### Mathematics of Neural Networks and Deep Learning

**Keynote speaker:** Gitta Kutyniok  
**Technical University of Berlin**

- The Mathematics of Deep Learning: Can we Open the Black Box of Deep Neural Networks?

**Session Chair:** Margaret Duff, Bath

**Session speakers:**
- Barbara Mahler, Oxford  
  Contagion Maps for Manifold Learning
- Patrick Kidger, Oxford  
  Universal Approximation - Transposed!
- Haoran Ni, Warwick  
  Numerical Estimation of Information Measures

### Optimisation

**Keynote speaker:** Peter Richtarik  
**KAUST**

- On Second Order Methods and Randomness

**Session Chair:** Simon Vary, Oxford

**Session speakers:**
- Louis Sharrock, Imperial  
  Two-Timescale Stochastic Approximation in Continuous Time with Applications to Joint Online Parameter Estimation and Optimal Sensor Placement
- Nash Treetanthi, Oxford  
  Uncertainty aversion in Multi-armed bandit problem
- Florentin Goyens, Oxford  
  Nonlinear matrix recovery
- Vadim Ratnov, Edinburgh  
  Forward utilities and Mean-field games under relative performance concerns
- Melanie Beckerleg, Oxford  
  Binary Matrix Completion for Recommender Systems, with applications to Drug Discovery

### Applications of machine learning in life sciences

**Keynote speaker:** Carola Schönlieb  
**University of Cambridge**

- Hybrid mathematical and machine learning methods for solving inverse imaging problems - getting the best from both worlds

**Session Chair:** Connah Johnson, Warwick

**Session speakers:**
- Tamara Grossman, Cambridge  
  Deeply Learned Spectral Total Variation Decomposition
- Lancelot Da-Costa, Imperial  
  A global brain theory, stochastic thermodynamics and applications to autonomous behaviour
- Laura Guzmán Rincón, Warwick  
  Outbreak detection using Bayesian hierarchical modelling and Gaussian random fields

### Bayesian methods

**Keynote speaker:** Alexandre Bouchard-Côté  
**University of British Columbia**

- Scalable approximation of integrals using non-reversible methods

**Session Chair:** Torben Sell, Cambridge

**Session speakers:**
- Henry Moss, Lancaster  
  BOSH: Bayesian Optimisation Sampled Hierarchically
- Sam Power, Cambridge  
  Accelerated Sampling on Discrete Spaces with Non-Reversible Markov Processes
- Riccardo Barbano, UCL  
  Quantifying Model-Uncertainty in Inverse Problems via Bayesian Deep Gradient Descent