Faculty of Science, Engineering and Medicine

Professor Luc Moreau
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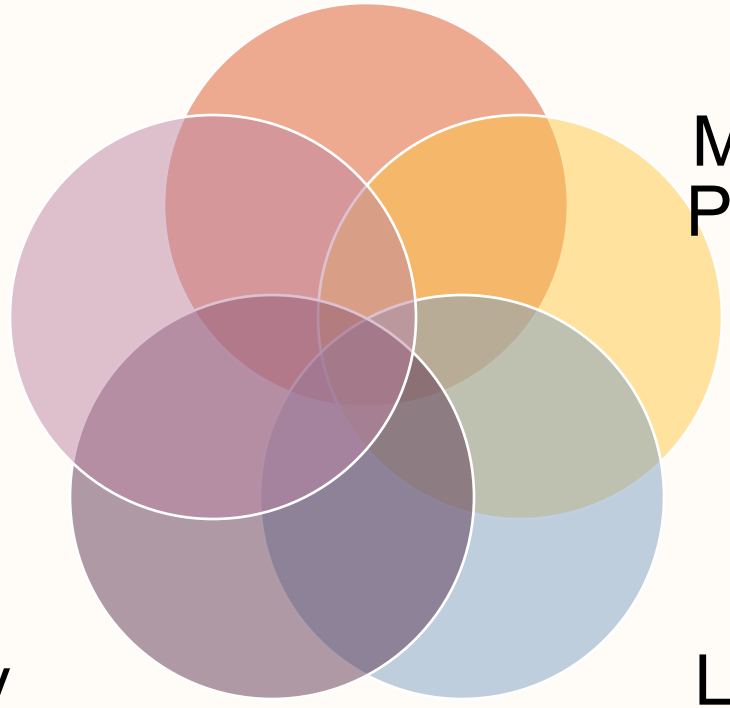
UNIVERSITY OF SUSSEX

The Disciplines

Engineering and Informatics

Brighton and Sussex Medical School



Mathematical and Physical Sciences

Psychology

Life Sciences

A Long Tradition of Science

Chemistry

- Archer Martin (1952)
- Sir John Cornforth (1975)
- Sir Harry Kroto (1996)

Genetics

- Sir Paul Nurse (2001)

Physics

- Sir Anthony Leggett (2003)
- Geoffrey Hinton (2024)

- The University of Sussex was officially created in 1961
- A reputation for innovation in its research and teaching structure
- Today's initiative **"Impossible Until Done"**:
  - work that dares to cross boundaries,
  - push scientific limits, and
  - create impact far beyond academia

Centres of Excellence

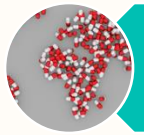
Sussex AI

Sussex Neuroscience

Sussex Centre for Quantum Technologies

Sussex Centre for Consciousness Science

Genome Damage and Stability Centre



Centre for Global Health Research

Sussex Sustainability

Some Highlights Across FoSEM

4

Mechanisms of Memory: Why We Remember, Forget, and How Alzheimer's Affects Recall

Chris Bird, Psychology

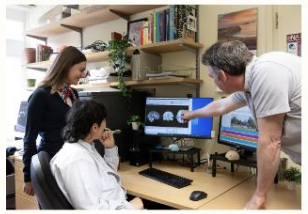
I research how we are able to remember our day-to-day experiences. This includes investigating the psychological processes - why we remember some things but forget others - and also the brain systems that underpin these processes. I also investigate how memory is affected by neurological diseases such as Alzheimer's disease.

Key Funders

- ERC Consolidator grant of €2M (~£1.7M)

Previous funders

- ERC Starting Grant
- Wellcome Trust
- ESRC
- Alzheimer's Society
- Alzheimer's research UK
- MRC



Key Partners

Imperial College London, Cambridge University, plus others, Boston College, Washington University, Columbia University, plus others, NHS

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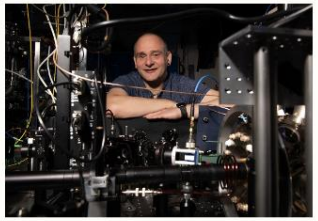
Real-world quantum computing

Winfried Hensinger, MPS

The overarching goal of my research is to build the world's first quantum computer with millions of qubits powerful enough to tackle complex calculations, enabling us to solve important real-world challenges. I aspire to bring together some of the world's brightest talent, state-of-the-art facilities, and key stakeholders to make the dream of practical large-scale quantum computers a tangible reality.

Key Funders

- £50M in research funding for my research group and my spin-out company Universal Quantum attracted ~£100M
- Current level of funding is £24M (CDT including partner contributions), US$1.6M (ARO), £1M (Innovate UK, part of a £7.6M consortium grant) along with lots of smaller grants such as EPSRC, Universal Quantum
- Innovate UK, ARO, EPSRC, European Commission Quantum Flagship, Universal Quantum



Key Partners

Imperial College London, Google, University of Southampton, Universal Quantum, Rolls Royce, American Express, Edwards Vacuum

6

XLZD: Sussex-Led Higgs Boson and Dark Matter Exploration at CERN

Antonella De Santo, MPS

Antonella established and leads the Sussex ATLAS team, which in 2012 co-discovered the Higgs boson at CERN's world-leading Large Hadron Collider. Antonella looks for dark matter and other exotic particles in the debris of LHC high-energy proton-proton collisions. She also leads Sussex's effort designing the ultimate dark matter experiment XLZD.

