FisMatEcol Boletin

Enero y Febrero

Dr. Oliver López Corona
Dra. Elvia Ramírez Carrillo

Eventos

UNAM
POSGRADO
Urbanismo

Programa
de Maestría y Doctorado en Urbanismo

Seminario

Métodos de Inteligencia Artificial en la Planeación y el Diseño Urbano

Invita a la
Conferencia Magistral

El papel de la complejidad en gemelos digitales urbanos

Imparte el

Dr. Carlos Gershenson-García
IIMAS-UNAM

11:00 hs

Unidad de Posgrado
J004

02 MARZO 2026
Presencial
(se graba la Conferencia)

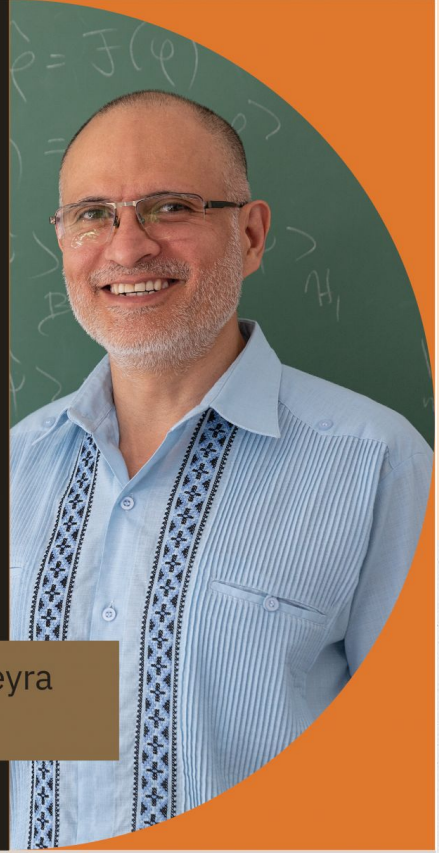
06 MARZO 2026
Retransmisión
de la Conferencia

