

Report on the visit at National University of Mongolia

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August 18 - September 10, 2014

In 2013, CIMPA started its activities in Mongolia by organizing two schools. In August 2013, I was one of the organizers and lecturers of a CIMPA school² held at NUM³. The local organizer recently got his PhD in Japan as well as most of the researchers in mathematics in NUM.

I had several meetings with the staff of the department of mathematics of NUM where they asked me many questions about CIMPA and other international institutions. They were very interested to extend their collaborations with mathematicians in European countries.

Following these meetings, the head from the department of mathematics asked me to help him to have an agreement between NUM and the university of Nice. They also invited me to give a series of talks for the Bachelor students in 2014. In fact, they required the visits of two mathematicians from Nice in September 2014. However, for some reasons, mainly financial, due to the restructuring of the university, the invitation was reduced to only one.

The first three days: Herb Clemens and I attended ICM in Seoul. We organized these travel to Mongolia from 18 to 22 of August, H. Clemens could stay no much longer.

- First meeting with the professors of the department of maths.
Ten or so professors of the department of mathematics attended this first meeting. G. Bayarmagnai, the Head, and Uugnea Ninjbat organized a presentation of mathematics in NUM⁴.
- Meeting at the Mongolian Academy of Sciences with Prof. S. Tumurbat.
- Second meeting with the professors of the department of maths where G. Bayarmagnai and Uugnea Ninjbat listed their needs to promote mathematics in Mongolia⁵.
- Meeting with the vice chairman of the Parliament of Mongolia, Radnasumberel Gochigdorj, with the participation of a mathematician, member of Academy.

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<http://math.unice.fr/>

²Hypergeometric Functions and Representation Theory

³National University of Mongolia

⁴see the joint document 1

⁵see the joint document 2

The last ten days: I gave fourteen talks, the first one as a general presentation, the others for the Bachelor student. each day, two talks of about 1h30 each, and finally two talks for the professors and researchers.

- September 1 (10h -11h30): Maths in our day life: “Explosion of Maths” (SMF) and presentation of INRIA as model of research institute where teams are multi-disciplinary.
- September 1 (14h -15h30): Pythagoras Theorem
- Two talks every work day up to September 9:
 - Pythagoras theorem (spherical, hyperbolic geometries)
 - Geometries in dimension 2, uniformisation.
 - Duality in mathematics by examples.
 - Affine and projective geometries, short introduction.
 - Groups and algebraic curves.
- September 5: Meeting with the staff of the Institute of maths of NUM: discussion about pure and applied maths and applications of maths.
- September 10: Topology and Robotics (2 talks for the professors).

All these talks were held in the main room of the university. I prepared some slides. A majority of professors of the department of mathematics attended all the talks together with about 30 students of the bachelor and master, one secondary teacher and some professors of the university of technology.

The professors asked many questions during and after the talks but not the students. My purpose was to explain the importance and the role of geometry that was a challenge because there is no course in geometry in NUM. At the end of my stay, the head of the department of mathematics told me that they decide to add some courses in geometry in the bachelor program.

NUM was created in 1942 and the department of mathematics in 1974. Up to the end of the Soviet Union domination early 90', the university had all its international relations with the communist countries. The collapse of the Soviet Union is a breakdown for the educational system in Mongolia.

24 years later, NUM has a young department of mathematics with 13 PhD from Japan, Canada, Russia, UK,

There exists the Institute of Mathematics devoted to the research. It publish four times a year the Mongolian Mathematical Journal. Each volume is about 50 pages and it gathers about 6 articles of uneven quality. The director , R. Enkhbat, seems active in research. His speciality is optimization. and optimal control. The Institute and the department are located in the same building, same level, but even if the members of these two institutions maintain good relations, there is almost no collaboration on the

scientific side. There is a kind of misunderstanding about pure and applied mathematics. The Institute focus its interest on the applied side, neglecting the theoretical side, the department whose the official role is mainly the training of undergraduates students, organizes its research program independently of the Institute.

However, the mathematicians at NUM are young, dynamic and there is a strong willing to promote mathematics. They need some help from international community. They already organized two CIMPA schools in 2013, one will be held next year and they plan for 2017 a CIMPA school on Number theory and Cryptography.

The French Embassy⁶ in Mongolia opened the office of Cooperation and Cultural Action. I met the “Conseiller de Coopération et d’Action Culturelle”, M. Jean-Florent Filtz. I made a short presentation of the mathematics in NUM. M. Filtz informed me that the Embassy will give 10 scholarships for Mongolian undergraduate, graduate students. The mathematicians have to propose a good candidate. M. Filtz was interested by the project of SEAMS schools and he suggested to add a course related to sismology.

Mathematical Society of Mongolia

The president died last year and a new president has to be elected by the end of 2014. They have to make active this Society. As a first step, they required to become member of SEAMS. They will be able to organize some SEAMS schools.

Documentation

The library has very few books and no journals.

Websites

The websites of the department of mathematics and the Institute of Mathematics do not give informations and they should prepare a complete presentation if they want to be part of the international community.

Projects

- September 2015: Michel Waldschmidt (Paris 6) and Francesco Papalardi (Roma) will visit MUN to give some seminar preliminary to the CIMPA school in 2016.
- Organization of a CIMPA school on Number theory and Cryptography in 2016-7.
- Project of SEAMS schools on Maths and Environment (ICSU grant program) in 2015-6 and a CIMPA school in 2017.
- Visit of Prof. G. Bayarmagnai, Head of department of maths, NUM, at University of Nice (October-November 2014).

– Meetings with the lecturers of the SEAMS schools,

⁶www.ambafrance-mn-org

- Meeting with the director of International Relations Office of UNS (discussion about MOU, exchange of lecturers, co-diploma),
- Meetings with the mathematicians and the directors of the department of maths and the Laboratoire Dieudonné (collaborations, visits of lecturers, scholarships for NUM students).