## **Research Excellence Celebration**

Wednesday 14 December 2022





## Welcome





## **Extremism: A Philosophical Analysis**

Professor Quassim Cassam





## Improving care for sporadic or recurrent miscarriage

**Professor Siobhan Quenby** 





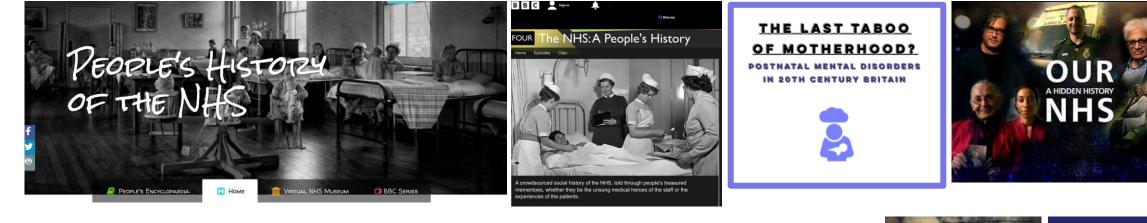
## **Patients and Prisoners, Migrants, and Mental Health** Research in the Centre for History of Medicine

**Professor Roberta Bivins** 





#### **Two Decades of High Impact Research**







SUPPORT US S







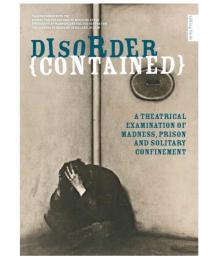
#### **Developing Health Humanities at Warwick**



Health Humanities Lead: Roberta Bivins

Co-lead: Eivor Oborn

The greatest challenges in health and medicine elude straightforward solutions. Technology won't end health inequalities or workforce fatigue and demoralisation. Organisational stagnation and obesogenic environments won't yield to single discipline approaches.





Motherhood? Postnatal Mental Disorders in 20th Century Britain



We're changing the world. Are you ready? The Health GRP works with a range of partners to address global health issues through research.

Our academics work across disciplines, providing pioneering research into the health challenges that affect us all.



**DNA at Britain's Borders** 



<u>'Hazardous Hospitals:</u> Cultures of Safety in the NHS"



HOME

WHERE

IS

THE

The Child's Speech: speech therapy, stammering and activism in Britain, c.1906-2000





## A New National Electron Diffraction Facility

Dr David Walker





## **Research Technology Platforms (RTP)**

- 12 core central facilities in Faculty of Science, Engineering and Medicine
- Provide access to state-of-the-art instrumentation and expert staff providing training, support and scientific input
- X-ray Diffraction RTP located in Materials & Analytical Science building
- University's aim is to support the strategic development, implementation and management of leading-edge infrastructure and equipment to enable world-class research







## **X-ray Diffraction RTP: Key Science Areas**



• Organic chemistry

- Ferromagnets, ferroelectrics, superconductors
- Semiconductors, solar cells, power electronics
- Polymers, nanomaterials
- Battery materials, catalysts, energy storage materials
- Amorphous materials

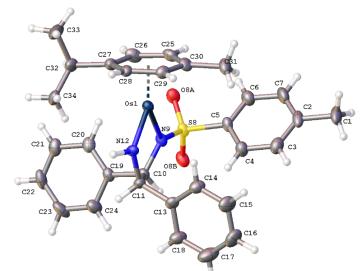
Capability to study materials at non-ambient conditions, e.g. *in-situ* XRD of charging cycles in battery pouch cells





## **Why Electron Diffraction?**

- X-rays have been used for > 100 years to solve structure of crystals
- Important to understand the structure of a crystalline material in order to understand other key properties
- Even with powerful X-ray light sources, crystals > 1  $\mu$ m size are required to solve crystal structure
- Many key materials are difficult/impossible to grow into suitably sized crystals
- Use electrons instead of X-rays:
  - Electron interaction with matter ~10,000 x stronger than X-rays
  - Much smaller crystals required (10-500 nm in size)
  - Very sensitive to light elements, e.g., hydrogen, lithium







## **National Electron Diffraction Facility**

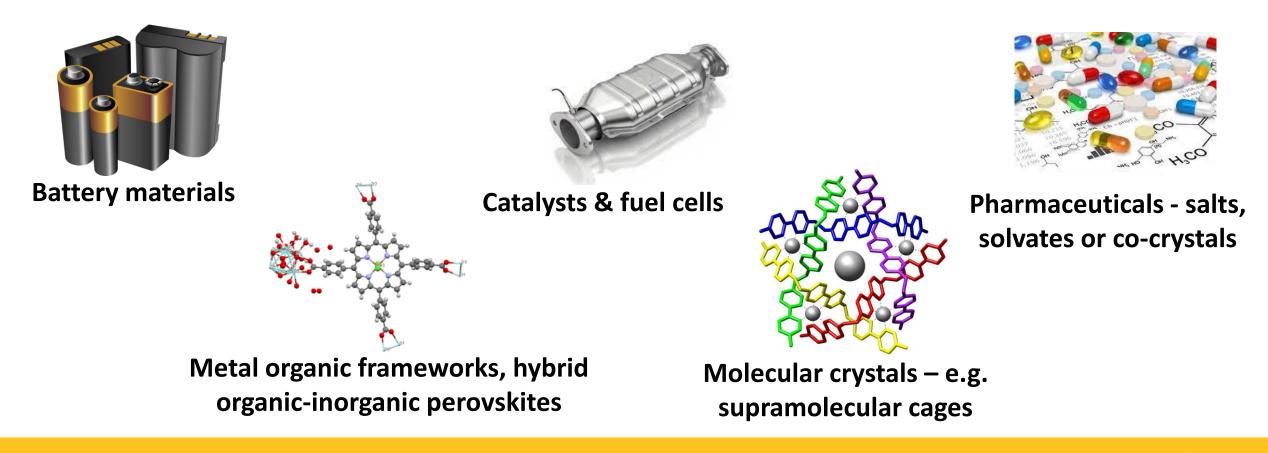
- £3 million EPSRC/UKRI strategic equipment grant with University of Southampton; National Crystallography Service & Rigaku
- 2 Rigaku Synergy electron diffractometers
- Makes technique easily accessible to crystallographers
- Facility offering access nationally
- Aims to:
  - Scope out future demand for ED in UK
  - Run a diverse range of sample types, building up crucial knowledge
  - Develop techniques including sample preparation, software usage, novel sample environments and theory advancement
  - Scale up throughput of structures solved by ED







## **Electron Diffraction – Science Areas**







### **Thanks To**



Professor Simon Coles University of Southampton Director of UK NCS Grant PI



Professor Richard Beanland Academic Director of Electron Microscopy RTP **Grant Co-I** 

Oncs

Professor Richard Walton Academic Director of X-ray Diffraction RTP Grant Co-I

> Rigaku oxford diffraction

Dr Mark Light University of Southampton Grant Co-I Dr Ian Hancox Research Technology Engagement Manager

Technician Commitment





## **Sustainable Materials**

Professor Kerry Kirwan





# Translation and the construction of gender in cultural and national identities

Dr Olga Castro





## **Capturing Biosynthesis in Flight**

Dr Matthew Jenner





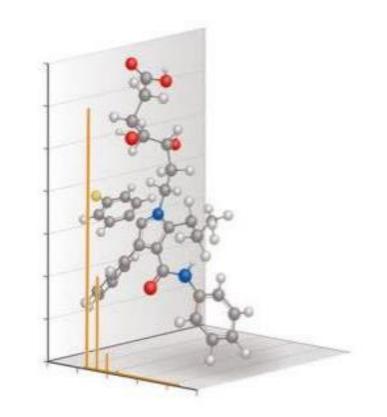
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Mass spectrometry meets proteins...



