



UNIVERSITY OF  
BIRMINGHAM

A warm welcome to Birmingham and to PSD12

Professor Stephen Jarvis

Pro Vice Chancellor and Head of Engineering and Physical Sciences



**UNIVERSITY OF  
BIRMINGHAM**

**Global top 100 university  
Established in 1900**

**39,965 students  
10 Nobel prize winners and two  
British Prime Ministers among  
alumni and staff**

**Russell Group research intensive  
university**

**£1 billion investment in campus over  
last 10 years**





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## A university of firsts

- Birmingham was the first civic university, welcoming students from all backgrounds
- It was also the first UK university to open a secondary school
- The University of Birmingham is the first Russell Group university to establish a campus in Dubai
- Birmingham was also the first university to incorporate a Medical School
- Our Business School is the longest established in the country





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## A civic and global university

- Tyseley Energy Park supports the City in its commitment to reducing air pollution
- Oversight of two FE colleges in Birmingham and Doncaster
- Over 4,700 collaborating institutions worldwide
- 52% of Birmingham's publications are with international collaborators
- Our campus in Dubai will open later this year
- Key contributor to science worldwide, e.g. CERN, aLIGO and DUNE





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## Research that matters

- 81% of our research is world leading (4\*) or internationally excellent (3\*)
- Our research has had a lasting impact on lives, culture, industry and society for over 100 years
- From world-class cancer research to pioneering the development of new fuels and systems, our academic expertise continues to address the key challenges facing the modern-day world

