ISAAC - Newsletter July

Dear ISAAC members,

Some time has passed since my last letter on March 23rd, 2020. The Corona virus has spread all over the world. I found out from ISAAC members that they were infected with the virus. Of course the entire ISAAC community hopes that all affected colleagues are healthy again. Our life has changed fundamentally in the past few weeks. Public life has been severely restricted in most countries.

Universities are closed. But in most cases, as mathematicians, we have the advantage that we can continue to work from home. This enabled us to complete our contributions for the Proceedings of the 12th ISAAC congress.

Teaching as a digital transfer of knowledge was certainly a new challenge. In many countries, strict restrictions will be relaxed in the near future. Connected with this is the hope of being able to hold or take part in workshops or congresses again. On the horizon, I can see already a small light that brings us to the 13th ISAAC congress next year in Ghent in Belgium. I ask our ISAAC members to plan already, to organize sessions during the congress and to invite colleagues from their research area to contribute to the sessions. Usually, the members of the special interest groups are very active in this matter.

I wish you a good and successful time, many new mathematical results and a get together next year in Ghent

Stay healthy

Michael Reissig
President of ISAAC

Uwe Kähler
Vice-president of ISAAC

SIG in Operator Theory and Harmonic Analysis (OTHA)

The Special Interest ISAAC group in Operator Theory and Harmonic Analysis (OTHA) consists of ISAAC and non-ISAAC members whose activities are focused on the modern methods and applications of the contemporary harmonic analysis: real and complex variable methods, and the operator theory, including the study of complex multiparameter objects with variable parameters (properties). Membership in the ISAAC Interest group OTHA is open to all ISAAC members. Webpage and contacts: http://otha.sfedu.ru/isaac/.

On the photo – Alexey Karapetyants, Michail Karyakin (head of the Math Department of the Southern Federal University), members of the Steering committee: V. Mehrmann (President of the EMS), Armen Sergeev (Vice-President of the EMS), Roland Duduchava (President of the Georgian Math Union), Betul Tanbay (Vice-President of the EMS).

The idea of creating ISAAC group OTHA was given by the President M. Reissig during the 12th International ISAAC Congress held from July 29 to August 2, 2019 in Aveiro, Portugal. In the same place, during the discussion, the main directions and actions of the development of the OTHA group were identified. One of the first successful actions of OTHA Group members was the International Caucasian Mathematical Conference (https://euro-math-soc.eu/cmc/), the local organizers of which were members of the OTHA group A. Karapetyants. V. Kravchenko, J. Restrepo.

However, the basis for the OTHA group was a series of OTHA conferences http://otha.sfedu.ru/. We must say that the fruitful cooperation of ISAAC and the OTHA series of conferences has been ongoing since 2015, the ISAAC community being a strategic partner and sponsor of the conference.

On the photo – participants of the OTHA-2019 conference.

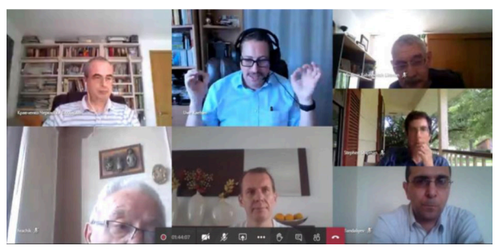
On the photo – Professor Armen Jerbashian from Colombia is giving review of his recent research (December 2019).

One of the important aspects of the work of the OTHA group is the integration of scientists from all over the world, the formation of bases for fruitful scientific communication and dialogue.

In the current Covid situation the organization of online seminar activity is quite important, and this will be discussed below.

The editorial activity is one of the main issues as well. As part of an agreement between the ISAAC international community and Springer, the volume Modern Methods in Operator Theory and Harmonic Analysis is published in the series “Mathematics and Statistics”. The book included articles by plenary lecturers of the 2018 conference and also articles by other invited leading scientists, see https://link.springer.com/content/pdf/bfm:978-3-030-26748-3/1.pdf. It was decided to develop this successful experience now within the framework of the actions of the OTHA group, and at the moment, with the support of ISAAC, a two-volumes book is under preparation in the Springer series “Mathematics and Statistics”. The Volume 1 will be devoted to harmonic analysis and applications in general. Volume 2 to be focused on probability, applications and mathematical (statistical) methods in biology and medicine. But still everything is in the context of a general harmonic analysis and its numerous applications.