The application of **mass spectrometry**, in combination with other analytical and structural techniques, to solve complex biological problems.







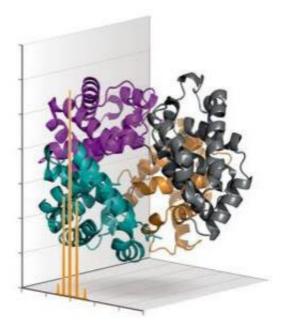
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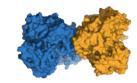
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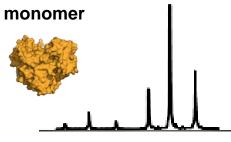


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#### dimer





oligomeric states



gand / drug binding







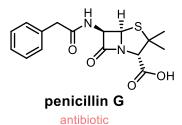
conformational changes\*\*



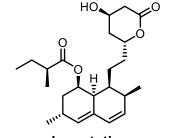
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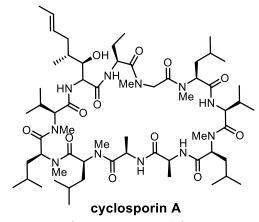
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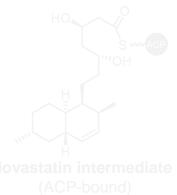
first of  $\beta$ -lactam class revolutoinised medicine



lovastatin cholesterol-lowering drug global statin sales (2020) ~ \$1 trillion

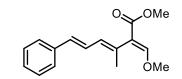


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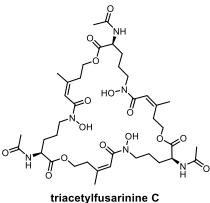


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- interactions between acyl carrier protein and catalytic domains key to programming rules.

#### very difficult to monitor biosynthetic steps



strobilurin A fungicide azoxystrobin global sales > \$1 billion



triacetyirusarinine C anitbiotic 'fusigen' ointment for skin infections



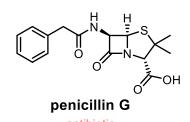




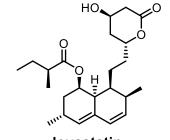
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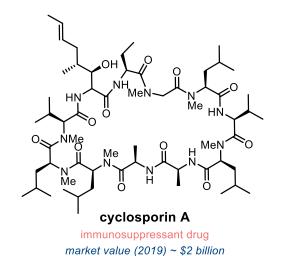
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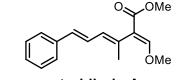


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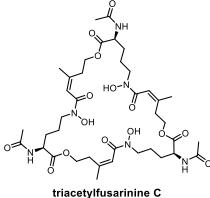


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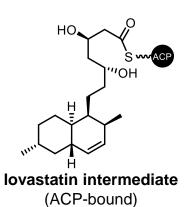




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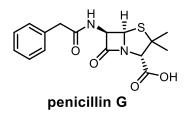




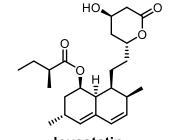
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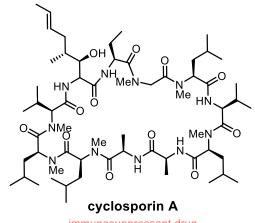
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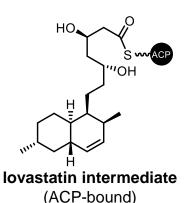


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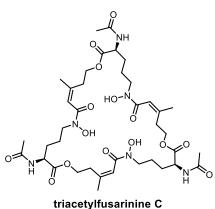
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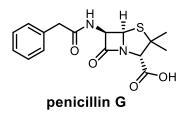




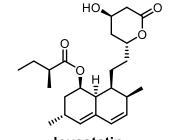
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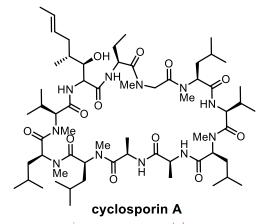
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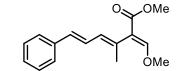
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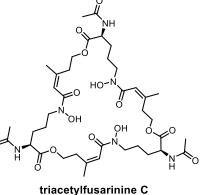
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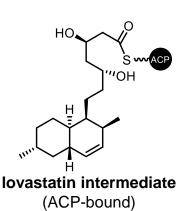
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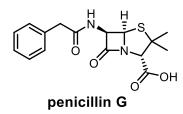




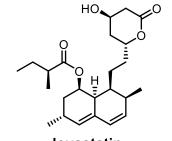
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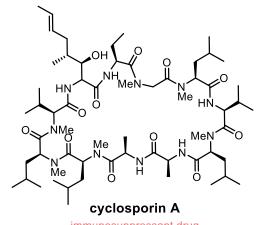
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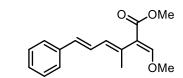
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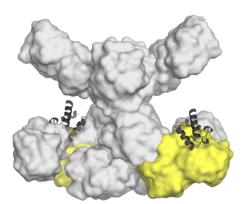
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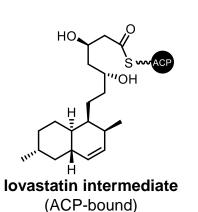


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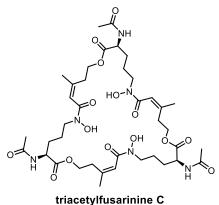
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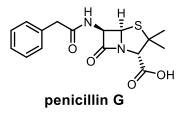




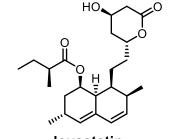
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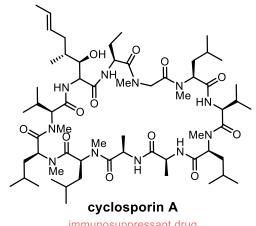
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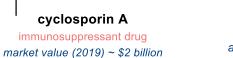


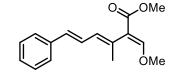
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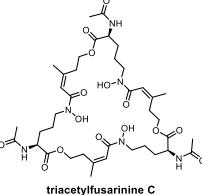
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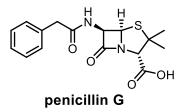