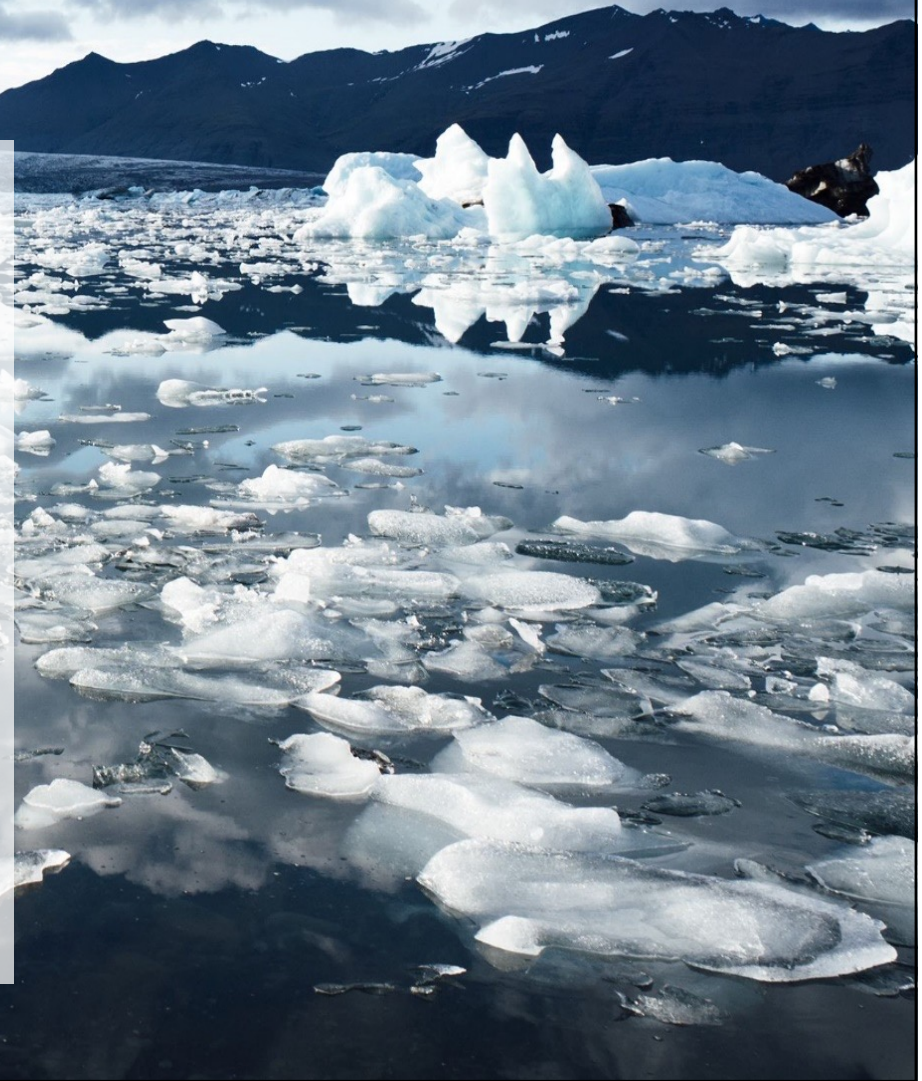




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# Sustainability

- Tackling climate change in a wide range of areas
- Birmingham Energy Institute, generating solutions for the decarbonisation of heat, energy storage, recycling of critical materials, innovation in hydrogen fuel cells
- UK's first hydrogen-powered train will showcase at COP26 in November 2021
- Formulation Engineering Group and Birmingham Plastics Network working with P&G and other industry partners on sustainable household products





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A wide-angle photograph of the University of Birmingham's main building, a grand red-brick structure with multiple domes and arches, set against a sunset sky. The building is illuminated by the warm light of the setting sun, creating a golden glow. In the foreground, there is a green lawn with a winding path and some trees.

# Engineering and Physical Sciences

# Chemistry

- *Three priority areas* Energy, Sustainability and Health
- *Driven by three research groups* Materials; Molecular Synthesis and Biological Chemistry; Interactions, Interfaces and Sensing
- *Emerging areas of strength* Critical Materials and Recycling; Batteries; Supramolecular Chemistry; Polymers and Plastics
- *Increasingly applications-oriented* Increasing number of patents; 4 spin-outs in the last REF research assessment period
- *With increased strength in 'core Chemistry'* 88% of staff have live awards and increase in PDRAs and PhDs
- *Emerging activity in solid state chemistry and energy, therapeutic solutions and point-of-care diagnostics, sustainability and recycling*

Molecular Sciences Building, which will open in 2023, will be transformative for UoB Chemistry



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# Chemical Engineering

- *Formulation Engineering* including the long-running CDT in Formulation Engineering; expanding microstructure engineering beyond foods to healthcare and energy; increasing activity in scalable processes and systems (Unilever, P&G, Rolls-Royce)
- *Healthcare Technologies* including the Healthcare Technology Institute; expanding translational and enterprise agenda; growth through the new life sciences park; interdisciplinary connections with University Hospitals Birmingham
- *Energy* including the Birmingham Centre for Energy Storage, world leading in thermal and liquid-air energy storage and cold-chain technologies; hydrogen group among the largest in UK; growth in liquid air energy storage, e.g. for offshore renewable transmission and storage; clean cooling; molten salt science for next generation reactors; energy policy

Forthcoming new facilities include Health Innovation Campus, Net Zero Building, National Centre for Decarbonisation of Heat



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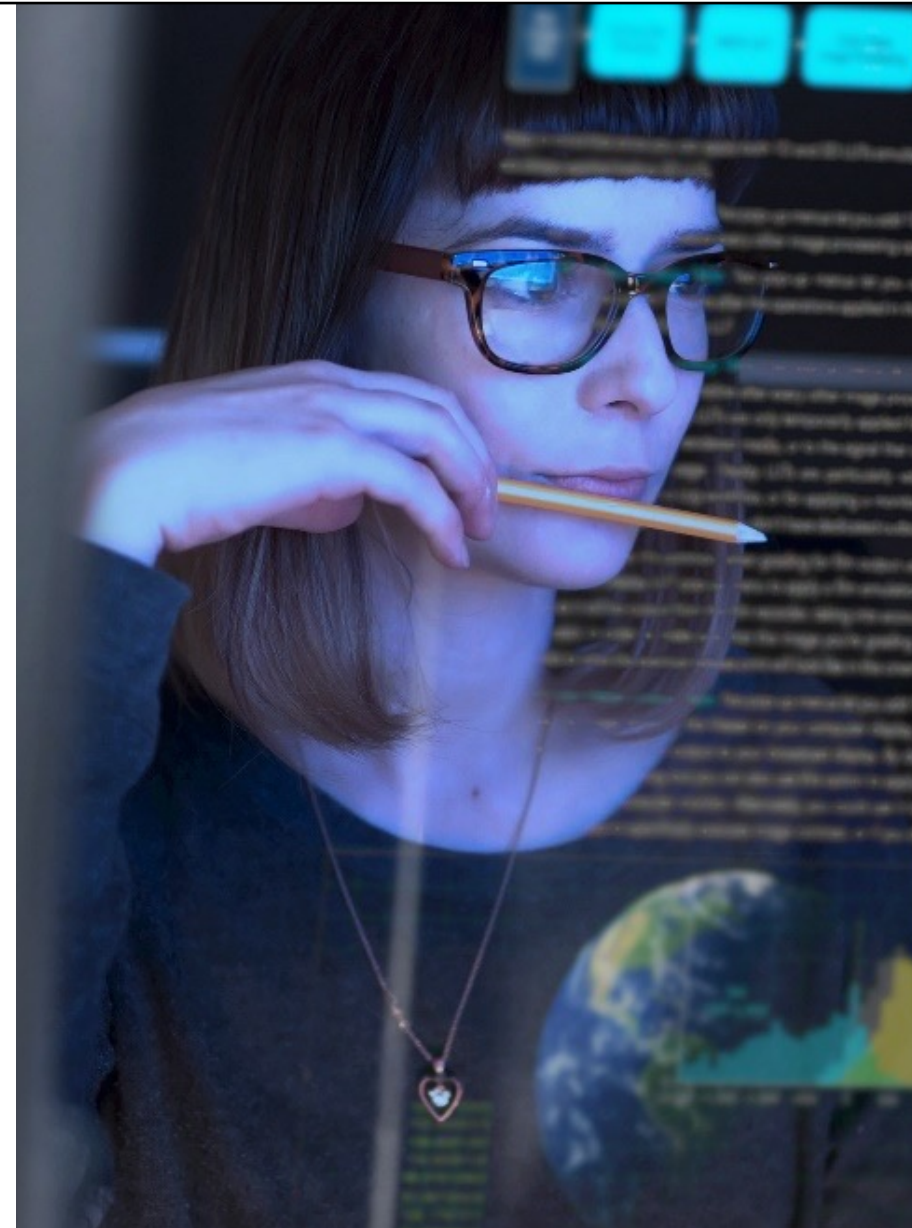


