

## MICHAELA BREZINOVA

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### EDUCATION

- **PhD in Computational Chemistry**  
Vendruscolo Lab at the University of Cambridge  
**October 2023 - Present**  
Focus on advancing computational approaches to drug discovery (primarily of small molecules) with an emphasis on neurodegenerative disorders, such as Alzheimer's and Parkinson's disease. See *Publications* section.  
**Technical Skills and Tools:** *Python, TensorFlow, Bash, HPC (Slurm workload manager), AutoDock Vina, Chimera (X), OpenEye Suite, RDKit, Open Babel*
- **MPhil in Computational Biology (Distinction)**  
The University of Cambridge, Cambridge  
**October 2021 - November 2022**  
**Relevant Coursework:** *Genomics I/II, Biological Imaging and Analysis, Deep Learning, Genome Sequence Analysis, Population Genetics Analysis*  
**Dissertation Project:** *Deep Docking: Pipeline optimization and case study on  $\beta$ -amyloid peptide - cost-effective screening of drug-like small molecules that bind to  $\beta$ -amyloid peptide involved in Alzheimer's disease using deep learning*
- **BSc Honours in Mathematics and Computer Science (First Class)**  
The University of Edinburgh, Edinburgh  
**September 2016 - June 2020**  
**Relevant Coursework:** *Functional Programming, Computer Security, Data and Analysis, Processing Formal and Natural Languages, Algorithms and Data Structures, Machine Learning Practical, Quantum Information, Bayesian Theory, Honours Algebra, Probability*  
**Dissertation Project:** *Representation of Body Shapes - a new approach on body shape representation that extends a current Dynamic Skinned Multi-Person Linear Model (DMPL) with LSTM layers that learn positions of points using sequentiality of mesh data*

### WORK EXPERIENCE

- **UNIVERSITY OF CAMBRIDGE, Research Assistant - Cambridge, United Kingdom**  
**May 2023 - October 2023**  
Worked in the Vendruscolo Lab as a part of the global Aligning Science Across Parkinson's initiative (Team Wood). The main focus was unsupervised learning analysis of DAB staining microscopy images of large alpha-synuclein aggregates from Parkinson's patients and developing a kinetic model of aggregate growth.  
**Technical Skills and Tools:** *Python, TensorFlow, FIJI (ImageJ)*
- **ILLUMINA, Bioinformatics Intern - Cambridge, United Kingdom**  
**August 2022 - November 2022**  
Worked as a part of Genome Quality Group, focused on data analysis of large amounts of genomic data to maximize the quality and breadth of information that can be learnt from a genome and in turn improve the output of the DRAGEN platform (a platform that enables analysis of next-generation sequencing data)  
**Technical Skills and Tools:** *Nextflow, Make, Bash, BCFTools, R*
- **GOOGLE, Software Engineer at Google Health - London, United Kingdom**  
**September 2020 - October 2021**  
Worked on Care Studio, clinical software to unify healthcare data, with focus on desktop features and front-end latency optimizations  
**Technical Skills and Tools:** *Soy (Closure templates), TypeScript, Java, C++*
  - Delivering new features to the platform that optimise the data shown to clinicians ( required full-stack work)
  - Collaborating with clinicians, product managers as well as UX designers to make sure the features work exactly as intended and are improving the customer experience
  - Designing (under supervision), implementing and delivering the first version of a critical latency feature required to meet the release latency requirements
- **CERN, Remote Summer Collaboration - Geneva, Switzerland (Remote)**  
**June 2020 - August 2020**  
Replacement of a Summer Student Programme (cancelled due to COVID-19), worked on a profile customisation for ALICE (A Large Ion Collider Experiment) O2 InfoLogger (<https://cds.cern.ch/record/2728718>)  
**Technical Skills and Tools:** *HyperScript, JavaScript, NodeJS, SQLite*
  - Planning and delivering a new profile customisation for ALICE O2 InfoLogger taking software robustness and durability (10+ years) into account (once the experiment resumes, the program has to be functioning for 10+ years)

- **GOOGLE, SWE Intern at Google Travel NBU (Next Billion Users) - Zurich, Switzerland**  
**July 2019 - September 2019**  
 Worked on a new flexible dates feature for India Rail Travel App  
**Technical Skills and Tools:** *Soy (Closure templates), TypeScript, Java*
- **GOOGLE, STEP Intern at Google Account - Munich, Germany**  
**July 2018 - September 2018**  
 Worked on the redesign of the Takeout page ([takeout.google.com](https://takeout.google.com)). The new design is currently in production.  
**Technical Skills and Tools:** *Soy (Closure templates), TypeScript, Java*