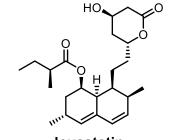
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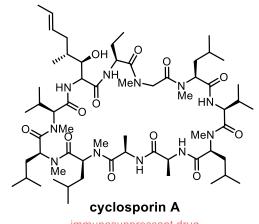
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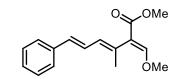


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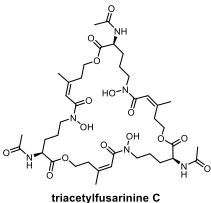


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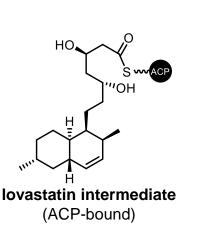
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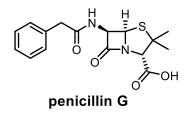




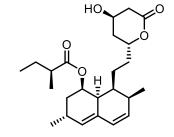
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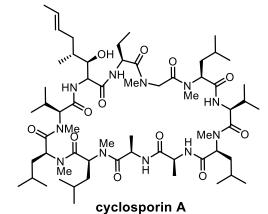


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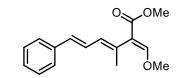
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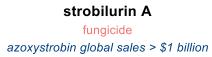


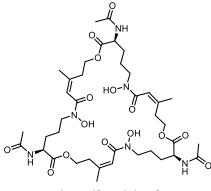
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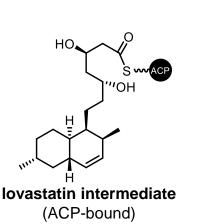




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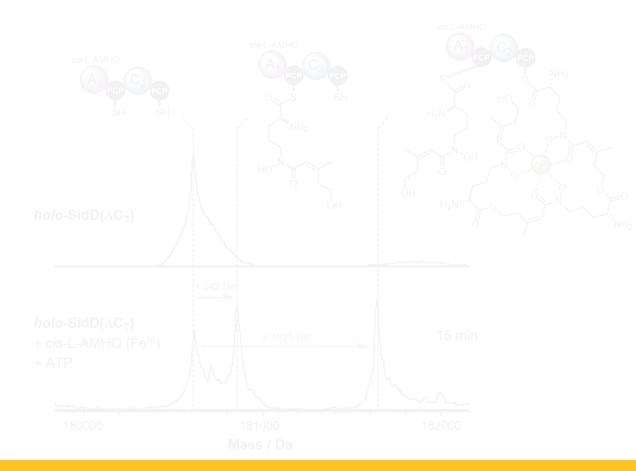


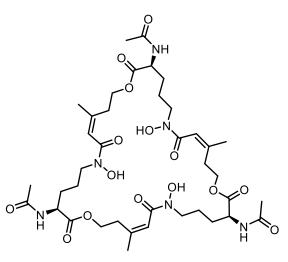




#### Example of Capturing Biosynthesis by Mass Spectrometery

Watching the SidD synthetase 'in action'...





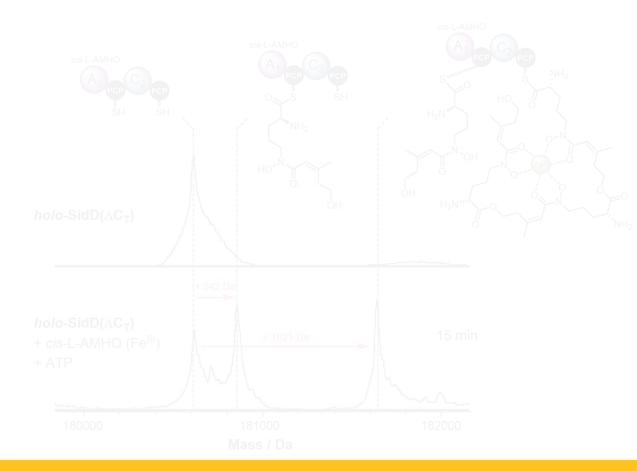
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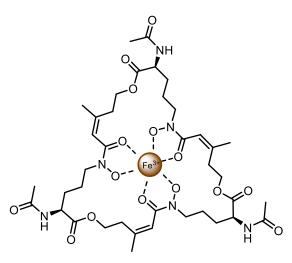




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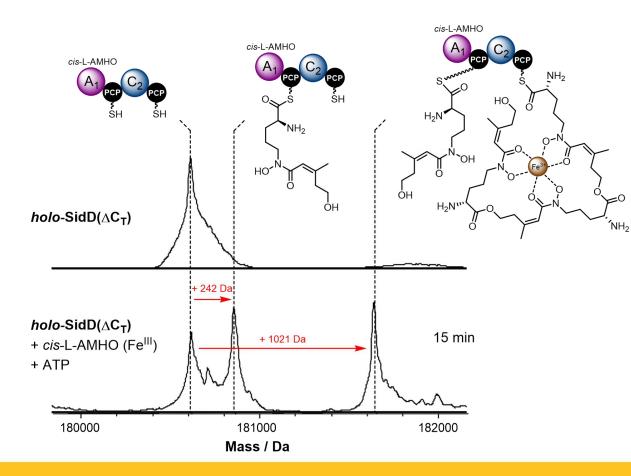
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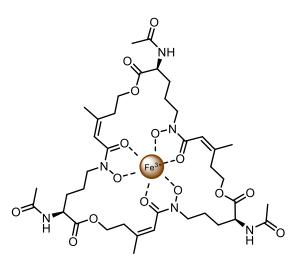




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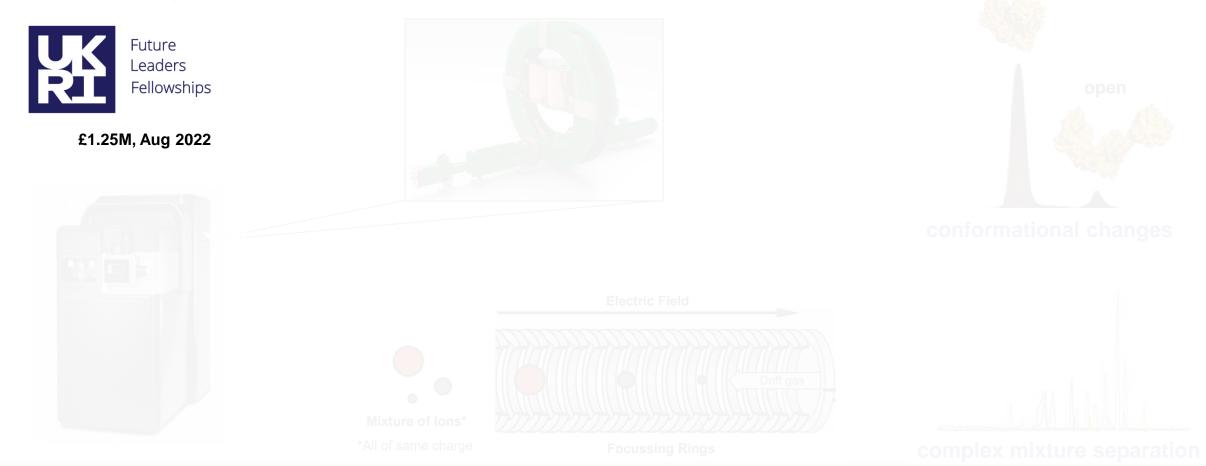
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#### Moving Forward – New Instrument, New Possibilities...