Earlier in 2018, members of the OTHA group (A.Karapetyants, V.Kravchenko) organized the international Mathematical Center of the Southern Federal University, https://rmc.sfedu.ru. The positions of post-docs have been formed, events for young people have been organized, course programs are updated, and many other scientific and educational activities are being held. The leaders of the center consider the partnership with ISAAC being strategic and many actions and events are being carried out and will be carried out with the support and deep involvement of ISAAC members.



On the photo – some participants of the seminar.

For instance, the mentioned above online Seminar on Analysis, Differential Equations and Mathematical Physics is organized by the Regional Mathematical Center of the Southern Federal University with a deep involvement and support of the special Interest ISAAC-OTHA group. Supervisors are members of the OTHA group: Alexey Karapetyants, Vladislav Kravchenko. It is especially pleasant to note that among the first plenary lecturers of the seminar was Professor Uwe Kähler, CIDMA - Department of Mathematics, University of Aveiro, and vice president of the ISAAC community. We believe that this fact is quite symbolic, and it especially emphasizes that the ISAAC community supports innovations and initiatives in every possible way.

We are planning the OTHA 2020 conference for August 2020, but now the situation with Covid19 is uncertain. Nevertheless, in this year we will definitely hold OTHA in one format or another. Please, consult the conference website http://otha.sfedu.ru/.

The OTHA-ISAAC special interest group welcomes any research and educationally oriented initiatives from other ISAAC members, we are also open for collaboration and project activities. All such proposal could be directed to Alexej Karapetyants at karapetyants@gmail.com.

Alexej Karapetyants, Chair of the SIG OTHA

SIG in Integral transforms and reproducing kernels (IGITRK)

If we wish to foresee the future of mathematics, our proper course is to study the history and present condition of the science - Henri Poincaré

They were always meant to be together. Integral transforms and the theory of reproducing kernels cannot be dissociated from each other. The ubiquitous presence of reproducing kernels in almost every field of modern mathematics and the akin sciences of physics, data science and signal analysis, has been playing a fundamental role in breaking boundaries between disciplines, working as a common reference point for the scientific exchange of ideas between researchers originating from different backgrounds. The concept of reproducing kernels contains such a perfect combination of simplicity, beauty and usefulness, that often mathematicians get their interest aroused at a first encounter. With foundations grounded on the early twenty century work of Zaremba and Mercer, later object of detailed study by Aronszajn, Bergman and Saitoh, it was mostly in the first two decades of this century that reproducing kernels started invading science at large.

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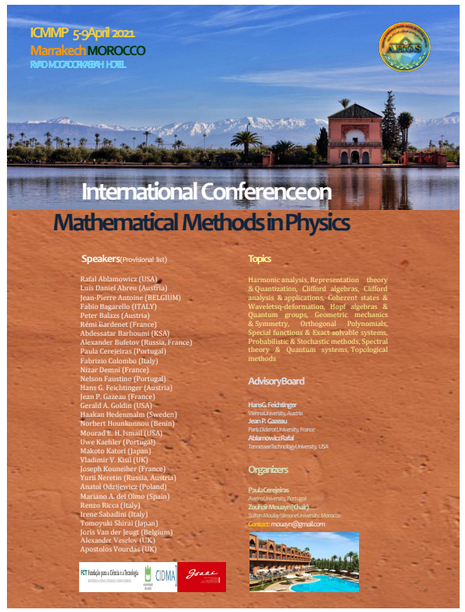