# Computer Science

- *Research specialisms* include Artificial Intelligence, Theoretical Computer Science, Cyber Security, Human-Centred Computing, Computational Life Sciences
- *Outstanding recent new hires* from, for example, Oxford, Carnegie Mellon, Princeton, Max Plank Institute
- *Cyber Security* is a recognised academic centre of excellence, collaborating with regulatory agencies, GCHQ, DCMS, JLR, HP, Huawei, Microsoft, IBM, Google, Deloitte, BT and others
- *Alan Turing Institute* partnership has strengthened research in computer vision, robotics and machine learning; leading establishment of the Interdisciplinary Data Science Institute
- *Engagement with users and beneficiaries* is widescale, including the development of trustworthy voting systems, supply chain security, vehicle dynamics and engine optimisation, imaging for drug discovery, low-cost medical devices



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# Engineering

- *Significant investment and restructuring* of Civil, Mechanical and Electrical Engineering; 2021 12,000m<sup>2</sup> state-of-the-art building and adjacent buildings for Buried Infrastructure and Rail
- *Research expertise* in Environmental Engineering, Fluid Mechanics, Structural Engineering, Transportation, Communications and Sensing, Electrical Power Systems, Biomedical Engineering, Manufacturing Processes
- *Birmingham Centre for Railway Research and Education* (BCRRE) largest university-based centre for railway research and education in Europe; Queen's Anniversary Prize in 2017
- *Diverse industry portfolio* including over 80 organisations, growing number of patents and licence agreements
- *Forward look* includes focus on High Value Manufacturing, Remote Sensing and Infrastructure, Space Technologies, Digital Systems including AI and Data Science, Sustainable Transport



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# Mathematics

- *Pure mathematics* including Combinatorics, Probability and Algorithms; Analysis; Algebra; Geometry and Mathematical Physics; Topology and Dynamical Systems
- *Applied mathematics* including Optimisation, Numerical Analysis and Data Science; Mathematical Biology and Healthcare; Continuum Mechanics and Non-linear Systems
- *Recent successes* include Future Leaders Fellowships (Spill and Kelly), an EPSRC Established Career Fellowship (Terry), ERC Fellowship and European Prize in Combinatorics (Montgomery), Leverhulme Research Leadership Award (Montenegro-Johnson), 1851 Fellowship (Westaway)
- *Research continues to have significant impact* in areas including epidemiology, particle dynamics, medical imaging, pest monitoring for agriculture, systems optimisation, medical devices (inc. haptics and sensors), fertility treatment