Cyclic Ion Mobility System







#### Acknowledgements



The application of **mass spectrometry**, in combination with other analytical and structural techniques, to solve complex biological problems.



Mia Foran, Munro Passmore, Nazia Auckloo, Maddie Summers, Karolina Kowalska, Ollie Terrell, Joe Newman, Caitlin Williams

#### LEVERHULME TRUST \_\_\_\_\_

Of BBSRC Discovery Fellowships



Future Leaders Fellowships



Biotechnology and Biological Sciences Research Council





## Research in the Centre for Interdisciplinary Methodologies

Professor Cagatay Turkay





CIM - background and context

Established in 2012 as a Category One Research Centre

Over ten years have grown to approx. 22 academic, research and professional support staff + PhD programme with approx. 20 students.

Three research-led PG Degrees with around 100 students MA Digital Media and Culture MSc Big Data and Digital Futures MASc Data Visualisation







#### What and who is CIM?

**Interdisciplinary** – bringing together experts from the social sciences, sciences & humanities

**Engaged** – addressing pressing issues and emerging questions which cannot be adequately addressed within the framework of a single discipline

**Pioneering** – focus on methodological innovation across disciplines and new forms of participation











#### Broad range of research themes



Interdisciplinary methods and methodologies



Applications, infrastructures, interfaces



Experiments in participation



Environments and ecologies



(Im)possible spaces



```
Intelligent futuring
```







across three Units of Assessment across three Faculties

B11 - Computer Science and Informatics (ranked 4<sup>th</sup>)

Artificial Intelligence and Human-Centred Computing

C21 – Sociology (ranked 10<sup>th</sup>)

Inequalities and Social Change Economy, Technology and Expertise

#### D33 – Music, Drama, Dance, Performing Arts, Film and Screen Studies (ranked 12<sup>th</sup>)

Theory, Aesthetics and the Popular Cities, Places, Environments







Impact Case Study – Yellow Dust Making environmental issues visible and prompting public action

#### Led by Dr Nerea Calvillo

Installations in urban spaces, visualisations, sensing 460,000 people visited 'Yellow Dust' at the Seoul Biennale

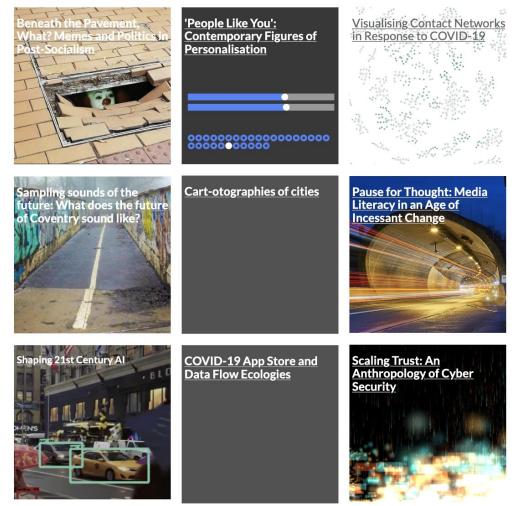








#### **Research Projects**



https://warwick.ac.uk/fac/cross fac/cim/research/research-projects/



**Economic** and Social **Research Council** 



**Engineering and Physical Sciences Research Council** 



Arts and



**Humanities Research Council** 

Natural Environment **Research Council** 







LEVERHULME TRUST\_\_\_\_\_





## Ecological belongings: transforming soil cultures through science, art and activism













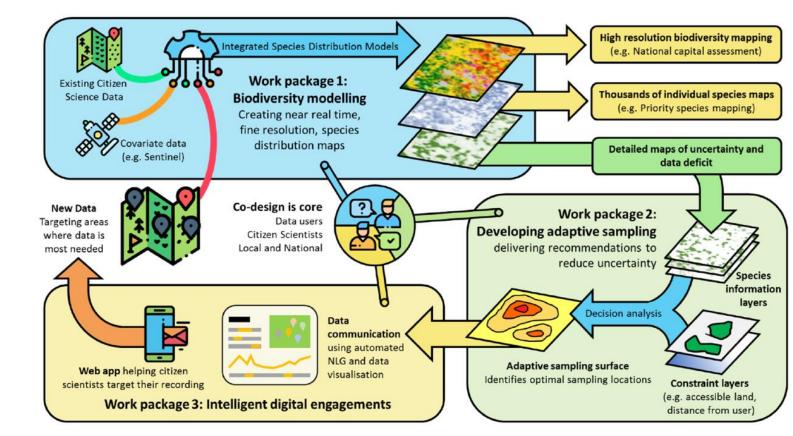
Arts and Humanities Research Council



Prof M Puig de la Bellacasa



#### DECIDE: Delivering Enhanced Biodiversity Information with Adaptive Citizen Science and Intelligent Digital Engagements







Dr. Greg McInerny Prof. Cagatay Turkay

#### WARWICK. RESEARCH IS THE WAY AHEAD.

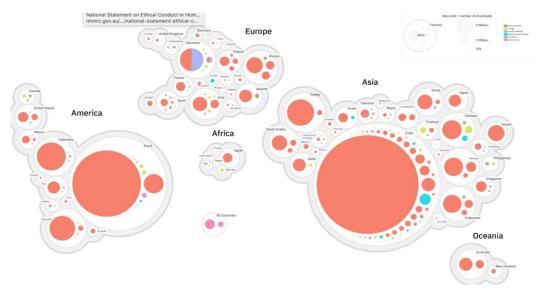
Natural

Environment

**Research Council** 



#### **Covid-19 App Store and data flow ecologies**









#### Prof C Turkay, Prof M Keeling (Zeeman)



**Public Health** Officers



Visualisation for communication

#### for Explaining & informing

Limited interaction with analysis findings

.. involving: Multi-level temporal networks

Visualisation for analysis

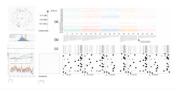
for Exploring and explaining

Privacy-aware analytics & representations •

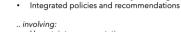
Direct interaction with network collections

Integrated computational analysis

Integrated computational tools & models



Deliverable-1: Visual Analytics Tool



- Uncertainty representations
- Visual storytelling techniques
- Integrated visual and verbal explanations