## PUBLICATIONS

- **Brezinova, M.**, Fuxreiter, M. and Vendruscolo, M., 2025. DropFit: Determination of the Critical Concentration for Protein Liquid-Liquid Phase Separation. *Journal of Molecular Biology*, p.169294. Server website: <https://www-cohsoftware.ch.cam.ac.uk/index.php/dropfit>
- (Currently in review) **Brezinova, M.**, Brotzakis, Z.F., Horne, R.I., Chowdhury, V.R., Gregory, R.C., Gentile, F. and Vendruscolo, M., (2024). 'Identification of high-affinity secondary nucleation inhibitors of A $\beta$ 42 aggregation from an ultra-large chemical library using Deep Docking'. (<https://www.researchsquare.com/article/rs-4512167/v1>). GitHub link: [https://github.com/MichaelaBrezinova/open\\_source\\_deep\\_docking\\_protocol](https://github.com/MichaelaBrezinova/open_source_deep_docking_protocol)
- Amico, T., Dada, S., Lazzari, A., **Brezinova, M.**, Trovato, A., Vendruscolo, M., Fuxreiter, M., & Maritan, A. (2024) 'A scale-invariant log-normal droplet size distribution below the critical concentration for protein phase separation', *eLife*, 13, RP94214. doi: 10.7554/eLife.94214.2

## PATENTS

- Andrews, D.J., **Brezinova, M.**, 2024. Detecting variants in nucleotide sequences based on haplotype diversity (<https://patents.google.com/patent/WO2025090883A1/>)

## WORKSHOPS, CONFERENCES, SUMMER SCHOOLS

- (Selected) **Short Talk at AI in Drug Discovery and Biomedicine Conference as a part of IRB Barcelona BioMed Conferences - Barcelona, Spain**  
**April 2025**  
 Gave a talk on my work on the *Identification of high-affinity secondary nucleation inhibitors of A $\beta$ 42 aggregation from an ultra-large chemical library using Deep Docking*
- **Eastern European Machine Learning Summer School (EEML) - Novi Sad, Serbia**  
**July 2024**  
 Attended EEML - a week-long summer school on core machine learning and artificial intelligence topics
- **Talk at Bio2Brain Network's (<https://bio2brain.eu/>) AI Online Workshop**  
**June 2024**  
 Gave a talk on my work on the *Identification of high-affinity secondary nucleation inhibitors of A $\beta$ 42 aggregation from an ultra-large chemical library using Deep Docking*

## SKILLS

- **Programming Languages:** *Python (experienced), Bash (experienced), TypeScript (experienced), Soy (Closure Templates) (experienced), HTML (experienced), CSS (experienced), Java (skilful), R (skilful), C++ (skilful), Haskell (familiar)*
- **Cheminformatics:** *RDKit (skilful), Open Babel (Obabel) (skilful), Chimera (skilful), AutoDock Vina (skilful), OpenEye Suite (skilful)*
- **Machine Learning and Data Science:** *TensorFlow (skilful), PyTorch (familiar)*
- **Computational Tools and Frameworks:** *Slurm (experienced), Nextflow (skilful), Make (skilful)*
- **Spoken languages:** *Slovak (native proficiency), Czech (native proficiency), English (full professional proficiency), German (limited working proficiency), Mandarin Chinese (elementary proficiency)*

## VOLUNTEERING AND EXTRACURRICULAR

- **Lab Demonstrator at the University of Cambridge**  
**January 2024 - Present**  
 Lab demonstrator for computational practicals of Chemistry Part IB course. The main focus is the use of Python, Google CoLab, Avogadro and Orca
- **Code First: Girls, Introduction to Web Development course instructor**  
**January 2020 - March 2020**  
 Teaching female students about the front end-development: HTML, CSS, Bootstrap, Git and GitHub

- **Director of Media for the Women in Tech Conference in Edinburgh**  
**May 2017-June 2018**  
Organising Women in Tech Conference in Edinburgh, focusing on media and graphic design
- **MathPALS Student Leader at the University of Edinburgh**  
**September 2017-December 2017**  
Facilitator at Mathematics Peer Assisted Learning program, holding study groups for first-year Mathematics students

## **COMPETITION ACHIEVEMENTS**

- 3rd place at International Team High School Internet Mathematical Olympiad
- 3rd place at National Scientific Research Paper's Competition for high school students in Mathematics and Physics category with paper on topic *Mathematics and Music*