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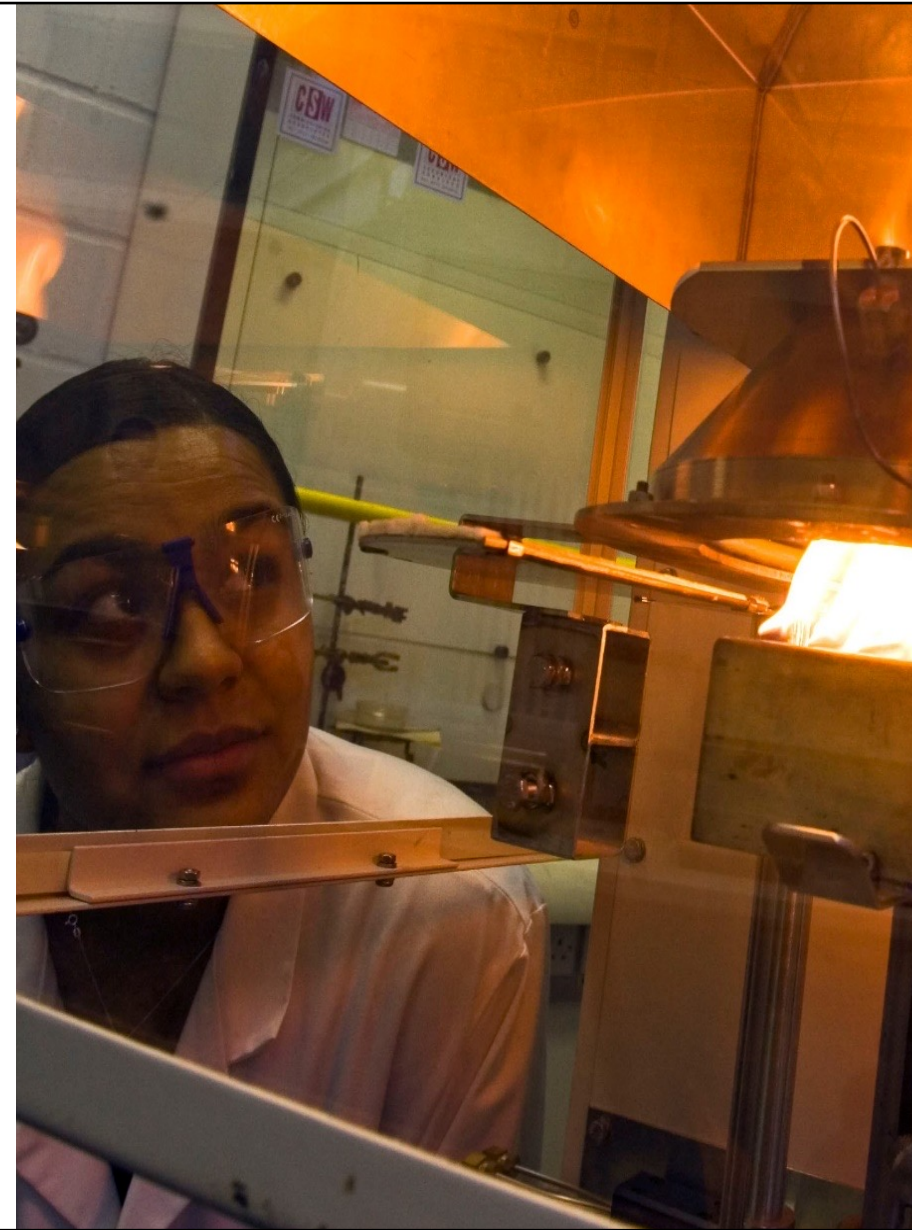


# Metallurgy and Materials

- *Advanced Materials Processing, including the £60m UK-RPIF Centre of Excellence in High Temperature Research is an exemplar of collaboration between industry (Rolls-Royce) and academia*
- *Materials for Challenging Environments seeks to understand the behaviour of materials during their life cycle*
- *Birmingham Centre for Strategic Elements and Critical Materials specialising in recycling and recovery of critical materials from end-of-life products*
- *Materials for Sustainability focuses on technology-relevant energy materials, their modelling, characterisation and recycling*
- *Multifunctional Materials and Devices develop smart materials for a wide range of devices, from consumer electronics to biomedical applications*
- *Supporting expertise in Robotics, Electron Microscopy, Advanced Materials Processing*