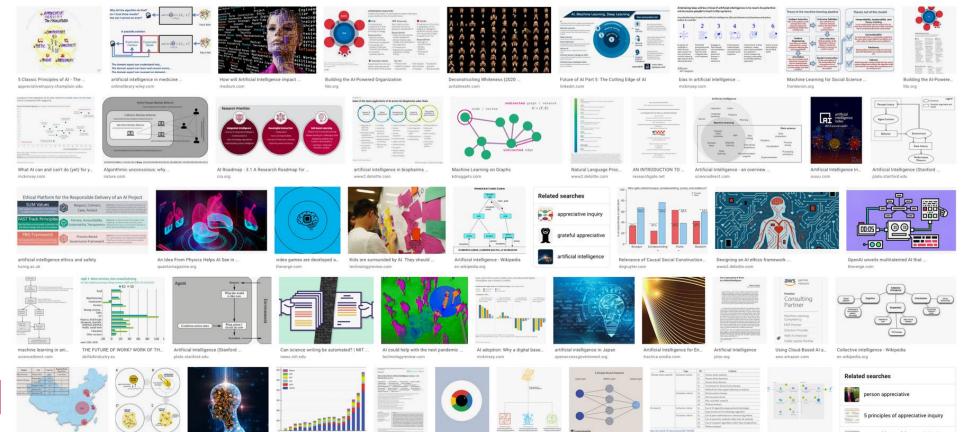
Deliverable-2: Web-based Visualisation Tool

#### Visualizing contact networks in response to Covid-19





#### Shaping 21th Century AI: controversies in media, policy and research









Prof Noortje Marres, Dr Michael Castelle, Dr James Tripp (IDG)

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K

Economic and Social Research Council



## **PEOPLE LIKE YOU** CONTEMPORARY FIGURES OF PERSONALISATION



1





Prof Celia Lury

#### WARWICK. RESEARCH IS THE WAY AHEAD.

velicome





#### What's next for CIM?

Build new and stronger links across the faculties and external partners

Take a leadership role in the development of digital- and data-related strategy across the University, including open research and research infrastructure

Contribute to FSS and (F)SEM grand challenges in both teaching and research





## Ghost Town: Coventry's history in the television archive

**Professor Helen Wheatley** 





# Social Impact and Coventry City of Culture

Dr Andrew Anzel





## Research in the Power and Control Systems of Research Laboratory: Compressed Air Energy Storage

**Professor Jihong Wang** 

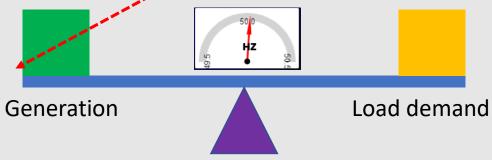




#### Background

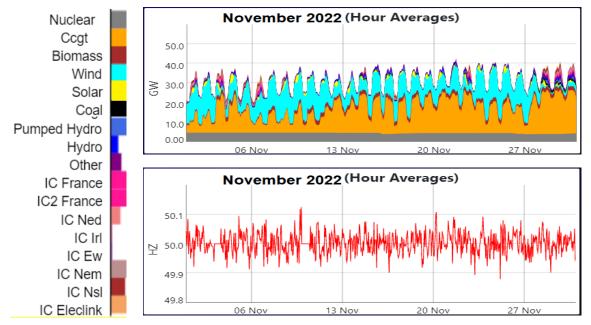
Power generation must be equal to the load demand in order to maintain the power grid stability.

Power system operator – maintaining the balance



The balance is currently maintained via the conventional fossil fuel fired thermal power plants combined with other mechanisms.

#### GB generation, fuel types and grid frequency, Nov 2022



#### Balancing is costly.

- Balance cost in September: £317.77 m
- Balance cost between May 2021- April 2022:
   £3,182.31m

https://gridwatch.co.uk, https://data.nationalgrideso.com

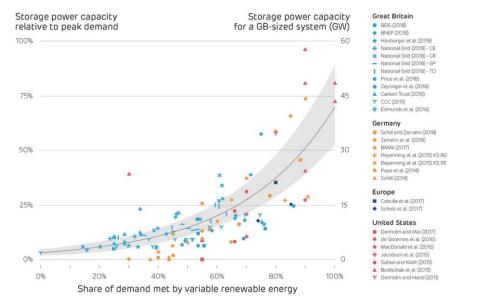




#### The role of Energy Storage

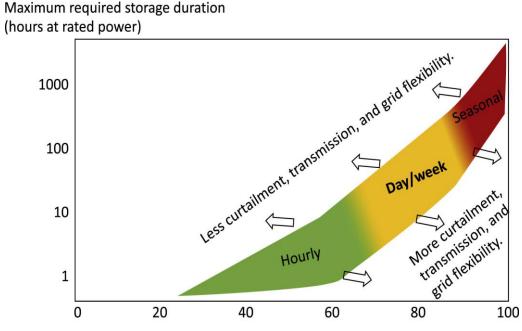
#### Among all the balance mechanisms, **energy storage** can provide an energy buffer to detach the generation and usage to support grid flexibility.

For a deeply decarbonized power system, it requires a storage capacity of >50% of the peak demand with comparison of 28 independent studies.



https://reports.electricinsights.co.uk/q3-2019/how-much-energy-storage-will-we-need/



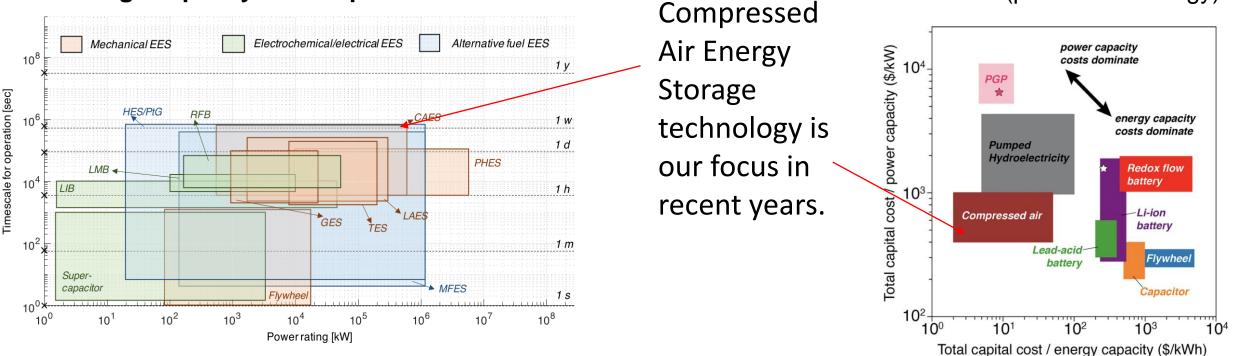


Annual electricity from wind and solar on a regional grid (%)

Albertus, Paul, Joseph S. Manser, and Scott Litzelman. "Long-duration electricity storage applications, economics, and technologies." *Joule* 4.1 (2020): 21-32.



