

Boletín del IMI, Nº 78 (16 de febrero de 2023) <https://doi.org/10.57037/b-imi.00078>

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1) A Message from the IMI Director

Dear colleagues,

It is a pleasure to inform you that, after the IMI membership renewal process started in September 2022 (mandatory by the regulations of the Complutense University of Madrid) and the admission of new members, the institute now has 76 researchers. I also welcome the new members: Nuria Caballé Cervigón, Pilar Coscojuela Escanilla, Francisco Gallego Lupiáñez, Miguel García Bravo, José González Llorente, Jesús Llorente Jorge, Johann Heinz Martínez Huartos, Isabel Molina Peralta, Vicente Muñoz Velázquez, María del Carmen Pardo Llorente, Baldur Sigurdsson and Juan Luis Vázquez Suárez.

Welcome to all of you!



Ángel Manuel Ramos del Olmo

2) IMI News

13 February 2023 *SIAM News*. [Mathematical Modeling for Preparedness in Humanitarian Logistics](#). SIAM highlights the work carried out by Teresa Ortuño and Begoña Vitoriano (IMI members), together with Adán Rodríguez-Martínez, (former IMI member).



María Teresa Ortuño



Begoña Vitoriano

3) Eventos del 16 al 24 de febrero de 2023

Seminario de Análisis Matemático y Matemática Aplicada

Título: Termalización de memorias cuánticas

Conferenciante: Angelo Lucia (UCM)

Día: 16 de febrero de 2023

Hora: 13:00h

Lugar: Seminario Alberto Dou (Aula 209), Facultad de CC Matemáticas, UCM

Organizado por: Instituto de Matemática Interdisciplinar (IMI) y el Departamento de Análisis Matemático y Matemática Aplicada

The poster is a vertical rectangular graphic with a blue background and yellow text boxes. At the top, it features logos for the 'DEPARTAMENTO DE ANÁLISIS MATEMÁTICO Y MATEMÁTICA APLICADA', 'Facultad de Ciencias MATEMÁTICAS', and 'Instituto de Matemática Interdisciplinar'. Below the logos, the title 'SEMINARIO DE ANÁLISIS MATEMÁTICO Y MATEMÁTICA APLICADA' is written in yellow. The speaker's name 'Angelo Lucia UCM' is prominently displayed in white. The main title of the seminar, 'Termalización de memorias cuánticas', is in bold black text. A short abstract in Spanish follows, explaining the concept of quantum memories and their protection from noise. The date and time, 'Fecha: Jueves 16 de febrero de 2023 a las 13:00 horas', and the location, 'Lugar: Aula Alberto Dou (209) Facultad de CC Matemáticas, UCM', are listed at the bottom in white text.

Seminario de Álgebra, Geometría y Topología

Title: **Post-quantum cryptography, a new era.**

Speaker: Jintai Ding (Tsinghua University, China)

Day: 21st February, 2023

Hour: 13:00h

Place: Aula B03, Facultad de CC. Matemáticas, UCM

Organized by: Instituto de Matemática Interdisciplinar (IMI) y el Departamento de Álgebra, Geometría y Topología

The poster is for a seminar titled "SEMINARIO DE ÁLGEBRA, GEOMETRÍA Y TOPOLOGÍA". The speaker is Jintai Ding from Tsinghua University (China). The topic is "Post-quantum cryptography, a new era." The text on the poster describes public key cryptosystems (PKC) as the security foundation of modern communication systems, particularly the Internet. It mentions that existing PKC like Diffie-Hellman key exchange, RSA, and ECC can be broken by a quantum computer. To prepare for the coming age of quantum computing, new public key cryptosystems that could resist quantum computer attacks are needed. The lecture will give an introduction to post-quantum cryptography and its recent developments, including the NIST standardization process and its impact. A practical and provably secure (authenticated) key exchange protocol based on the learning with errors problems, which is conceptually simple and has strong provable security properties, is presented. This new construction was established in 2011-2012. The poster also explains that all existing LWE-based key exchanges are variants of this fundamental design. In addition, it discusses how to use the signal function invented for KE for authentication schemes and how to discuss key reuse attacks on those key exchanges. The seminar is organized by the Department of Algebra, Geometry and Topology and the Interdisciplinary Institute of Mathematics. The date is February 21st, 2023, at 13:00h, in Aula B03, Facultad de CC. Matemáticas, UCM.

Seminario de Análisis Matemático y Matemática Aplicada

Title: **An introduction to the big and little lip functions**

Speaker: Bruce Hanson (St. Olaf College)

Day: 23rd February, 2023

Hour: 13:00h

Place: Seminario Alberto Dou (Room 209), Facultad de CC. Matemáticas, UCM

Organized by: Instituto de Matemática Interdisciplinar (IMI) y el Departamento de Análisis Matemático y Matemática Aplicada

The poster is for a seminar titled "SEMINARIO DE ANÁLISIS MATEMÁTICO Y MATEMÁTICA APLICADA". The speaker is Bruce Hanson from Saint Olaf College. The topic is "An introduction to the big and little lip functions". The text on the poster defines the "Big Lip" and "Little Lip" functions and discusses their relationship to the differentiability of a function f . It mentions the Rademacher-Stepanov Theorem, which states that f is differentiable almost everywhere on the set \mathbb{R}^n if f is measurable and has positive measure. The poster also discusses the relationship between the "Big Lip" and "Little Lip" functions and the differentiability of f . The seminar is organized by the Department of Analysis, Mathematical and Applied Mathematics and the Interdisciplinary Institute of Mathematics. The date is Thursday, February 23rd, 2023, at 13:00 hours, in Aula Alberto Dou (209), Facultad de CC Matemáticas, UCM.