zoom
ID: 470 061 0181
Codigode acceso: sesionmu

UNAM
Nuestra gran Universidad

COLOQUIO IIMAS

Un enfoque conceptual a los modelos matemáticos



Dr. Luis Octavio Silva Pereyra

IIMAS-UNAM

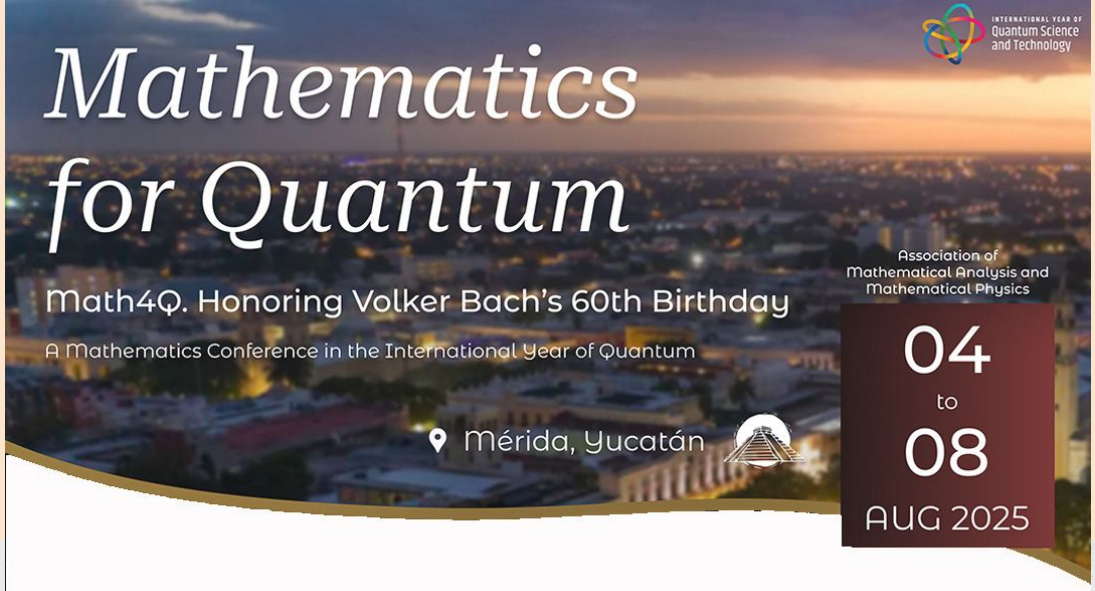
Física matemática

26 MAR 2026 • 13:00 HORAS • AUDITORIO IIMAS

UNAM Nuestra gran Universidad

iimas

50 ANIVERSARIO IIMAS UNAM 1976-2026



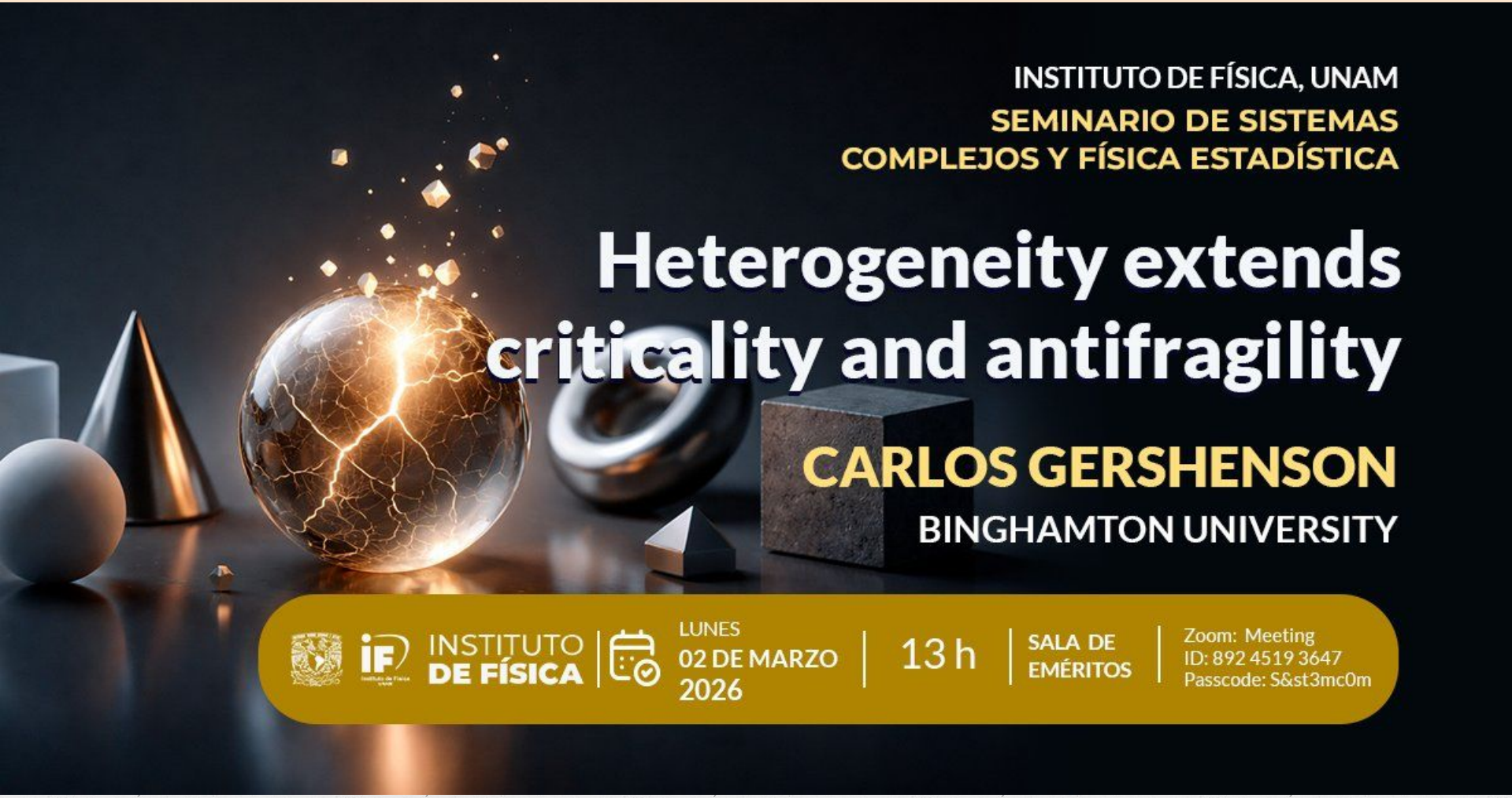
This conference in mathematics is devoted to mathematical analysis in mathematical physics specially focused in quantum physics. The workshop is intended to bring together the mathematical physics communities from the Americas and Europe, with the intention of fostering new collaborations and networks.