#### Storage capacity and response time scale



Main EPSRC support for the research

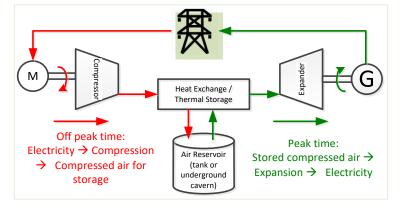
- Development of a novel energy efficient magnetic scroll air motor, EPSRC (EP/H004084), 2010-2012
- Integrated market-fit affordable grid scale energy storage (EPSRC Programme Grant), EPSRC(EP/K002228/1)2012-2018
- Supergen Energy Storage Hub, EPSRC (EP/L019469/1), 2014-2020
- Joint UK-India Clean Energy centre (JUICE), EPSRC(EP/P003605/1), 2016-2022
- Hi-CAES: High Performance Compressed Air Energy Storage Elevated through High-Temperature Thermal Storage, EPSRC (EP/W027372/1), 2022-2024





Total cost (power and energy)

#### **Compressed Air Energy Storage (CAES)**

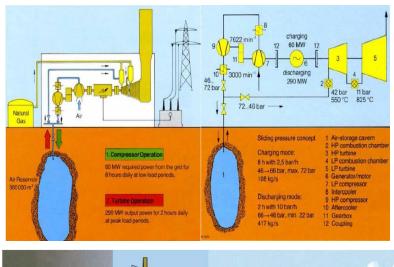


The first CAES plant, Huntorf, Germany, established in 1978

Charging power: 60 MWe (8 hrs) Discharge power: 321 MWe (2 hrs)

The second CAES plant, in McIntosh, USA, established in 1991.

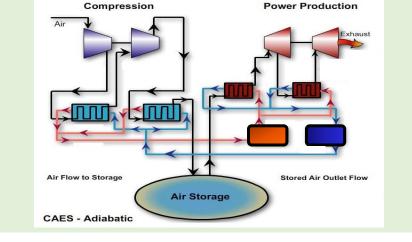
Charging power: 60 MWe (45 hrs) Discharging power: 110 MWe (26 hrs)



Wind & off-peak energy for compression Motor + Compressor Air Generator Turbine Recuperator Not to Scale Air In/Out

Wang, J, Luo, X., Krupke, C., Dooner, M., Compressed Air Energy Storage, Chapter 3 in the book Energy Storage, World Scientific, Vol.4, pp81-120, July 2017.

Third generation CAES system – no Fossil Fuel

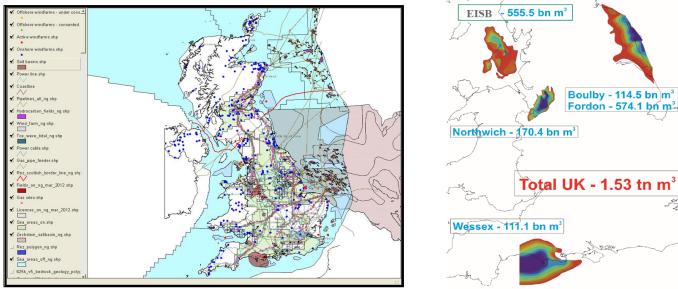




#### **Research challenges:**

- Low energy density, need large storage volumes
- Low round trip efficiency

A map of national storage resources (CO2, Compressed Air, Gas, H2, Thermal etc) and its map to the renewable power generation



$$\begin{split} \Delta m &= (\rho_2 - \rho_1) V_C \\ \begin{cases} \rho_2 &= P_2 / (RT_2), \quad z = 1 \\ \rho_2 &= P_2 / (zRT_2), \quad z = z(P,T) \end{cases} \\ \dot{E} &= \dot{m} [h - h_0 - T_0 (s - s_0)] \\ h - h_0 &= c_p (T - T_0) \\ s - s_0 &= c_p \ln(T/T_0) - R \ln(P/P_0) \\ E_{store} &= \int_{Ch \arg ing} \dot{E} dt = E_2 - E_1 \\ &= P_0 V_C [(\frac{P_H}{P_0} \ln(\frac{P_H}{P_0}) - \frac{P_H}{P_0}) - (\frac{P_L}{P_0} \ln(\frac{P_L}{P_0}) - \frac{P_L}{P_0})]/z \end{split}$$

Summary exergy data calculated for the massively bedded halites in the main UK halite bearing basins assessed in this study. Also shown are the estimates for caverns with heights of 100 m and over, and 100-150 m, together with estimates based upon both 1% of caverns and based upon *the number of operating or planned/permitted gas storage cavern numbers in each basin* (bracketed numbers in 'Category' column). Total capacity ~ 1433 TWh.

- Evans, D., Parkes, D., Dooner, M., Williamson, P., Williams, J., Busby, J., He, W., Wang, J., Garvey, G., 2021, Salt Cavern Exergy Storage Capacity Potential of UK Massively Bedded Halites, Using Compressed Air Energy Storage (CAES), *Applied Sciences*, 11, 4728.
- King, M, Jain, A, Bhakar, R, Mathur, J, Wang, J, Overview of current Compressed Air Energy Storage projects and analysis of the potential underground storage capacity in India and the UK, *Renewable and Sustainable Energy Reviews*, Vol 139, 110705, 2021. https://doi.org/10.1016/j.rser.2021.110705
- He, W, Luo, X, Evans, D, Busby, J, Garvey, S, Parkes, D, Wang, J, Exergy storage of compressed air in cavern and cavern volume estimation of the large-scale Compressed Air Energy Storage System, *Applied Energy*, Vol 208, pp745-757, December 2017, https://doi.org/10.1016/j.apenergy.2017.09.074.





#### Energy storage modelling and simulation toolbox

#### 

Home Background Software Demo Team Contact Login/Out



#### http://estoolbox.org

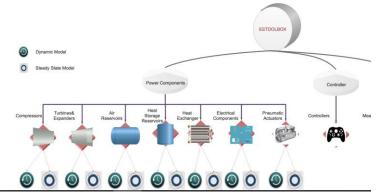
Luo, X, Dooner, M, He, W, Wang, J, Li, YW, Li DC, Kiselychnyk, O, Feasibility study of a simulation software tool development for dynamic modelling and transient control of adiabatic compressed air energy storage with its electrical power system applications, Applied Energy, Vol. 228. pp1198-1219, 2018.



nti Software

Software Demo Team Contact Login/Out

marked or the functions of machines. The second level subdirectory can be divided into the third level subdirectory and even furt classification method, the massive component modules to CAES-TES systems can be clearly sorted out and the user can easily fir a software component models to assemble a required system model for simulation study and other applications. Data driven model



#### Download list of components

In this section, you can download the models and documents contained in the ESToolBox. Documents and models for each component can be found in the category list on the left of the page. They can also be found by clicking on the relevant icons below. New models are continuously being developed, and old ones updated. Login is required to download the documents and models. If you do not have an account, you can find the application webpage by clicking the Login/Out button above.