ICMMP2021 meeting in Marrakech, Morocco - https://icmmp21.doodlekit.com

Today, integral transforms and reproducing kernels lye at the heart of state of the art research in complex analysis, functional analysis, generalized functions, potential theory, spectral analysis, representation theory, operator theory, PDEs, pseudodifferential operators, Clifford analysis, random matrices, determinantal point processes, Gaussian analytic functions, statistical inference, Riemannian geometry, orthogonal polynomials, q-series, packing problems, number theory, harmonic analysis, approximation theory, sampling theory, inverse problems, learning theory, support vector method, kernel method, discretization principle, Tikhonov regularization, integral equations, interpolation problems, matrix theory, inequalities, quantum mechanics, quantum field theory, condensed matter physics, quantum optics, deep learning, data science, supersymmetry...and the list could go on. In face of this evidence, the ISAAC Special Interest Group on Integral Transforms and Reproducing Kernels consists of ISAAC members and participants of ISAAC Congresses whose research activity is directly connected with integral transforms and reproducing kernels, of those members and participants with interest in interdisciplinar research and also of those who have the desire of expanding their scientific scope beyond their core fields. The main goal of the IGITRK is to support such scientific research activity, to develop scientific exchange and international collaboration in the field of integral transforms, reproducing kernels and related areas. The intrinsic transdisciplinar nature of the group leads to a natural interest in the interaction with other ISAAC interest groups and special interest groups of another mathematical societies. The organization of the SIG sessions on the ISAAC Congresses is planned... also the conference icmmp21, Marrakech takes into account these ideas (the same spirit).

Zouhaïr Mouayn, representative of the SIG IGITRK in the ISAAC board

Switching to online education

The pandemic situation which started this year everywhere in the world forced most schools and universities to move their activities online. Nobody was ready for it since the situation was completely unexpected. There are various videoconferencing systems which can be used to teach classes online, using a blackboard/whiteboard and a webcam to film, or a tablet and a shared screen. Among these systems we can mention Zoom, Canvas, MS Teams, Google Meet, Adobe Connect, Cisco Webex Meeting or open source systems like BigBlueButton. One has to bear in mind that very often users are connected to domestic wi-fi so the platform should be performing good enough to hold dozens (or hundreds) of users.

The choice of most suitable platform depends on the size of the classes and on the collaboration of the IT services in each institution. An open source system like BigBlueButton is only good if there is enough IT support to take care of the installation. For a system like Zoom the domestic internet connection should have at least 10 Mbit in upload to avoid any freezing in classes. The experience at the Politecnico di Milano was really productive: with the help of the IT office using MS Teams it has been possible to create virtual classes containing exactly the students enrolled in a certain class (quite often involving hundreds of students) and all the classes have been taught at the scheduled time, as it was for a traditional class, but online. Each student has on his/her device a list of virtual rooms, one per each course. After the first impact, teaching online became rather easy. Students could interact in real time during the lecture using the chat. The instructor can read in real time the remarks or questions and can decide either to reply immediately, to postpone or to ask the student to intervene, using microphone and

video (which normally should be kept off by the students). The instructor can ask questions and easily create polls in the chat, so that students stay focused and actively participate to the class. Another positive aspect with the system that we chose, i.e. MS Teams, is that lectures can be recorded. Normally, the video is accessible only to students attending the course. If the instructor wishes, the video can be made accessible to all students of Politecnico (an account is needed to access the material). Videos have been widely appreciated by the students. Normally, a lecture is done using a tablet and the material can be easily shared with students. It should be noticed that we had various meetings (all done online and recorded!) in which we have been instructed on how to use the platform and a active phone number was provided to help solving unexpected problems. In conclusion, teaching online was a challenge which has shown some positive aspects that can be kept even in the future. Even when we will go back to normality, to transmit all the lectures via Teams will be a useful service for students who, for any reasons, are not able to participate to a class in person. Also, using elearning resources (may it be MS Teams or a combination like Moodle/Zoom or Moodle/BigBlueButton) is going to help students staying in closer touch with the teachers and each other.

The part concerning the exams is more challenging. We are currently doing exams and it is premature to draw conclusions. Oral exams can be easily done using one of the above platforms. Written exams are more difficult. The major problems are: to make sure of the identity of the student doing the exam; to make sure that a student is not communicating with others; to make sure that the material delivered is done by the student. This represents a particular challenge since the examinator has no control over the student's computer, his surroundings, or distribution channels.