https://bit.ly/MATH4Q

Organizing Committee

- Miguel Ballesteros (Chair)
- Volker Bach
- Mathew Dawson
- Diego Iniesta
- Luis O. Silva
- Julien Ricaud
- Yuriria Cortés
- Rafael del Rio

DGDCUNAM Divulgación de la Ciencia · Museo de la Luz Mérida · iimas · CIMAT · Carolo-Wilhelmina zu Braunschweig


INSTITUTO DE FÍSICA, UNAM
SEMINARIO DE SISTEMAS
COMPLEJOS Y FÍSICA ESTADÍSTICA
Heterogeneity extends criticality and antifragility
CARLOS GERSHENSON
BINGHAMTON UNIVERSITY
INSTITUTO DE FÍSICA
LUNES
02 DE MARZO
2026
13 h
SALA DE EMÉRITOS
Zoom: Meeting
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Passcode: S&st3mc0m

Educación | AEFI MÉXICO

Programa del Seminario de la Complejidad en la Administración Pública

Martes 3 de marzo 2026, 11:00 horas (Presencial y Zoom)
Primera sesión "*Complejidad en la administración pública*"
(Tres conferencias magistrales, 30 minutos por ponencia)

1. *Dr. Carlos Gershenson García, Centro de la Complejidad UNAM*
2. *Dr. César Augusto González Bazán, Colegio de Morelos- UAEM*
3. *Dr. Óscar Eduardo Cigarra Mayorga, Red de Expertos en Sistemas Complejos del IPN*

Martes 10 de marzo 2026, 11:00 horas (Zoom)
Segunda sesión "*Combate a la corrupción*"
(Doss conferencias, 40 minutos por ponencia)

1. *Dr. Enrique Cáceres Nieto, Instituto de Investigaciones Jurídicas UNAM -Centro de la Complejidad UNAM*
2. *Dr. Jason Alexis Camacho Pérez, Centro de Estudios en Administración Pública de la FCPyS - UNAM*

Martes 17 de marzo 2026, 11:00 horas (Zoom)
Tercera sesión *"Análisis estructural de violencias y construcción de paz"*
(Dos conferencias, 40 minutos por ponencia)

1. *Dra. Ana Paula Hernández Romano, Coordinadora del Dialogo Nacional por la Paz*
2. *Dra. Tania Galaviz Armenta, Facultad de Estudios Superiores de Cuautla*

Martes 24 de marzo 2026, 11:00 horas (Zoom)
Cuarta sesión "Sustentabilidad ambiental"
(Dos conferencias, 40 minutos por ponencia)

1. *Dr. Oliver Xavier López Corona, Investigador IIMAS-UNAM.*
2. *Dr. Jorge Alejandro Silva Rodríguez de San Miguel, Coordinador de la Maestría en Administración de Empresas para la Sustentabilidad, ESCA Unidad Santo Tomás IPN*
3. *Dr. Christian Muñoz Sánchez, Coordinador de la Maestría en Ciencias en Administración de Negocios, ESCA Unidad Santo Tomás IPN*

