Polyachenko **Yury**

Intern for the EPFL E3 summer program

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Dear Prof. Smit, Prof. Curtin, Prof. Marzari and other members of the selection committee,

My name is Yury Polyachenko and I am a third-year undergraduate student at MIPT - one of the most famous and prestigious universities in physical sciences in Russia. I am applying for the EPFL E3 program because at EPFL I've found hosting labs which in my view correlate with my interests and background astoundingly well. Therefore here is my a bit structured tail about myself and why I think me and EPFL are a grate match:

About Me

I've been fascinated about the idea of computer simulation since 9^{th} school grade. At a particular moment back then I realized that it seemed I'd known enough to try to see how a system moves according to Newton's law without solving equations exactly as we always did in school. I spent next 2 years (10^{th} and 11^{th} grades) under the supervision of a head of a lab in the Institute of Astronomy RAS. I was modeling stellar dynamics in a galaxy and mastering various computer skills along the way. Because of my school achievements I could go to any Russian university with no exams required. I was leaning towards applied and computational physics and MIPT had the best Physics department in the country so that defined my choice.

At the MIPT I continued to develop my computer skills and knowledge of physics. Regular courses success is represented by the GPA 4.99/5. My more specific interest still only grew and so did my skills. I say that because of a summer internship offer I got after my freshmen year from my CS seminarian who worked at MIPT in the «Laboratory of Mechanical Systems and Processes Modeling». I've created a proof-of-concept model which was used for further studies.

At the same time in the beginning of my 2^{nd} semester I found a lab where I though I wanted to try to dig deeper. The head of the lab was Genry Norman with whom I've been working for 2 years now. My first project where was devoted to simulation of self-diffusion in the Lerrand-Jones system. At the end of the year the project was elected top 10 of the class which consisted of $\sim$ 1100 people. I spent the 1^{st} half of my sophomore year improving the project and preparing an oral report for the MIPT conference. The report was again a success – I won 2^{nd} place in the section among bachelors. After the exams I was occupied by nothing but regular studies. It happened so that a programmer position at the company my other CS seminarian was working in became available and I got accepted. During the work at IOGT I significantly improved my matlab skills because it was the main language. Before the end of the academic year I was accepted for the CECAM summer school at SISSA. In my 4^{th} semester, right before the school, I'd completed a Molecular Dynamics course and got the best final grade in the class. So the summer school was a nice continuation and repetition of the completed course. Mark Tuckerman gave a series of lectures on that school and I really liked him and the topics he covered. I really enjoyed communicating with students from different cultures and specializations and explaining difficult moments to them. That gave me an idea to try teaching students. I knew that in Russia there is an educational center called Sirius where I can apply with a project and will guide a group of high school students if accepted. I applied with a new task I got from Norman by that time. I spent next month helping students master basic computer skills, physics and math essential for understanding and performing molecular dynamics. In the end they managed to run a simple simulation on a remote server in LAMMPS and to verify basic laws such as energy conservation or maxwell distribution. At that moment I liked working with those kids because they were really motivated and eager for new things. I continued to work on the project and delivered an oral report in the New Athos in the August. Remembering the positive experience with kids I decided to try to teach freshmen. They did a new CS python course and I was relatively good in it, so that was it. For next 4 months I've been doing my research work and helping freshmen with python exercises. Averaged over longer period and over not so united group average motivation wasn't so high so I can't say I loved every moment of the process but it was an interesting experience. Updated project was presented on the 62^{th} MIPT conference but I yet continued to work on it. At that point it was not only me but another 3^{rd}-year student and a PhD student. Our final results will be presented on the international ELBRUS 2020 conference. With Norman we are also working on an article. I hope now you have a certain

understanding of my interests and my background. Thus I can move to questions «why me for EPFL?» and «why EPFL for me?»

Why Google?

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Why Me?

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I guess the thing that was exiting me back when and still does in doing a physical simulations is that personally for me it has just right ratio of theory and practice in it. Also I like to see the result of what I am doing and computational physics provides me with such opportunity.

Sincerely,

Polyachenko Yury

Attached: Curriculum Vitae