Alexander Demin

Education

2019 – Present **Bachelor of Computer Science**, *HSE University, Russia*, GPA: 8.9/10.
Major: Machine learning, Minor: Applied math

Experience

Summer 2022 **Google Summer of Code**, *Participant*.
Mentors: Chris Elrod, Yingbo Ma

Jan 2022 - Present **Max Planck Institute for Informatics**, *Research Intern*.
Supervisor: Hamid Rahkooy, Automation of Logic group
- Developing effective computer algebra algorithms applied to systems biology
- Implemented the F5 algorithm, integrated it in Reduce, published a conference paper, and gave a seminar talk

Sep 2021 - Jan 2022 **Istituto Nazionale di Fisica Nucleare**, *Student Researcher*.
Supervisor: Tommaso Dorigo
- Implemented a novel semi-supervised algorithm to search for rare $B^0 \to \tau^+\tau^-$ decays to be used at CERN
- Contributed to a confidential research report for a project supported by The European Commission

Summer 2021 **École polytechnique Computer Science Laboratory**, *Research Intern*.
Supervisor: Gleb Pogudin, Modélisation algébrique group
- Proposed an interpolation-based algorithm to solve symbolic ODE parameter identifiability problem

2020 - Present **HSE University, Faculty of Computer Science**, *Teaching assistant*.
- A teaching assistant for courses Matrix Computations, Numerical Linear Algebra, Algorithms and Data structures, and Linear algebra in different semesters at HSE university
- Some of my responsibilities were: managing course logistics for classes of 200^+ students, designing homework problems, helding office hours, and mentoring a tiny course-project

Publications

Peer-reviewed

1. Alexander Demin, Hamid Rahkooy, Thomas Sturm, *F5: A REDUCE Package for Signature-based Gröbner Basis Computation*, Computer Algebra in Scientific Computing, 2022

Other

2. Hevjin Yarar, Alexander Demin, Tommaso Dorigo, Luca Quagliarella, and Andrey Ustyuzhanin, *A Semi-supervised Learning Method for the Search of Rare Processes in LHC Data*, Report 2.1 of INSIGHTS ITN to European Commission, 2022

Projects

2021 - Present **Gröbner bases and Symbolic root finding**, *supervised by Shashi Gowda, MIT*.
- Implemented Faugère's F4 algorithm for symbolic polynomial system solving that outperforms the state-of-the-art implementation on a standard well-established benchmark [github]

2020 - 2021 **Exact Reduction of ODE systems**.
- Studying intuition behind ODE linear dimensionality reduction in application to systems biology models
- Released an algorithm that excels the current state-of-the-art approach by providing a wider range of possible solutions to ODE reduction [github]

Awards

2021 - 2022 **The Ilya Segalovich Scholarship**, Awarded by HSE university and Yandex for excellence in teaching.

2022 **Best Student Scientific Talk**, Selected as the best student talk at HSE annual CS conference.

2021 **Erasmus$^+$ KA107 Fellowship**, Granted with École polytechnique mobility stipend.

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