Martes 31 de marzo 2026, 11:00 horas (Zoom)
Quinta sesión "Educación, ciencia y tecnología"
(Dos conferencias, 40 minutos por ponencia)

1. *Mtro. Enrique Ku González, Director General de Planeación, Programación y Evaluación Educativa de la AEFCM*
2. *Dra. Georgina Araceli Torres Vargas, Coordinadora del Consejo Académico del área de las Humanidades y Artes de la UNAM*

Plantas sagradas mayas, tradiciones y reelaboraciones

febrero 27 @ 3:00 pm – 4:00 pm

En el marco de las actividades académicas de la 47 Feria Internacional del Libro del Palacio de Minería.

Salón Filomeno Mata.

Oportunidades

Jaime Carrera-Hernandez • 1st

Professor at Geociencias UNAM

1d • Edited •

#hiring

I am looking for two highly motivated **#posdoctoral** collaborators to develop numerical models to study the impact of climate change on hydrological processes in Mexico to start in September 2026.

We need to submit the applications by March 5th.

To apply you need to have published articles (sorry, but the University does not count MDPI publications) and a PhD.

Please send me a message with your CV. The position is in Querétaro (México) initially for one year and can be renewed for another year (two years in total).

Oferta de Trabajo

CONVOCATORIA DEL PROGRAMA DE BECAS POSDOCTORALES EN LA UNAM 2026, PRIMER PERIODO

A partir del **miércoles 11 de febrero** al **viernes 6 de marzo de 2026 (hasta las 14 horas)**, recibiremos en el correo electrónico **secacad@iecologia.unam.mx** las propuestas de candidatos interesados en participar en la **Convocatoria del Programa de Becas Posdoctorales en la UNAM 2026, PRIMER PERIODO**. En caso de ser otorgada la beca, los beneficiarios iniciarán en **SEPTIEMBRE de 2026**.

Los candidatos propuestos deberán cumplir con los requisitos y obligaciones descritas en las *Reglas de Operación del Programa de Becas Posdoctorales en la UNAM* y en los acuerdos del Consejo Interno ***(participar en DOCENCIA en la UNAM (no remunerada) e impartir un SEMINARIO INSTITUCIONAL al año de beca o al final del periodo)***.

Acceder a:

- ***Convocatoria 2026***
- ***Reglas de operación del Programa***
- ***Carta de postulación del asesor***
- ***Carta compromiso tiempo completo de la persona candidata***
- ***Solicitud de beca (Formato DGAPA)***
- ***Resumen de la documentación que deberá entregar***

大阪大学
THE UNIVERSITY OF OSAKA

Faculty Position in Premium Research Institute for Human Metaverse Medicine (PRIMe), The University of Osaka

