thin Film Materials

by **Joshua Buckingham** (University of Bath)





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## Cohort 4

### Posters

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Factors influencing contrail observability in satellite images

by **Oliver Driver** (Imperial College London)

Developing microfluidic platforms to generate PLGA nanoparticles for alveolar drug deliver

by **Melih Engur** (Imperial College London)

Responsive Aerosol: A Design Framework for Aerosol with Required Properties

by **Sorrel Haughton** (University of Bristol)

Interactions of SARS-CoV2 and Influenza Viruses with Particulate Matter Air Pollution

by **Erin Kiely** (Imperial College London)

Radioactive Aerosols in Wall-Bounded Turbulent Flow

by **Gregory Marsden** (University of Bristol)

Analysis of Ash for Near-Vent Volcanic Lightning

by **Thomas O'Hara** (University of Bristol)

Assessing the airborne stability of influenza A virus

by **Kennedy Peek** (University of Bristol)





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## Cohort 4

### Posters

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Next-Generation Nasal Drug Delivery Exploiting non-Newtonian Fluids and Smart Thermoresponsive Materials

by **Hessam Rasooli Nia** (University of Hertfordshire)

Initial Characterisation Results of the Dekati<sup>®</sup> Oxidation Flow Reactor (DOFR<sup>™</sup>)

by **Stephen Robertson** (The University of Manchester)

Health implications of airborne tyre and brake wear particles

by **Siriël Saladin** (University of Cambridge)

Developing and deploying new sensors for in-situ monitoring of cloud

by **Charlie Stainton-Bygrave** (The University of Manchester)

Photoinitiated Chemistry in Single Levitated Aerosol Droplets using Cavity Ring-Down Spectroscopy

by **Xu Zhang** (University of Bristol)

## Cohort 5

### Posters

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Dry Water for Future Inhaled Medicines

by **Oluwatoyosi Akande** (University of Hertfordshire)

Chemical and toxicological properties of aerosol emissions subject to atmospheric processing

by **Joseph Bainbridge** (The University of Manchester)

Particle-surface Adhesive Forces and their Role in Resuspension Phenomena

by **Patric Boardman** (University of Bath)

Stability of dry powder formulations used in drug delivery to the lungs studied one particle at a time

by **Anna Catton** (University of Bristol)

Combining state of the art real-time multi-technique optoelectronic bioaerosol spectrometry with neural network algorithms to discriminate, monitor and model different biological aerosol emissions from agriculture

by **Zhuo Chen** (The University of Manchester)

Ice Nucleation in Aerosols Containing Biomolecules

by **Fraser Crawford** (University of Bristol)



## Cohort 5

### Posters

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Development of a Novel Single Droplet Mass Spectrometry Approach to Investigate Interfacial Photochemistry in Aerosol Droplets

by **Nathan Croll Dawes** (University of Bristol)

LLPS and Aerosol Optical Properties Measured Using Cavity Ring Down Spectroscopy

by **Ruaridh Davidson** (University of Bristol)

Organ-on-chip - the end of animal testing?

by **Felix Dobree** (Imperial College London)

Data-informed modelling of aerosol resuspension under aerodynamic loads

by **Nicolas Duthou** (University of Bristol)

The impact of environmental conditions on the prevalence and aerosol transmission of *Streptococcus pyogenes*

by **Phoebe French** (Imperial College London)

Model systems for exchange of liquid between different aerosol sources

by **Ryan Hyde** (University of Bath)



## Cohort 5 Posters

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Optimising the performance of air cleaning technology for mitigation of infections in hospital environments

by **Anushi Khandare** (University of Leeds)

Early Life Air Pollution Exposure and its Lasting Effects on the Lung: Understanding how early exposure to pollutants can develop asthma

by **Armin Markazi Omidvar** (The University of Manchester)

Aerosol emissions from aviation and their impact on climate

by **Kexin Qiu** (University of Leeds)

Investigation of novel methods to study the survival of foot-and-mouth disease virus in aerosols

by **Charlotte Reston** (University of Bristol)

Hydra - Hydrogels for Aerosol Capture

by **James Summers** (University of Hertfordshire)

High-dose antibiotic inhalers for acute lower respiratory tract infections in primary care

by **Xiaojie Sun** (University of Bath)



## Cohort 5 Posters

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Using Experiments to Develop Understanding of Nanoparticle Activation to Inform Contrail Models

by **Emily Winter** (Imperial College London)

Transmission of bacterial resistance genes in aerosol

by **Xia Yi** (University of Bristol)

Improving aerosol and spray process computational fluid dynamic models with machine learning approaches

by **Oscar Zhang** (University of Leeds)

Hygroscopic dynamics of solution phase aerosol on generation and inhalation to the lungs

by **Nan Zhou** (University of Bristol)



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## EPSRC Centre for Doctoral Training in Aerosol Science

### Core Team

- Prof Jonathan Reid – CDT Director
- Dr Rachael Miles – CDT Course Manager
- Dan Hardy – CDT Deputy Course Manager
- Paul Lacey-Drake – CDT Administration Manager
- Yaelle Hartley – CDT Partnerships Manager
- Ka Man Kam – CDT Administrator

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