This section includes models and document of the compressor modules used in the ESToolBox. The models are developed in MATLAB/Simulink, and the documents give information on the system/element being modelled, the modelling equations, the structure of the model, the model's I/O, the model's parameters, performance capabilities and limitations information and simulation results demonstrating the model's functionality.

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This section includes models and document of the turbine modules used in the ESToolBox. The models are developed in MATLAB/Simulink, and the documents give information on the system/element being modelled, the modelling equations, the structure of the model, the model's I/O, the model's parameters, performance capabilities and limitations information and simulation results demonstrating the model's functionality



This section will presents models and documents of the air reservoir modules used in the ESToolBox

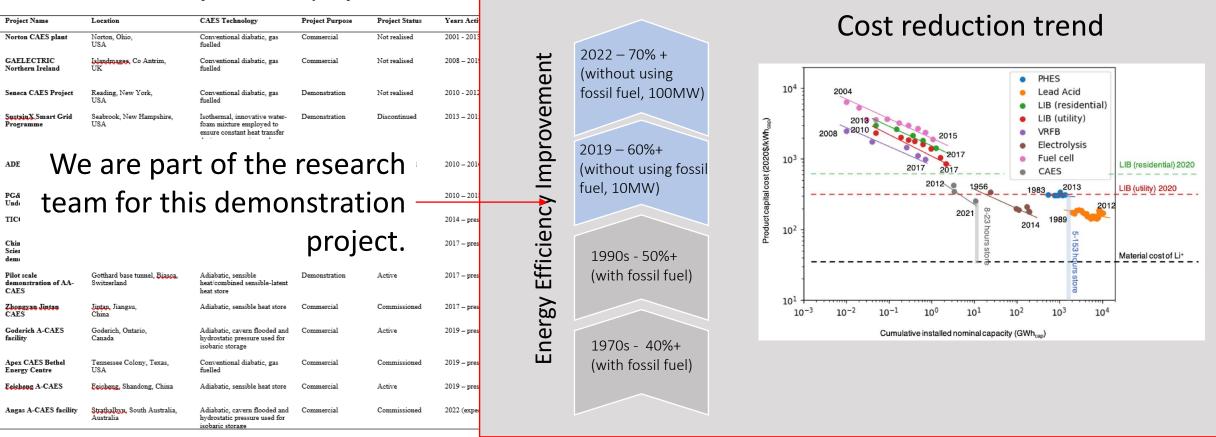
Heat Storage

This section will presents models and documents of the heat storage reservoir modules used in the ESToolBox





#### List of Current major CAES projects



King, M., Jain, A., Bhakar, R., Mathur, J., Wang, J., 2021, Renewable and Sustainable Energy Reviews





He, W., King, M., Luo, X., Dooner, M., Li, D., & Wang, J. (2021). Advances in Applied Energy, 100060.

#### **EPSRC** research project:

Hi-CAES: High Performance Compressed Air Energy Storage Elevated through High-Temperature Thermal Storage, started from Sept 2022

Aims: to increase the round trip efficiency, energy density and power density

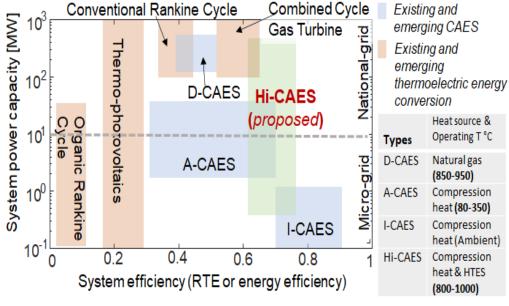
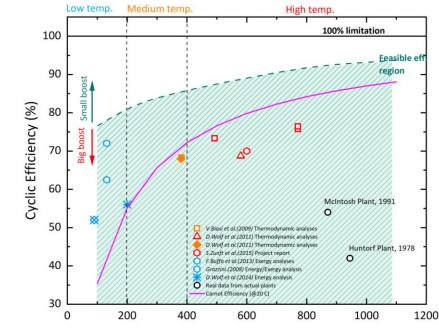


Fig. 1 CAES and Thermal-power generation technology comparison



Maximum temperature (C)





## Performing Citizenship: Social and political agency in non-professional theatre practice (1780-1850)

**Dr David Coates** 









A Midsummer Night's Dream

Royal Shakespeare Company with the Canterbury Players

Marlowe Theatre 2016





The Pic Nic Society caricatured by James Gillray 1803

© The Trustees of the British Museum



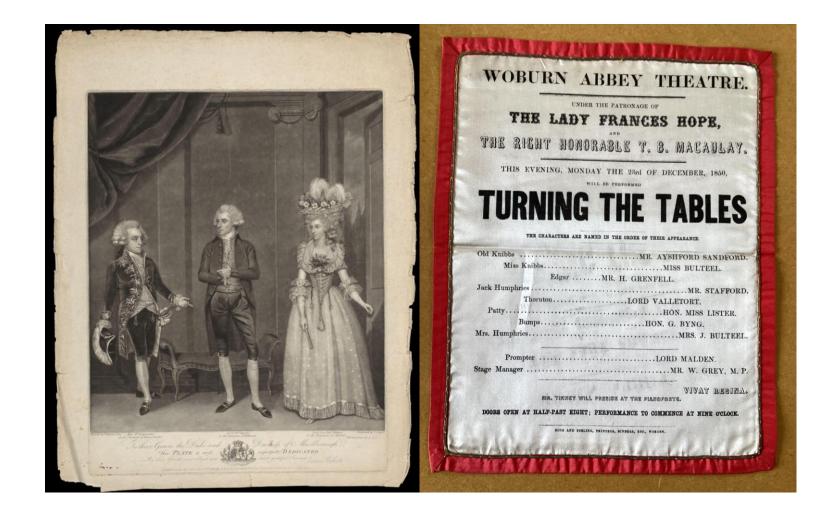


The Play That Goes Wrong

#### **Mischief Theatre**

Premiered 2012





Mezzotint of Private Theatricals at Blenhiem Palace 1788 V&A Collections

Silk Playbill of Theatricals at Woburn Abbey 1850 Bedford Collection



## RULES REGULATIONS, &c.

1. THIS Society shall confis of at least forty members, together with eight Ladies. And every member shall be obliged to play fome character or other, or such as may be allotted by the Committee once in three months, or forfeit for such neglect the sum of 5s, and in default of playing once within the year to be expelled.

II. Each member on his admiffion (before the opening of the house) shall pay into the hands of the Treasurer One Guinea, & weekly 2s. towards the general expenditure, and if any member be in arter three weeks, he shall fine 1s. if four weeks, 2s. and if five weeks subforciption, he shall be expelled.