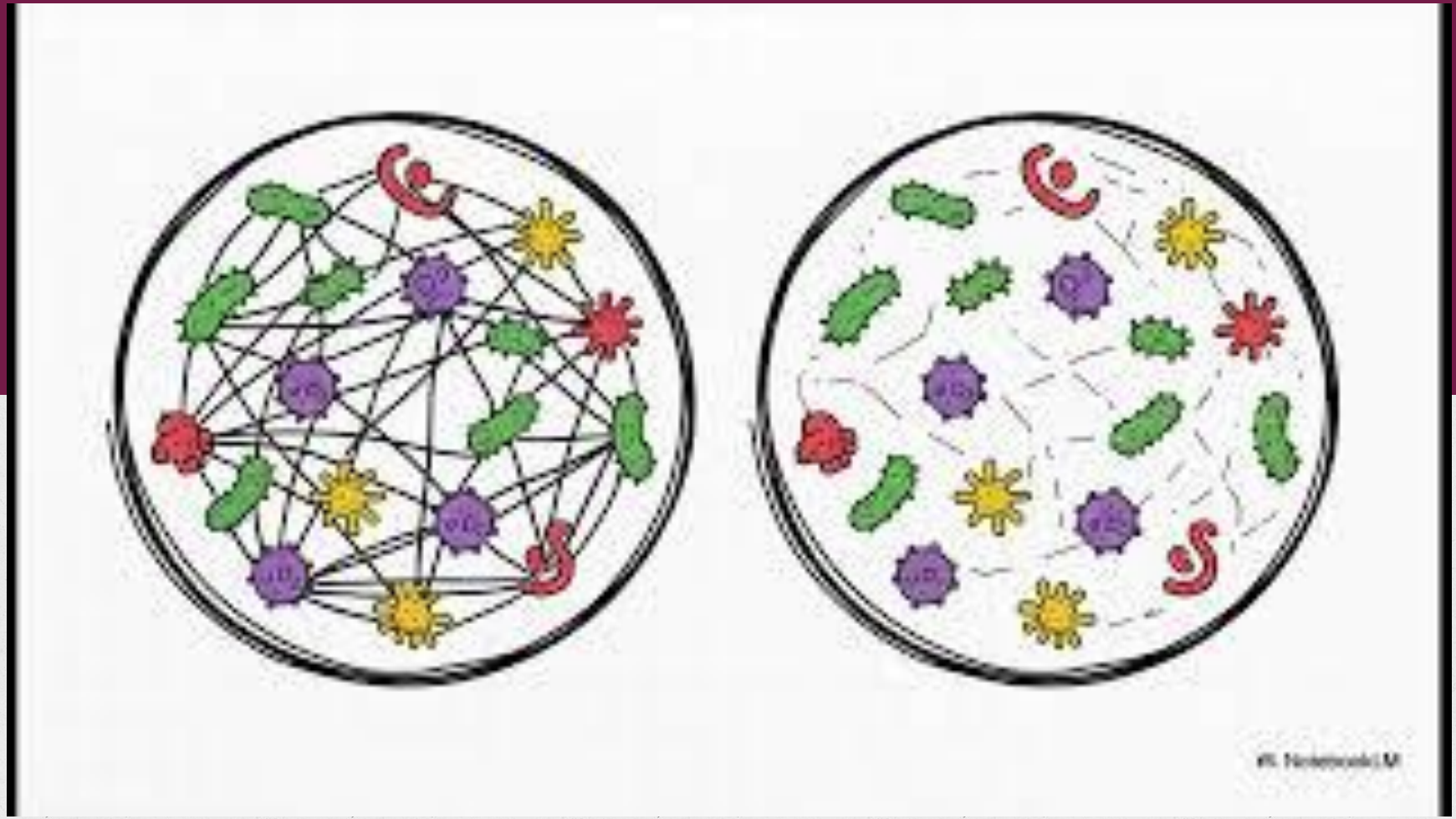
Outline	The Premium Research Institute for Human Metaverse Medicine (WPI-PRIMe) at The University of Osaka aims to create a new scientific field, Human Metaverse Medicine, by combining two academic disciplines: human organoid-based biomedical science and information mathematical science. This new field seeks to understand and provide solutions for chronic diseases. We are looking for one Specially Appointed Assistant Professor (Full-Time) to join the team led by Dr. Elisa Domínguez Hüttinger.
1. Position	Specially Appointed Assistant Professor (Full-Time)
2. Number of Positions	1 (One)
3. Affiliation	Premium Research Institute for Human Metaverse Medicine (PRIMe) (Information and Mathematical Sciences Group)
4. Work Location	Suita Campus (2-2 Yamadaoka, Suita-City, Osaka, Japan)
5. Specialized Field	**Mathematical and Computational Modeling**: - Multi-scale mathematical modeling. - Dynamical modeling of complex biological systems. - Mathematical models of regulatory networks across scales. **Data Analysis and Bioinformatics**: - Statistical analysis of clinical and experimental data. - Computational biology and bioinformatics. **Systems-Based Approaches to Medicine**: - Systems medicine. - Creating digital twins of complex epithelial tissue diseases.

