STEPS Students Report

Ilia Nekrasov (S5)

Faculty of Mathematics and Mechanics, SPbU

I am Nekrasov Ilia. I am a 5-th year undergraduate student of St Petersburg State University, St. Petersburg, Russia. It is definitely a great luck that I was able to participate in STEPS program in this Spring of 2017.

Before the trip to Tokyo, I have known that it would be the brightest month for many reasons. It was hospitable and absolutely open Japan culture.It was the greatest city of all over the world --- Tokyo with constantly energising Shibuya, with full of never sleeping graduate students campus Komada, with the greatest mathematical physicists campus Kashiwa (more concretely, Kavli IPMU). It was absolutely magnificent Mathematics. But let me consider this reasons seriatim.

First of all, it is a great mathematical society of Japan. My host professor for STEPS program, Yoichi Mieda is a world-known brilliant specialist in contemporary number theory (it is a mathematical discipline studying integer numbers (1,2,3,...) and trying to answer the principal questions about its nature, like the Fermat's last theorem), especially in the arithmetic local Langlands theory. Here I need to say that the last one(the Langlands program) is a huge mathematical program which provides surprising connections between many mathematical (absolutely unrelated before the Langlands program) areas like number theory, representation theory, mathematical physics, geometry and many others. Right now this program is still on the edge of science -- it is not built completely yet, so everyone can participate in the construction of this mathematical "Tower of Babel" of ours days. It is worth to say here that there not so many mathematicians can emerge you in this area mathematically right and pedagogically correct (in the case of wrong "first meeting" with the Langlands program, it is 99% that a normal guy will just run away as fast as possible) -- and Prof. Mieda is the man who can and he has taught me. During our every week meeting and many others informal conversations I have learned about many aspects of the arithmetical Langlands program:

-- explicit nonabelian Lubin-Tate theory (number theory),

-- Deligne-Lustig theory (representation theory),

-- elliptic sheaves and further, more general theory, Drinfeld shtukas (number theory).

Through this small research, I learned the explicit connection between the complicated

definition of the Drinfeld shtukas and its properties AND the Deligne-Lustig varieties! This connection makes the first definition absolutely natural and its properties immediately obvious. I should remark that now many works of S. Vostokov and St Petersburg Number theory School on explicit formulas for higher reciprocity laws can be reformulated and generalized by using nonabelian Lubin-Tate theory -- it is a topic of my present research.

Also during my stay in Tokyo, I have participated in many mathematical events:

-- Number Theory Seminar Paris--Tokyo--Beijing;

-- Developments in mathematics at IPMU: in honour of Kyoji Saito;

-- Extra course and seminar on Analytic Number Theory;

-- Seminar on C*-algebras and related questions.

Secondly, I discovered Japan! It was my first visit to this great country. I have lived near the Shibuya station (just 20 minutes to the Komaba campus) And I have to say that this station is just an entertainment centre of Tokyo: delicious foods, giant store-streets etc. Every day after University time on the way home I passed the Shibuya crossing and met Hachiko! It was a real pleasure to run every morning around awaking Tokyo.

Thirdly, I want to say a million thanks to STEPS program for the chance to meet such great colleagues --- graduates students in the Graduate school of Mathematics, Tokyo University.They are a little older me, so I had a chance to learn not only about my general mathematical area but many others. And I have used all these chances! Therefore during my month in Tokyo, I became more familiar with some aspects of integrable dynamical systems, C*-algebras, continuous representations of Lie algebras.

Summing up, I want to say that the STEPS program opened the great world for me! Thank You very much.