In the case of the Politecnico of Milano, we have chosen to use MSForms associated with Zoom to supervise. In this case, the exam can consist in quizzes (in this case the grading is automatic) or questions with open answer that can be given directly in Forms or can be uploaded. Writing with Forms is relatively convenient: it can be compared with an equation editor in Word, with the possibility to use some Latex commands. The supervision with Zoom is ideal up to 49 (=7x7) students, so various virtual classes to supervise might be needed. In alternative, we use Moodle with Respondus, a system of proctoring with the possibility to revise videos (suitably tagged with a level of priority). In this case, no one is supervising since everything is done by an artificial intelligence. Moodle is more flexible since Latex files can be used to prepare the text. Shuffle questions and answers is possible with both Forms and Moodle. With Moodle it is easy to construct different tests, since Moodle can randomly select questions each of which is chosen from a pool of questions.

There is one point regarding cheating one should keep in mind. Additional controls which are non-digital are more effective than digital ones. For a paper-and-pen like exam where the student has to write down his answers on normal paper and then digitalize it using his smartphone a simple system like forcing students to put the laptop/webcam in a 90 degree angle to them at a distance of at least 1,5 m (easily done with a chair and some books) is more effective than trying to buy and use proctoring software or using free solutions like SafeExamBrowser. The biggest challenge for a classic written exam is the fact that nowadays remote controls of computers are easy (in Windows or MacOS they are part of the operating system) so tests need to be either individualized (different questions, ideally randomly chosen for different students) or done in a low-tech way (like the previous mentioned situation where the computer is only used in a supervisionary rule). In case of an oral exam there is an additional problem for Mathematics due to the lack of a real blackboard. Solutions like internal blackboards of videoconferencing systems are rather painful to use for writing formulae while one cannot expect students to have more advanced technology like an Ipad/Apple Pencil combo. Up to now the most practical solution was to let the students to write their part down on a sheat of paper and then digitilize it using their smartphone, but one needs to take the necessary time into account.

As we already pointed out, the exams are ongoing and we can evaluate the perfomances only after the Summer. However, we expect that all these experiences will have a lasting impact on teaching in the future.

Irene Sabadini, Secretary and Treasurer of ISAAC

Uwe Kähler, Vice-President of ISAAC

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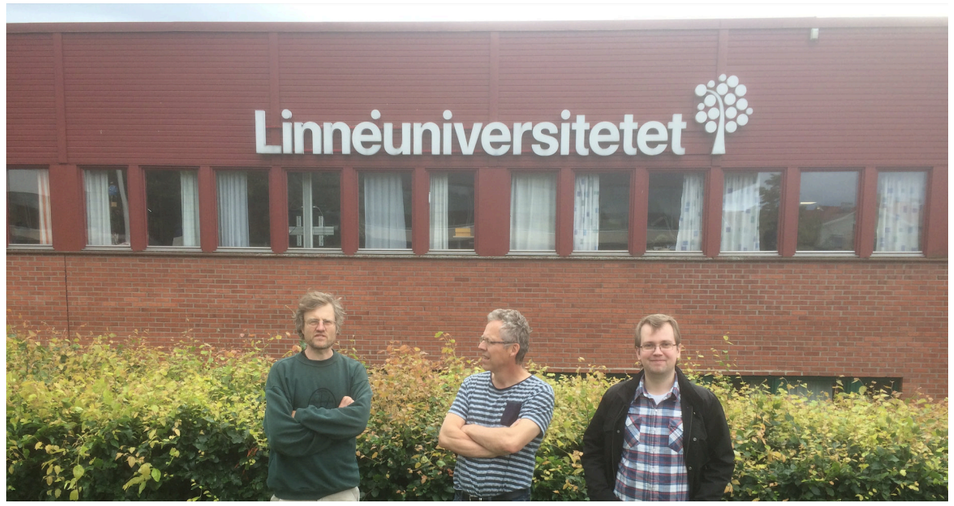

On the photo – at Linnæus University, Växjö, Sweden

Situation at universities in Sweden during the Corona pandemic

From the news I understand that Sweden in general has been less closed down during the Corona pandemic compared to other countries. This seems to include the universities and other institutions as well. In the middle of March, new rules and recommendations were introduced in Sweden because of the pandemic. The Swedish universities were forced to implement these recommendations in suitable ways.

I am employed at Linnæus University, Växjö, and in the university it was decided that no teaching or examination were allowed to take place in rooms at the university. This forced us to perform these fundamental events by web communications. For this communication Swedish universities use the program Zoom.