Conceptos

Ecobiont ontology

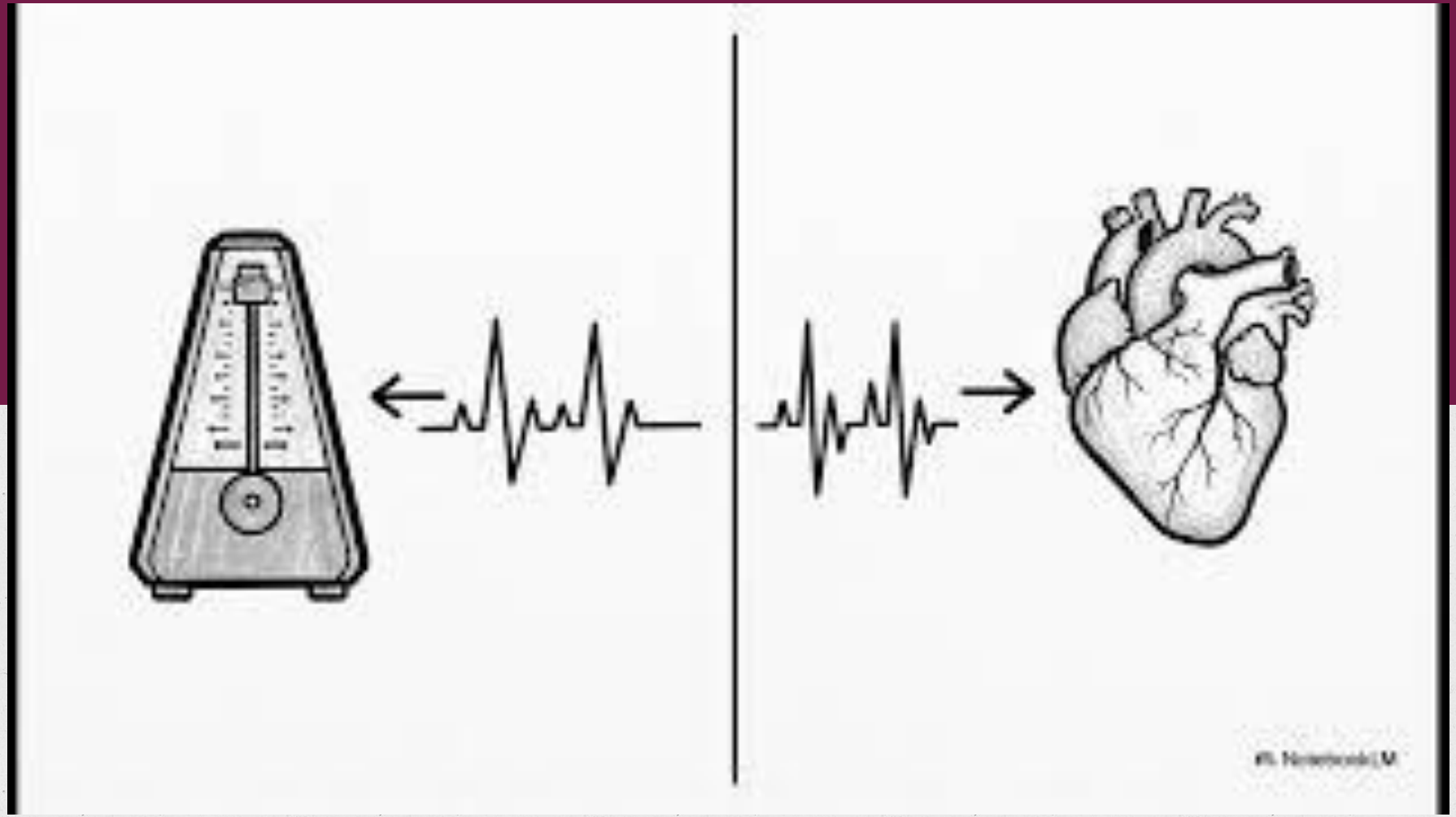
The Ecobiont ontology is a theoretical framework in evolutionary biology and ecology that conceptualizes an **ecobiont** as an integrated unit of selection comprising co-evolving genetic, microbiome, and social/technological components, extending beyond traditional holobiont models by incorporating niche construction and viewing human-technology couplings (**technobionts**) as pivotal evolutionary agents. [1] [2] Proposed by Oliver López-Corona, Elvía Ramírez-Carrillo and collaborators, it posits that these interacting pools—genes, microbiomes, and socio-technological structures—form indivisible evolutionary entities that drive planetary dynamics, particularly in the context of modern environmental crises. [2] [1]

