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SUMMARY

Physicist with 5 years of experience developing open source science & software in an interdisciplinary setting, leveraging PyTorch, causal analysis, and distributed HPC computing on large molecular and epidemiological data sets.

EDUCATION**PhD in Statistical Biophysics | University of Edinburgh****Sep 2018 - Dec 2022**

- I use information theory, machine learning, and causal discovery to construct hypergraphs of gene and protein interactions to discover novel cell identities.
- Developed a complex and highly parallelised bioinformatics pipeline to analyse > 100k genome-wide transcriptomes on an HPC cluster.
- Supervised by Chris Ponting (Institute of Genetics and Cancer), Luigi Del Debbio (Higgs Centre for Theoretical Physics), and Ava Khamseh (School of Informatics).
- Coursework in machine learning and quantum information.
- Completed APTS programme in mathematical statistics at the universities of Cambridge and Oxford.

MSc Theoretical Physics | University of Amsterdam**Sep 2015 - July 2018**

- Research on Lie algebraic structures in integrable quantum systems.
- Thesis: *E_8 symmetry structures in the Ising model* (supervised by Bernard Nienhuis)
- Visited the **Niels Bohr Institute** in Copenhagen from Feb to Aug 2016 to study nonequilibrium physics and the physics of machine learning.

BSc Physics and Astronomy | University of Amsterdam**Sep 2012 - July 2015**

- Graduated with Honours/Cum Laude.
- Minor in Computational Science.

Propeduse in Art and Technology | HKU university of the Arts**Sep 2011 - July 2012**

- Work exhibited at various musea, galleries and festivals in the Netherlands, Germany, and Finland.

WORK EXPERIENCE**Research Associate | University of Edinburgh****Oct 2022 - Present**

- Lead R&D of the **Stator** software package, with users from various subfields of biology.
- Produce and guide original research in an interdisciplinary team that combines fundamental research with practical applications in biomedicine.

Information Officer | SciPost**Oct 2017 - July 2018**

- Expanded the editorial board, profiling and contacting potential new editors.

Member of the Junior Editorial Board | SPUI25**Feb 2017 - July 2017**

- Co-organised and presented monthly academic & cultural events for a broad audience.

Distillation Engineer | Mediamatic**Sep 2016 - Feb 2017**

- Designed, built, and demonstrated a bespoke 30 litre vacuum still for artistic and olfactory research.

SELECTED PUBLICATIONS AND TALKS

- A Compositional Game to Fairly Divide Homogeneous Cake - Applied Category Theory 2023 (upcoming)
- The Information Theory of Higher-order Interactions - Dutch Institute for Emergent Phenomena, Institute for Advanced Study, 2023. (invited talk)
- Synergy and Shannon Information: The information theory of higher-order interactions - DEMICS23, 2023 (invited talk).
- Higher-Order Interactions and Their Duals Reveal Synergy and Logical Dependence beyond Shannon Information - A. Jansma, *Entropy*, 2023 <https://arxiv.org/abs/2205.04440>
- A Compositional Game to Fairly Divide Homogeneous Cake - A. Jansma 2023 <https://arxiv.org/abs/2301.02281>
- Complex networks in the mouse brain: Higher-order gene regulation and Boolean logic - IGC Biomedical Genomics meeting, 2021 (talk).
- Cybergenetic in-and-outeractions: Searching for Strange Loops in Mouse Brains - Mathematical Quantum Physics Seminar, University of Innsbruck, 2021 (invited talk).
- Higher-order Interactions on Information Lattices - Mathematical Quantum Physics Seminar, University of Innsbruck, 2021 (invited talk).
- Model-free estimation of higher-order interactions - CSHL Biology of Genomes conference, 2021 (poster).
- Complex Gene Regulation: Higher-order interactions in single-cell expression data - European Mathematical Genetics Meeting, 2021 (long talk).
- Complex Gene Regulation: Higher-order interactions in single-cell expression data - CSHL Network Biology conference, 2021 (poster).
- A maximally noncommittal physicist looks at genetic interactions - IGC Biomedical Genomics meeting, 2020 (talk).

AWARDS

Protocol Fellowship | Ethereum Foundation

Nov 2022 - March 2023

- Collaboration with the Robust Incentives group and the Institute for Categorical Cybernetics (CyberCat).
- Analysed the compositional game theory of agents in cryptographic systems.

Technology Scholarship | ASML

Sep 2015 - Sep 2017

- Selected as one of 25 graduates nationwide for a two-year professional development programme, focused on leadership in technology.

VOLUNTEERING

Co-host | Computational Biology Journal Club

Feb 2019 - March 2020

- Hosted at the MRC Institute of Genetics and Cancer.

Beekeeper | Anna's Tuin en Ruigte

Oct 2017 - July 2018

- Beekeeper at a public permaculture garden.

Reader | VoorleesExpress

Nov 2016 - Nov 2017

- I read books to children whose parents were not able to.

Committee member | BetaBreak

Dec 2014 - Jan 2016

- Moderated and organised public debates on the role of science and technology in society at Amsterdam Science Park.

SKILLS

Languages

Dutch (native), English (fluent), German (fluent), French (basic)

Programming

Python, R, Nextflow, bash, Git, Haskell, Mathematica, Processing (Java), Arduino (C++)

Visual

LaTeX, SwiftUI, Photoshop, Grasshopper (Rhino)