Victor Kawasaki-Borruat

Curriculum Vitae

vborruat@student.ethz.ch
itiskawa.github.io/

Trying to get good at having ideas

Education

9.22–3.25 **Msc. Electrical Eng. & Information Technology**, *ETH Zurich*, *Grade: 5.5/6.0*
Signal Processing & Machine Learning Track.
Focus on Information Theory, Statistics, Theoretical Physics

9.21–9.22 **Visiting Bachelor Student**, *ETH Zürich*, *Grade: 5.21/6.0*
Focus on Numerical Methods, Computational Physics, Signal Processing

9.18–9.21 **BSc. Communication Systems**, *EPFL*, *Grade: 5.2/6.0*
Shared curriculum with Computer Science. Basic mathematics and programming.

9.15–9.18 **French-German Bilingual Matura**, *Gymnase de Chamblandes*, Pully
Mathematics & Physics track. Exchange year in Koblenz, Rheinland-Pfalz, DE

Master Thesis (ongoing)

Title ***Sampling for Statistical Physics with Anisotropic Diffusion Processes***

Supervisors Prof. Dr. Yuansi Chen, Prof. Dr. Hans-Andrea Loeliger

Description We aim to develop a non-isotropic diffusion-based sampling algorithm for spin glass Gibbs measures.

Keywords Approximate Message Passing, High-Dimensional Statistics, Random Matrix Theory, SDEs, Statistical Mechanics, Sampling Algorithms, Bayesian Variational Inference

Bachelor Thesis

Title ***Generalized Gaussian Quadrature for Singular Integrals***

Supervisors Prof. Dr. Ralf Hiptmair

Description Developed a `C++` library to compute integrals with divergent weight functions (logarithmic singularities) using the Golub-Welsch algorithm (link).

Professional Experience

3.23–present **Teaching Assistant**, *Institute for Dynamical Systems & Control*, ETH Zurich
- Head TA for Fall Semester 2023
- Participation in redaction of to-be-published book *Applied Category Theory for Engineering*
- Correction of exercise sheets & exams, course organization

9.21–12.22 **Data Science Assistant & Software Engineer**, *Taskbase AG*, Zürich
- AI model quality checking & optimization
- Server architecture refactoring & mocking services for unit tests

4.21–9.21 **Research Assistant in Digital Signal Processing**, *Hôpital Ophtalmique J-G*, Lausanne
- Developed signal analysis software for pupillometry data

9.20–6.21 **Teaching Assistant**, *EPFL*
- Teaching Assistant for Linear Algebra I (Fall Semester 2020)
- Teaching Assistant for Physics I (MàN 2021)

9.19–11.19 **Science Teacher**, *Etablissement primaire et secondaire Apples - Bière*, Apples
- School Teacher for the subject of Science, grades 7-9. Part-time regular substitute.

Projects & Scientific Writing

3.23–present **Applied Category Theory**, *Inst. for Dynamical Systems and Control*, ETH Zurich
I assist in the writing of the ACT4E book authored by Dr. A. Censi, Dr. J. Lorand & Prof. Dr. G. Zardini. Topics include Natural Transformations, Monoidal Categories, Enriched Categories. All in the context of feedback control systems (co-design).

3.23–6.23 **Capacities of Moment-Constrained MISO Channels**, *Institute for Information & Signal Processing*, ETH Zürich
Semester Project in Information Theory, supervised by Prof. Dr. Stefan Moser, Dr. Ligong Wang. Proofs of the formulation of the channel capacity of MISO optical channels. (link).

2.20 - 6.20 **Night Sky Simulation**, *EPFL*
Course Project in Java with JavaFX

2.21 - 3.21 **Toy Cryptocurrency Development**, *self-motivated*, Mockup of the blockchain technology using proof of work on a local webpage. Written in Python (Flask)

Talks

May 2025 **Diffusion-Based Sampling and Approximate Message Passing**, *ETH Zurich*
Given in Prof. Yuansi Chen's Random Walks group's seminar (SfS, D-MATH)

May 2023 **Applied Category Theory Talk**, *ETH Zürich*
Given at the Zurich Undergraduate Colloquium for Mathematics & Physics (link) .

Languages

English	Native	*Bilingual*
French	Native	*Bilingual*
German	Professional Proficiency	*Bilingual Matura (Koblenz, DE)*
Japanese	Conversational Proficiency	*JLPT N5*

Research Statement

With a background in and strong interest for the mathematical side of Engineering and Physics, I am looking to pursue research in the development of applicable yet mathematically beautiful theories. In particular, I have good knowledge of high-dimensional probability, random matrix theory and statistical mechanics, which I would like to put to use in proving strong results in Artificial Intelligence, Signal Processing, and Emergent behaviours of complex systems.

A few things that I appreciate

(Quantum) Information Theory, Dynamical Systems, Category Theory, Estimation & Machine Learning, Statistical Signal Processing, Statistical Mechanics, Music Theory, Classical Guitar, Kung Fu, Calisthenics