Central to the ontology is the **Technocene** paradigm, which reframes the current geological epoch not as the Anthropocene—emphasizing broad human impact—but as an era dominated by specific technobiont-driven alterations to Earth systems, such as urban-industrial scaling decoupled from natural evolutionary patterns. [1] This shift highlights how technology and social organizations have become intrinsic to evolutionary processes, necessitating a holistic analysis to address over-coupling between humans and artifacts that exacerbates planetary instability. [2] By bridging genetics, complex systems theory, and extended evolutionary synthesis, the framework argues for recognizing ecobionts as adaptive units that enable better decision-making in response to crises like biodiversity loss and climate disruption. [1] [2]



¿Qué es un sistema complejo?

"Es un sistema termodinámico abierto compuesto por componentes interconectados que, a través de sus interacciones y procesos evolutivos —restringidos por condiciones externas—, se autoorganiza hacia la criticalidad. Esta criticalidad se manifiesta como dinámicas invariantes a escala que equilibran procesos generadores de orden con aquellos que introducen aleatoriedad. El sistema maximiza sus capacidades computacionales e inferenciales, permitiéndole adaptarse, responder y prosperar en medio de la incertidumbre, estresores, perturbaciones y, en última instancia, el paso del tiempo —esforzándose por ser lo más antifrágil posible. Fundamentalmente, un sistema así puede entenderse mediante un *triplete contextual*, que constituye la verdadera ontología de todos los sistemas adaptativos complejos: (1) el sistema mismo y la información que genera; (2) su entorno inmediato y la información intercambiada con él; y (3) la forma en que el sistema responde a ese intercambio informacional dentro de un contexto específico." **Oliver López-Corona**



Cursos

Ecology I: The Earth System

1.018J

Undergraduate

Ecology II: Engineering for Sustainability

1.020

Undergraduate

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Game Theory
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Mi propuesta de que es lo que debería enseñarse y cómo.

Cultura


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Contemporary Art

Land & Environmental Art

Dr. Travis Lee Clark
Utah Valley University

BRITISH ECOLOGICAL SOCIETY

Goldsmiths
UNIVERSITY OF LONDON

Entanglements of art and ecology

with Dr Ros Gray

Artículo

Chapter 1
The European Sustainability Competence Framework (GreenComp): Introducing the Context for Investigating Learning for Environmental Sustainability

Guia Bianchi, Ulrike Pisiotis, and Paulina Koršňáková

1.1 Introduction

Humankind has coined many terms to describe the current alarming state of planetary health. The discourse has evolved from describing complex and interrelated environmental and social challenges as "wicked problems" (Murgatroyd, 2010), to talking about broader concepts such as "Anthropocene" or "Technocene" (López-Corona & Magallanes-Guijón, 2020); or referring to a "triple planetary crisis" (United Nations Framework Convention on Climate Change [UNFCC], 2022) or "polycrisis" (Lawrence et al., 2024), and discussing the distress caused by environmental problems with concepts such as "eco-anxiety" (Coffey et al., 2021) or "solastalgia" (Albrecht et al., 2007). Terms are not scarce, nor is our knowledge about how humans are contributing to accelerating these problems and interconnected crises. For example, 2024 was the warmest year recorded in Europe, following the already exceptionally warm 2023, with average temperatures exceeding 1.5 °C above pre-industrial levels (Copernicus Climate Change Service, 2025; European Environment Agency, 2024).

