

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 fit for each other:

About Me

I am fascinated about the idea of computer simulation since 9th school grade. In the end of the year I was watching some documentary about astrophysics and at some point there was an animation of collision of 2 galaxies (Milky way and Andromeda). During the animation I started to think how they managed to get this animation never having witnessed the event itself. The motion looked really smooth and physical so it definitely wasn't random. I suddenly realized that in general it wasn't that complicated and even I could try to get something similar to work. Next few days I'd spent coding Newton's laws of motion and gravity, simple data I/O and visualization. I managed to create a Solar system. What struct me was how well it was working having me spent only a few days. My interest didn't fade so my parents found a man from Institute of Astronomy RAS and I'd spent next 2 years (10th and 11th grades) modeling stellar dynamics in a galaxy and mastering various computer skills along the way. When time came to choose a university to go to I was 100% sure I wanted to do computer simulation in all its forms and shapes. For my school achievements I could go to any Russian university with no exams required. I was leaning towards applied 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». If it was some kind of advanced work I wouldn't be able to contribute anything valuable. But the topic was hardly touched before me so I was able to create a simple format to store polygonal geometry data and an engine to process wave propagation in it. Job was a good fit for me because it heavily relied on mechanics and analytic geometry both of which I completed by that time. The project was a success. I've created a proof-of-concept model which was used for further studies.

At the same time in the beginning of my 2nd 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 ~ 1100 people. I spent the 1st 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 2nd 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 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 I was accepted for the CECAM summer school at SISSA. In my 4th semester, right before the school, I 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'd 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.

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 Yuri

Attached: Curriculum Vitae