At our university we have been allowed to go to our offices, which I have done most of the days since the restrictions. It was at the same time recommended that we should work at home as much as possible.

On the other hand, because of the restrictions in teaching, the students have been absent, and several activities, among them the university restaurants, were closed shortly after that the restrictions were introduced.

In my opinion the Swedish way was fine, apart from the examinations. It should have been better to keep the examinations in rooms with examination guards, but with larger distances between the persons staying in the rooms.

Joachim Toft, ISAAC board member

Situation at universities in Brazil during the Coronavirus pandemic

The Universities and research institutes in Brazil assumed an important role together within the public health system in Brazil to face the coronavirus pandemic, with many University hospitals acting as references to treat patients and by providing tests for Covid-19 in their laboratories. Moreover, some experts like infectologists and applied mathematicians are working as advisors to local governments to decide about closing/opening non-essential activities in some regions. But beside that most experts recommended social isolation and local governments closed non-essential activities with social isolation index remaining between 40-50 percent in most cities and as a result Covid-19 cases are out of control in many regions of the country.

On the photo – place of the future ISAAC 2023

Following the recommendation of the World Health Organization, since end of March 2020 classroom lessons are suspended in schools and universities in Brazil. Since than most of universities started to give online lectures in theoretical courses to the students, by using their own platforms for teaching or Google Tools for education. Also all defenses of graduate theses started to be virtual and scientific visits to others universities and scientific institutes are not permitted. This situation is expected to continue until the end of the year. Between the difficulties with these quick changes of teaching, I may cite that several students do not have access to high quality internet or even do not have computers to follow the lectures, so universities had to give some special support to these students. Also, due to the economic crisis, several students had to leave their courses in private universities.

In my opinion, in the moment that public universities and scientific institutes in Brazil have been discredited by many politicians and grants for several scientific projects have been cut, the answer was an important contribution from several scientific institutes to minimize the Covid-19 crisis in Brazil. So, I hope that in challenging time as now it becomes more clear for the population that to spend money in science is an important investment that the community can do.

Marcelo Rempel Ebert, ISAAC board member

Online conferences at the Ghent Analysis & PDE Centre

Despite the difficult COVID-19 times, there are some high-level international conferences being organised online. In particular, the Ghent Analysis & PDE Centre has already organised two high profile conferences:

International Workshop on Fractional Calculus

https://analysis-pde.org/workshop-fractional-calculus/

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WORKSHOP FRACTIONAL CALCULUS

Think fractional gain integral

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International Conference on Pseudo-Differential Operators

https://analysis-pde.org/pseudo-differential-conference/

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Pseudo-differential conference

BE HARMONIC WITH ANALYSIS

$$\int_{\hat{G}} \mathrm{Tr}(\pi(x)\sigma(x,\pi)\hat{f}(\pi))d\mu(\pi)$$

Make a difference: pseudo-differentiate
Integrate with mind but pseudo-differentiate with heart

At the peak of participation, the first conference had over 130 and the second one over 80 online participants. The books of abstracts were made in the form of movies, to be displayed during the breaks. The second conference also had over 10 posters displayed on the website, and boasted 5-minute presentations of these posters taking place during the poster presentation session.

One can look at these conferences at the above addresses, as well as access the pdf files of the talks there. The videos of the talks and the movies of books of abstracts are available at the Ghent Analysis & PDE YouTube channel:

https://www.youtube.com/channel/UCAA0hCkGi7hSt6PtyAKZ1gQ/videos

You can follow activities of the Ghent Analysis & PDE Center at

https://analysis-pde.org/blog/

for future event, in particular for the Generalised Function Conference (online part) during 31 August - 4 September 2020, and the 13th ISAAC Congress 2021.

The International Conference on Generalized Functions GF2020 will be held at Ghent, Belgium, from August 31 to September 4, 2020. It will take place at the campus of Ghent University and it is organized by the Department of Mathematics: Analysis, Logic and Discrete Mathematics. The GF2020 aims at a broad coverage of research on generalized functions and their applications in and interactions with other areas of mathematics. The conference is dedicated to the 70th birthday of Prof. Stevan Pilipović.