4) Nuevas publicaciones

A. Boscaggin, E. Muñoz-Hernández. Planar Hamiltonian systems: Index theory and applications to the existence of subharmonics. *Nonlinear Analysis*, 2023, 226. <https://doi.org/10.1016/j.na.2022.113142>

S. A. Lobov, A. Mikhaylov, E. S. Berdnikova, V. Makarov, V. B. Kazantsev. Spatial Computing in Modular Spiking Neural Networks with a Robotic Embodiment. *Mathematics*, 11(1), 234, 2023. <https://doi.org/10.3390/math11010234>

5) Participación de miembros del IMI en eventos organizados por otras instituciones

Juan Luis Vázquez y Jesús Ildelfonso Díaz participarán en el **XVIII Ciclo de Conferencias de Divulgación Científica** de la Real Academia de Ciencias Exactas, Físicas y Naturales de España.

Títulos: Grandes matemáticos del siglo XX. La vida extraordinaria de Olga A. Ladyzhenskaya (1922-2004) (J. L. Vázquez), Ciencia básica que sustenta algunos modelos climáticos (J. I. Díaz)

Día: jueves 23 de febrero (J. L. Vázquez), jueves 11 de mayo (J. I. Díaz)

Lugar: Real Academia de Ciencias Exactas, Físicas y Naturales de España



REAL ACADEMIA DE CIENCIAS EXACTAS, FÍSICAS Y NATURALES DE ESPAÑA

Entrada Libre

Las conferencias tendrán lugar los jueves, a las 18:30 h, entre el 16 de febrero y el 22 de junio en la sede de la Real Academia de Ciencias.

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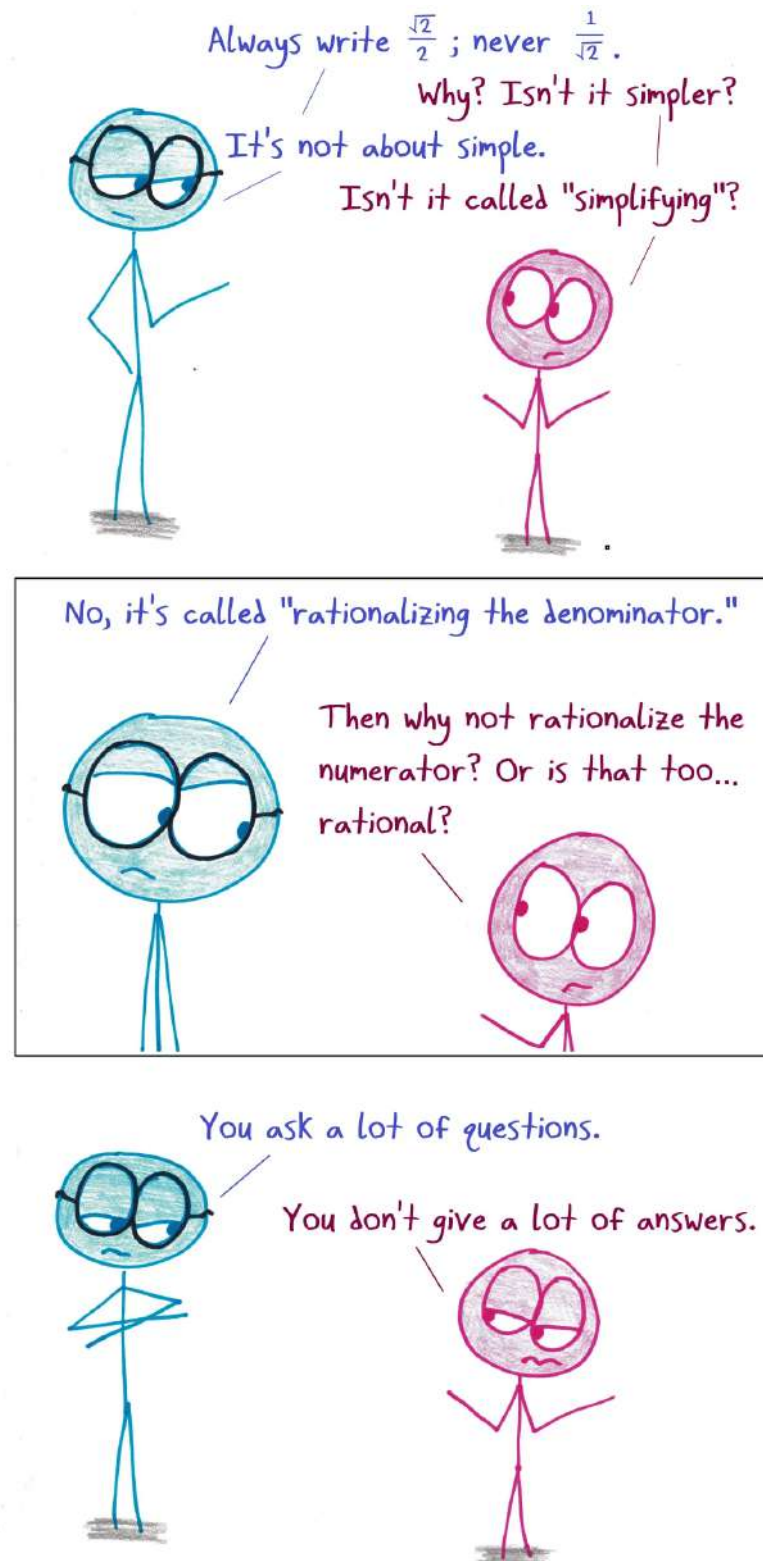
XVIII CICLO DE CONFERENCIAS DE DIVULGACIÓN CIENTÍFICA

CIENCIA PARA TODOS

DE FEBRERO A JUNIO DE 2023

6) La viñeta matemática

Comic strip sent by Ben Orlin.



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