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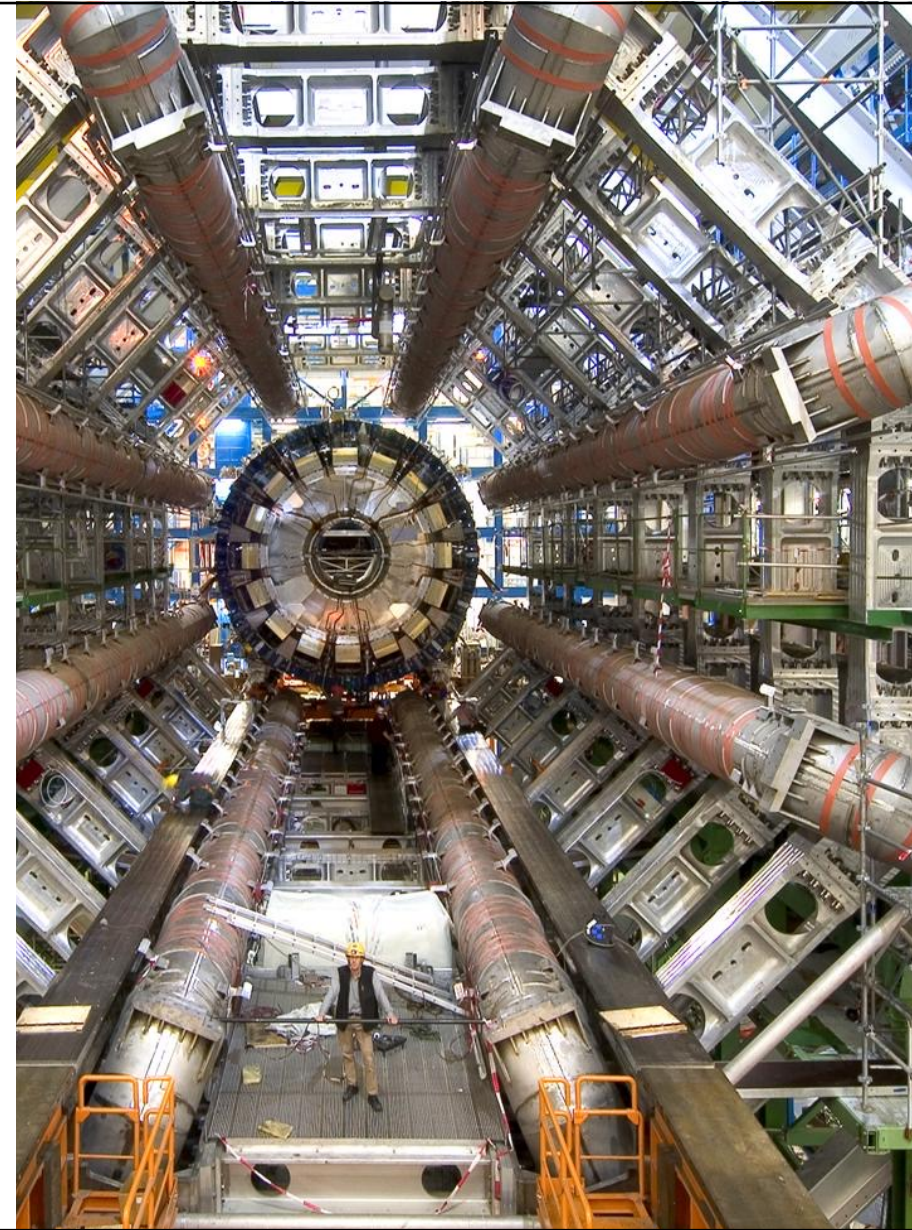
# Physics and Astronomy

- *Astronomy and Experimental Gravity* Theoretical astrophysics; Transients (Rubin Observation/LSST); Astroseismology; Exoplanets; Next generation instrumentation (ALIGO+); Next generation space missions (ESA LISA & PLATO)
- *Particle and Nuclear Physics* International leadership in ATLAS, LHCb, NA62, ALICE; Next generation detector technologies; Next generation experiments (EIC, DUNE, Future Collider); Dark matter; New accelerator driven neutron irradiation facility
- *Quantum matter* UK Quantum Sensing and Timing Hub; Quantum instrumentation; Nanophotonics; Metamaterials; Experimental condensed matter
- *Establishment of new cross-theme centres in Next generation detectors; QTFP; Dark matter; Data Science*

School offers excellence and world leadership in fundamental physics, and exemplars of impact and innovation in all areas



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