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13th ISAAC Congress 2021

International Society for Analysis, its Applications, and Computation
25 years of ISAAC: 1996–2021

Think like Isaac (Newton), present at ISAAC (Congress)

Up-coming conferences

12th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA12) , August 3-7, 2020, University of Science and Technology of China (USTC), now as an online conference with waived registration fee, **http://www.smartchair.org/hp/ICCA2020/**

Modern Methods, Problems and Applications of Operator Theory and Harmonic Analysis OTHA-2020, August 23 - August 28, 2020, Rostov-on-Don, Russia **http://otha.sfedu.ru/conf2020/**

International Conference on generalized functions - 31. August until 4. September Ghent University, Belgium, **http://cage.ugent.be/gf2020** (mixed presential/online)

Harmonic Analysis and related topics - celebrating Michael Lacey's birthday, May 25-29, 2020, Centre de Recerca Matemàtica, Barcelona, Catalunya, Spain (postponed)

44th Symposium in Real Analysis, Paris & Orsay, France, now: October 5-9, 2020, **https://ssra44.sciencesconf.org/**

YPATIA conference 2020 - Mathematics between France and Italy, November 23-25, École française de Rome, **https://indico.math.cnrs.fr/event/5450/overview**

6th international conference "Quasilinear Equations, Inverse Problems and their Applications", November 30-December 2, 2020, Dolgoprudny, Russia, **https://qipa2020.mipt.ru/**

International conference of Mathematical Methods in Physics, April 5-9, 2021, Marrakech, Morocco, **https://icmmp21.doodlekit.com/**

10th International conference "Inverse Problems: Modeling and Simulation", rescheduled May 16-21, 2021, Malta, **http://www.ipms-conference.org/ipms2020/**

New members

Ahmad Z. Fino

Born on January 1st 1985, Tripoli, Lebanon. Ph.D. in Applied Mathematics obtained on 23 February 2010 at "La Rochelle University" France, (Graduated with highest honor and the congratulations of the jury). Master of Science in Applied Mathematics, Faculty of Sciences, Lebanese University, 2007. Bachelor of Science in Pure Mathematics, Faculty of Sciences, Lebanese University, 2005. Since September 2010, Full-Professor at Lebanese University, Faculty of Sciences, Department of Mathematics, P.O. BOX 1352 Tripoli, Lebanon.

Abdel Rahman Yousef

Abdel Rahman Yousef joined the Department of Mathematics and Statistics at the American University of Sharjah in August 2019 as a visiting Associate Professor. Over the past sixteen years of academic experience at American and American-style universities, he taught variety of courses and supervised students at all levels (B.Sc., M.Sc. and Ph.D.). His current research interest focuses on operator theory, functional analysis, operator norm inequalities and fractional calculus.

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Last, but not least

Bourbaki wedding announcement

Monsieur Nicolas Bourbaki, Canonical Member of the Royal Academy of Poldavia, Grand Master of the Order of Compacts, Conserver of Uniforms, Lord Protector of Filters, and Madame nee One-to-One, have the honour of announcing the marriage of their daughter Betti with Monsieur Hector Petard, Delegate Administrator of the Society of Induced Structures, Member of the Institute of Classified Archaeologists, Secretary of the Work of the Lion Hunt.

Monsieur Ersatz Stanislas Pondiczery, retired First Class Covering Complex, President of the Re-education Home for Weak Convergents, Chevalier of the Four U's, Grand Operator of the Hyperbolic Group, Knight of the Total Order of the Golden Mean, L.U.B., C.C., H.L.C., and Madame nee Compact-in-itself, have the honour of announcing the marriage of their ward Hector Petard with Mademoiselle Betti Bourbaki, a former student of the Well-Ordereds of Besse.

The trivial isomorphism will be given to them by P. Adic, of the Diophantine Order, at the Principal Cohomology of the Universal Variety, the 3 Cartember, year VI, at the usual hour.

The organ will be played by Monsieur Modulo, Assistant Simplex of the Grassmannian (Lemmas will be sung by Scholia Cartanorum). The result of the collection will be given to the House of Retirement for Poor Abstracts, Convergence is assured.

After the congruence, Monsieur and Madame Bourbaki will receive guests in their Fundamental Domain; there will be dancing with music by the Fanfare of the VIIth Quotient Field.

Canonical Tuxedos (ideals left of the buttonhole). QED.

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