Key Funders

Focusing on **STFC funding:** The ATLAS fraction of the current Consolidated Grant amounts to about **£910k**. The current ATLAS Upgrade project grants, with various start/end dates, amount to **£1.235M**. The current XLZD@Boulby grant amounts to about **£173k**.

- UKRI
- STFC

Key Partners

CERN, ATLAS Collaboration, XLZD@Boulby Collaboration (: Birmingham University; Bristol University; Edinburgh University; Imperial College London [Lead]; King's College London; Liverpool University; Oxford University; Queen Mary, University of London; Royal Holloway, University of London; Sheffield University; STFC Daresbury Laboratory; STFC Rutherford Appleton Laboratory; Sussex University.

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Sensing technologies and high precision robotics

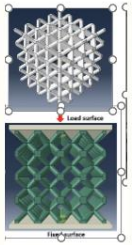
Elizabeth Rendon-Morales, Engineering and Informatics

Dr. Rendon-Morales' research is focussed on the design of novel sensing and actuation systems to develop the next generation of high precision drug delivery and medical robotic systems. She works alongside clinicians from BSMS, NHS Cardiac Research Unit and East Grinstead hospital to design and develop mechanisms to solve unmet medical needs in maxillofacial and cardiac surgery. She is passionate about promoting women participation in STEM.

Key Funders

Awaiting response from EPSRC panel -UKRI Health Technologies Connectivity Awards (£500K)–

- EPSRC
- e-futures network
- HIEF fund



Key Partners

Prof. Pablo Loza -Institute of Photonics Science Spain and Prof. Mohammed Maniruzzaman -the University of Texas at Austin, US.
Currently working on a collaborative project with Ceres Power LTD- a company located n Horsham, West Sussex that focuses on the production and manufacturing of Hydrogen fuel cells.

8

Neuroscience of Vision, Computation and Evolution

Thomas Baden, Life Science

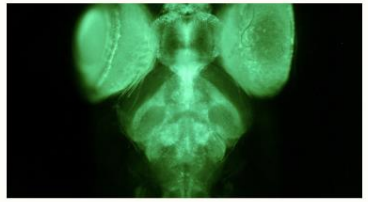
With its more than 100 neuronal building blocks, the circuit complexity of the vertebrate retina is arguably at least on par with that of the cerebral cortex. However, unlike the cortex, the retina is ancient and common to all vertebrates.

How did the retina first come to be, and how have its circuits changed along its more than half a billion year history to suit vision in essentially any habitat on earth, from sharks and lantern fish deep of the oceans to eagles soaring high up in the sky?

Understanding how retinal circuits 'compute', and how computations change in response to evolutionary pressures, is an essential stepping stone on our journey to understanding the function and evolution of the human brain.

£8m in active grants

- Wellcome Trust (£2.3m)
- European Research Council (£3.1m)
- BBSRC (£1.7m)
- Leverhulme (£1m)



Partners:

- Berkeley, Max Plank, Harvard, ...

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Understanding the biological basis of conscious experience, the neuroscience of perceptual experience, and the nature of the self

Anil Seth, Engineering and Informatics

The nature of conscious experience is one of the greatest remaining challenges in philosophy and science. My research brings together many different disciplines – from neuroscience and philosophy to physics and computer science – to shed new light on this age-old question. The deeper understanding of consciousness we are pioneering at Sussex brings many benefits across many areas of society, medicine, and technology.

Sussex has been at the forefront of the science of consciousness internationally for many years, ever since founding one of the first multidisciplinary research centres on the topic in 2010: https://www.sussex.ac.uk/research/centres/sussex-centre-for-consciousness-science/

Key Funders (£350k per year with research income of £500k per year)

- European Research Council (Advanced Investigator Grant)
- EPSRC
- MRC
- Canadian Institute for Advanced Research

Key Partners

Canadian Institute for Advanced Research (Program on Brain, Mind, and Consciousness); Imperial College London; Monash University (Melbourne), Conscium (advisory board)

Commercialisation

Universal Quantum

Metamonixx

AlternOx

Stingray Bio

OWidgets

Coming soon …

Pearl AI

Sussex Quantum Instruments (SQI)

Astute AI

ADVANCED MATERIAL DEVELOPMENT

biaco

113 BOTANICALS

Collaboration

- https://history.phys.sussex.ac.uk/mediawiki/index.php/Research-Tony_Leggett
- I also found time to appreciate and gain from the unique interdisciplinary ethos of Sussex at that time
- This kind of intellectual cross-fertilisation was very characteristic of Sussex
- I am very grateful that I was working in the relaxed and permissive environment that prevailed at Sussex in the early 70's.