III. No perfor fhall be confidered as entered in the Society without adding his name to the general lift, fuch lift may or may not be exhibited in the green room, at the option of the members, and no member once admitted can quit the Society without a forfeiture of all monies paid. The Ladies to add their names alfo. IV. That a Committee of feven perfons, including the Treafurer and Manager, are appointed to regulate the bufinefs of the Society, and if at any ime it be found neceffary to eftablifh new regulations, they or a majority of them, are at full liberty to the infpection of the members, in which cafe they muft be frictly obferved throughout the Society, on pain of certain forfeitures and penalties, to be by them alfo inflicted.

V. That the Committee do meet on the firft evening in each month, and at fuch other times as they fhall think proper or bufinels require, (at the Society's rooms only.) and fuch members of the Committee who ablent themfelves from the meeting beyond half-paft eight o'Clock, fhall forfeit 6d. If ablent the whole cvening 1s, and if ablent on three faceeflive evenings, to be expelled the Committee. And that the whole fociety may be placed upon an equal footing, two Committee-men fhall go out regularly once a month, and be replaced by mans fland on the lift, and on refufal to fine 2s. 6d.

VI. No perfor can be admitted a member of this Society but with the confert of a majority of the Committee, to whom the Proprietor fhall figally fuch perfor's name and addrefs, nor fhall any Lady be admitted unlefs the confines her playing to the Society alone. The Ladies upon admittion to be approved in like manner.

VII.

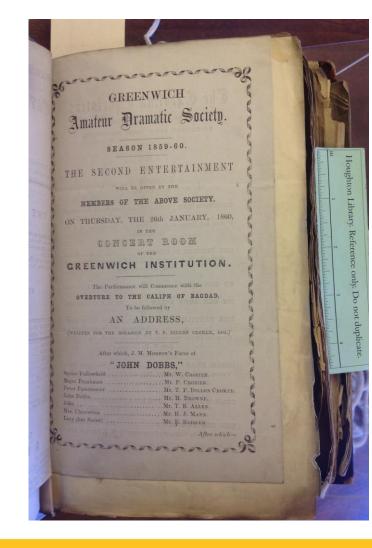


Rules and Regulations of the Lamb's Conduit Street Private Theatre, 1799

> Harvard Theatre Collections

Nicholas Kilvert of Brooklands Amateur Thespian Society - first President of the National Operatic and Dramatic Association (1899-1911)







Greenwich Amateur Dramatic Society 1859-60 Harvard Theatre Collections

Programme for the Busy Bees Society 1885

> V&A Theatre Collections





Stéphanie Félicité, Comtesse de Genlis(1746-1830)

Madame de Montesson (1738-1806)

Playwrights and organisers of amateur theatricals in Paris













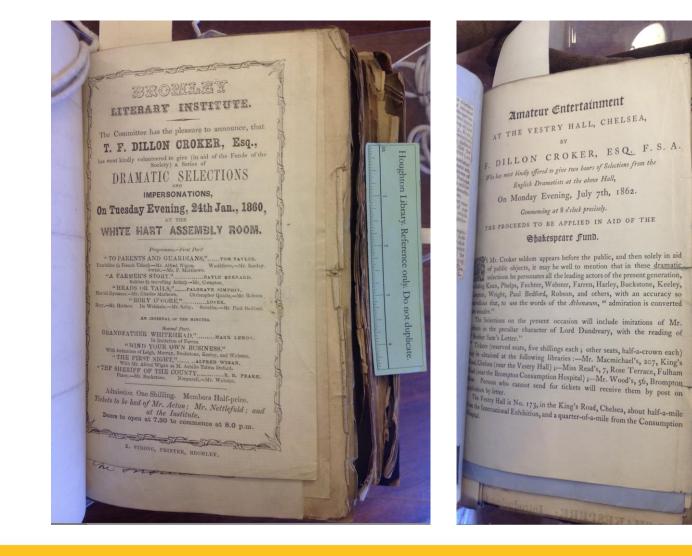
Playbill of Charles Dickens's Amateur Theatricals in Liverpool, 1852

> Harvard Theatre Collections

Photograph of Theatricals at the Corn Exchange in Melton Mowbray, 1861

New York Public Library





Dramatic Readings at Bromley Literary Institute, 1860

Amateur Entertainment in the Chelsea Vestry Hall, 1862

> Harvard Theatre Collections





Three Spires and Guildhall performing *Cinderella* at Warwick Arts Centre

January 2020





TERMS OF	LETTING THE SOHO THEATRE,
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	(Late Miss KELLY's), 73, Dean Street, Soho.
	The Miss Relative of the Long and the
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A Deposit of Three	Pounds to be paid on taking the Theatre; the remainder to be paid the manee, or the Deposit to be absolutely forfeited.
A Desfacional Propertor in	kept, and (if required) will prompt a rehearsal for 5s. and a Performance for 7s. 6d.
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Willy Clarkson, Costumier and Wigmaker

National Portrait Gallery, 1931

Price list for the hire of the Soho Theatre for amateurs, C. 1850

> V&A Theatre Collections



#### 😑 🖞 🗓 🎽 Amateur Theatre Wiki

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#### Amateur Theatre Wiki

Main Page Discussion

Welcome to the Amateur Theatre Wiki. This is a place for anyone passionate about amateur theatre. Here, you can find out more about amateur theatre in your home country, town or village. You can discover what amateur theatre was like a century ago and learn how it works elsewhere around the world. Most importantly of all, you can join our growing community of amateur theatre historians, who are busy adding their own amateur theatre histories to this site.

History starts now - and the site includes details of productions and performances that happened this year, as well as those that took place in the distant past.

#### Contents

- 1 Why should you get involved as a contributor?
- 2 How can you get involved?
- 3 How can you search the site?
- 4 Example Entries

#### Why should you get involved as a contributor? [edit ledit source]

For too long amateur theatre has been undervalued in societies and cultures around the world. In most nations, the study of theatre has focussed almost exclusively on professional activity. However, amateur theatre has played a vital role in many theatrical ecologies and needs greater acknowledgement. It's only through documenting amateur theatrical activities and histories that the contribution of amateur theatre to these ecologies can begin to be recognised.

#### How can you get involved? [edit | edit source]

#### WARWICK. RESEARCH IS THE WAY AHEAD.

#### Read Edit Edit source View history

ED.



Musical Uit de Schaduw van Appeltern

#### Amateur Theatre Wiki

#### Due to launch in Spring 2023









## Performing Citizenship: Social and Political Agency in Non-Professional Theatre Practice (1780-1850)

Dr David Coates (@DavidJCoates) Theatre and Performance Studies (@TheatreWarwick)







## **Genetic Improvement of Vegetable Crops**

Professor John Walsh





# The under-representation of racially minoritised women in political institutions

Dr Khursheed Wadia





## Thank you!



