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February 26, 2022

PU-NMS International Schools Series for Students and Faculty
Department of Mathematics, University of the Punjab
Lahore, Pakistan
February 14-18, 2022

Michel Jambu and *Michel Waldschmidt*

The Department of Mathematics, University of the Punjab, Quaid-e-Azam Campus, Lahore, Pakistan, in collaboration with The National Mathematical Society of Pakistan, organized the PU-NMS International Schools Series for Students and Faculty from February 14-18, 2022. Both of us, MJ and MW, were invited as Keynote Speakers. The main program was a series of 5 courses by each of us. MJ spoke on *Groups and Algebraic Curves*, while the title of the 5 courses by MW was *Interpolation* - the beginning of the fifth lecture by MW was replaced by a talk on *International cooperation in mathematics: some examples, including CIMPA, EMS - CDC, IMU - CDC, ICTP, TWAS, OWSD, Simons Foundation, ISP, RNTA, APSA, SARIMA, AFRIMath.* For this program, more than 70 students applied, only half of them were accepted, and less than 30 students actually participated.

On the afternoon of the last day of this program, a closing ceremony took place, during which Professor Ahmad Mahmood Qureshi gave an award from the National Mathematical Society of Pakistan to Professor Malik Zawwar in recognition of his activites.

Five more *special lectures* were scheduled, 3 by MW and 2 by MJ, but the first one by MW which should have taken place on the second day of the program, Tuesday February 15, with the title *Mathematics for Computer Science. Towards exact rounding of the elementary functions, an application of Diophantine Approximation to Scientific computing and validated numerics*, had to be cancelled, due to a decision of the Deans committee of PU on February 10 to conduct online the evening and afternoon classes from February 10 to February 25th, namely during the Pakistan Super League-II matches. Hence only 4 extra lectures took place.

The first *special lecture* was given by MJ in the afternoon of Wednesday, February 16 at the Department of Mathematics of Riphah International University, with the title *Topology and big data*, This program was organized by Professor Faqir Muhammad Bhatti.

The second *special lecture* was given by MW in the afternoon of Thursday, February 17, at Lahore College for Women University (LCWU), Lahore, on *Linear recurrence sequences.*

This visit to LCWU gave the opportunity to MW to discuss a project of a CIMPA School in 2024.

On Saturday, February 19, 2022, we both participated to the 1st International Conference on Pure and Applied Mathematics at the Government College University, Faisalabad (GCUF). The last two *special lectures* were part of the program of this conference. The first talk of this conference was delivered by MJ on *Topology and big data*, the second one by MW had the title: *Is the Euler constant a rational number, an algebraic irrational number or else a transcendental number?* There were almost 100 participants, mostly females ones.

This visit is part of a long term cooperation in mathematics between France and Pakistan. We informed the French Embassy of our visit before coming. We may also recall that the first institute which was awarded the label ERCE *Emerging Research Centers of Excellence* by the European Mathematical Society, upon the recommendation of its Committee for Developing Countries (of which MJ and MW were members), was the Abdus Salam School of Mathematical Sciences (ASSMS). Among many further international cooperation in mathematics going on with Pakistan, we like to mention the International Mathematics Master which launched its first pilot project in Lahore, Pakistan in September 2019, coordinated by Stefano Luzzatto, with the support of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste and the International Mathematical Union (IMU), in particular the program Graduate Research Assistantship in Developing Countries (GRAID).

We had the opportunity to visit the library of the mathematics department of the University of the Punjab, where we found a good number of books, but many of them are rather old - recent ones should be added.

We got a copy of the syllabus of the program of mathematics in BSc and MPhil; the quantity of material that the students are supposed to know at the end of their studies is really impressive. However it seems that no program on probability is included. On the other hand, the quality of the program would benefit from a comparison with the subjects which are included in the program of the International Congresses of Mathematicians (ICM); some topics, like fuzzy theories, could be avoided.

We are extremely grateful to Professor Alla Ditta Raza Choudary who initiated this invitation, and to the National Mathematical Society of Pakistan which supported our travel expenses. Local hospitality and accommodation during the school series were provided by the Department of Mathematics at the University Club, University of the Punjab, Quaid-e-Azam Campus, Lahore, Pakistan. Our host, Professor Malik Zawwar Hussain, was incredibly efficient for organizing this event; he took care of our stay from the beginning to the end, he welcomed us at the airport when we arrived and went with us when we left, he took care of all our needs, he invited us many times for lunch to his house, and of course he organized the scientific program in a very efficient way. We are thankful to him for his friendly and warm hospitality. A number of his colleagues were also very kind with us, we will not name them for fear of forgetting some of them, we just tell them now that we appreciated their nice welcome. Our visit was a short and dense one, we enjoyed a lot, and we believe that this kind of initiative is a strong and efficient contribution to the development of mathematics in Pakistan. We wish all success to this PU-NMS International Schools Series for Students and Faculty.

Michel Jambu   *Michel Waldschmidt*

Appendix 1: list of previous visits of MJ to Pakistan

• February 11-19, 2007: Abdus Salam School of Mathematical Sciences (ASSMS), CIMPA School Configuration Spaces and Applications. Rapport en français.

• 16-18 September 2017: International Workshop on Non Linear Analysis and Applications, University of Management and Technology (UMT), Lahore (Keynote speaker).

• 30 March-03 April 2018: 4th UMT International Conference on Pure and Applied Mathematics (Keynote speaker).
    https://cmap.umt.edu.pk/4thUICPAM2018/PATRON.aspx

• 23-25 August 2019: 20th International Pure and Applied Conference, Islamabad (Keynote speaker).

• 29 November-02 December 2019: 1st University of Lahore (UOL), ICM, University of Lahore (Keynote speaker).
    https://cma.uol.edu.pk/icm2019/about/

• 04-13 December 2019: Course Algebraic Topology, COMSATS, Lahore.

Appendix 2: list of previous visits of MW to Pakistan

• February 21 - 28, 2009: Abdus Salam School of Mathematical Sciences (ASSMS), CIMPA School, Lahore. Combinatorial and Computational Aspects of Commutative Algebra.

• November 25 - December 2, 2009: The French Science Tour in Pakistan (FSTP) (report in French).

• February 13-24, 2010: (report in French) Abdus Salam School of Mathematical Sciences (ASSMS) Graduate course: Introduction to Diophantine Approximation,

• September 24 - October 27, 2011: Abdus Salam School of Mathematical Sciences (ASSMS), Lahore.

• February 4 - 13, 2012: Abdus Salam School of Mathematical Sciences (ASSMS), CIMPA School : Local analytic geometry, Lahore (Pakistan).

• March 1-13, 2013: Abdus Salam School of Mathematical Sciences (ASSMS), Lahore, 6th World Conference on 21st Century Mathematics 2013.

• August 23 - 25, 2013: 14th International Pure Mathematics Conference 2013 (14 IPMC 2013), Preston University, Islamabad. Organized by Algebra Forum and the Pakistan Mathematical Society.

• November 18 - 28, 2015: Eminent Professors Lectures Program EPLP, National Mathematical Society of Pakistan (NMSP) and Kangourou Sans Frontières Pakistan (KSF Pakistan).

More details are available on MW's website
    http://www.imj-prg.fr/~michel.waldschmidt/AgendaArchives.html
    http://www.imj-prg.fr/~michel.waldschmidt/cooperations.html