

CAUSALITY IN BIOLOGY & AI

10-11 NOVEMBER 2025
PRBB AUDITORIUM, BARCELONA

Day 1 — Mon 10 Nov 2025

14:15. Welcome & Presentation James Sharpe (Collaboratorium – EMBL Barcelona); Mafalda Dias (CRG)

Session I: Causality Concepts — Chair: Mafalda Dias

14:30. Causation and biological complexity: what are the central problems?

James DiFrisco (Francis Crick Institute)

15:10. Emergent (Non-)Causal Abstractions Over Causal Structure in Mesoscale Biological Systems

Jonas Hartmann (UCL)

16:20. Downwards Causality from Tissues to Genes

James Sharpe (EMBL Barcelona)

17:00. Integrating Biology Across Scales: How Causal is “Causal”?

Ava Khamseh (University of Edinburgh)

17:40. Can modelling predict life? (video)

Denis Noble (University of Oxford)

18:00. End of Day 1 — James Sharpe (EMBL Barcelona) and reception at the Collaboratorium at 19:00

Day 2 — Tue 11 Nov 2025

09:15. Summary of Day 1 & Introduction to Day 2 Mafalda Dias (CRG)

Session II: Causality at Different Scales of Biology — Chair: James Sharpe

09:30. Of cause and effect in rapidly self-organizing systems

Gaudenz Danuser (Institute for Human Biology)

10:10. Sequence-based interpretable dimensionality reduction decodes cellular plasticity

Oliver Stegle (EMBL Heidelberg)

11:20. Host-Microbiome Interactions: Leveraging Genetic Variation in the Host to Better Understand Causality

Amelie Baud (CRG)

12:00. What causes inter-individual variation in lifespan?

Nicholas Edward Stroustrup (CRG)

12:40. Flash Talks — Tanmayee Narendra, Vasilis F. Ntasis, Júlia Vicens Figueres, Dimitris Volterras

Session III: Causality in AI Models — Chair: Gaudenz Danuser

14:30. Causal Representation Learning: From Biomarkers to Mechanisms

Caroline Uhler (Broad Institute of MIT & Harvard)

15:10. Explainable AI for Protein Design

Noelia Ferruz (CRG)

16:20. Causal Molecular Design

Eli Weinstein (DTU)

17:00. Closing Remarks James Sharpe (Collaboratorium – EMBL Barcelona)



Book of abstracts

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