



Caius Science Network

## The Easter 2025 *CSN informal talks*

20:45, June 5<sup>th</sup>, Senior Parlour

### **Mina Ryten** – Mapping the brain transcriptome to understand and treat neurodegeneration

Accurate and complete human gene annotation, defined as the genetic coordinates of all transcripts of a given gene, is fundamental to a huge range of genetic, transcriptomic and molecular analyses in health and disease. Growing evidence suggests that human gene annotation remains incomplete and is most incomplete within the brain. However, it is unclear how this affects different loci and more specifically our understanding of neurological diseases. To address this question, my research has focused on mapping the brain transcriptome and integrating that map with other forms of data from genomics to pathology. These analyses have revealed an unexpectedly rich and complex transcriptomic landscape in human brain that provides insights into the architecture of human brain diseases and potentially new therapeutic approaches.

### **James Alvey**– Machine Learning Can Solve All Your Inference Problems, Until It Can't

Modern science increasingly relies on simulations to understand complex systems, from the formation of galaxies to the behavior of the brain. In many of these cases, we can generate realistic data using detailed models, but we lack explicit, analytic function that would allow us to apply traditional statistical techniques. This talk will introduce *simulation-based inference (SBI)*, a set of methods that enable us to do Bayesian inference in scenarios where all we can do is model things on a computer. I'll discuss the basics of SBI in the context of statistics and machine learning, how and when to use it, and when things might go wrong (as well as how we can fix them)..

\* For more details on the CSN meetings, including previous talks, visit: <https://rafi.blumenfeld.co.uk/CSN/CSN.html>