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e-mail: guia.bianchi@ec.europa.eu

Societal Impacts 7 (2026) 100175

Contents lists available at ScienceDirect

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What theoretical physics can tell us about ecosystem health and why it matters

Oliver López-Corona [a,*], Elvia Ramírez-Carrillo [b,c]

[a] Investigadores por México (IxM), SECIHTI at Instituto de Investigaciones en Matemáticas Aplicadas y Sistemas (IIMAS), Universidad Nacional Autónoma de México (UNAM), CDMX, Mexico
[b] Investigadores por México (IxM), SECIHTI at Facultad de Psicología, Universidad Nacional Autónoma de México (UNAM), CDMX, Mexico
[c] Facultad de Ciencias, Universidad Nacional Autónoma de México (UNAM), CDMX, Mexico

ARTICLE INFO

Keywords:
Ecosystem health
Antifragility
Complex system, SDGs, Pandemics

ABSTRACT

Human wellbeing depends on healthy ecosystems, yet many environmental and public health approaches emphasize damage reduction rather than how ecosystems adapt to variability and disturbance. In this paper, we present an integrated framework for assessing ecosystem health based on three complementary dimensions: ecosystem integrity, criticality, and antifragility. Integrity describes deviations from minimally disturbed reference conditions and provides a spatial diagnosis of ecosystem state. Criticality captures ecosystem dynamics by characterizing the balance between stability and adaptability, while antifragility evaluates whether ecosystems simply resist disturbances or improve their functioning through adaptive responses. Together, these dimensions extend conventional resilience-based assessments and offer a broader perspective on ecosystem health. We discuss the societal relevance of this framework in relation to the Sustainable Development Goals and the concept of a safe operating space for humanity, highlighting links between ecosystem health, public health, inequality, and long-term sustainability. Drawing on empirical work in terrestrial ecosystems and the human gut microbiota, we illustrate how similar systemic principles operate across biological scales. To address emerging risks at the human–environment interface, we introduce the Pandemics Prism as a conceptual tool for understanding how interacting ecological, social, and institutional processes shape pandemic vulnerability and potential pathways for risk reduction.

Mathematics > Dynamical Systems

[Submitted on 16 Feb 2026]

A golden-ratio partition of information and the balance between prediction and surprise: a neuro-cognitive route to antifragility

Pablo Padilla, Oliver López-Corona, Elvia Ramírez-Carrillo, Ariadne Hernández Sánchez

Adaptive systems must strike a balance between prediction and surprise to thrive in uncertain environments. We propose an information-theoretic balance function, $f(p) = -(1-p)\ln(1-p) + \ln p$, which quantifies the net informational gain from contrasting explained variance p with unexplained novelty $(1-p)$. This function is strictly concave on $(0,1)$ and reaches its unique maximum at $p^* \approx 0.882$, revealing a regime where confidence is high but the residual uncertainty carries a disproportionate potential for surprise.

Independently of this maximum, imposing a self-similarity condition between known, unknown and total information, $p : (1-p) = 1 : p$, leads to the golden-ratio reciprocal $p = 1/\varphi \approx 0.618$, where φ is the golden ratio. We interpret this value not as the maximizer of f, but as a structurally privileged \emph{partition} in which known and unknown are proportionally nested across scales.

Embedding this dual structure into a Compute-Inference-Model-Action (CIMA) loop yields a dynamic process that maintains the system near a critical regime where prediction and surprise coexist. At this edge, neuronal dynamics exhibit power-law structure and maximal dynamic range, while the system's response to perturbations becomes convex at the level of its payoff function-fulfilling the formal definition of antifragility. We suggest that the golden-ratio partition is not merely a mathematical artifact, but a candidate design principle linking prediction, surprise, criticality, and antifragile adaptation across scales and domains, while the maximum of f identifies the point of greatest informational vulnerability to being wrong.

Comments: 16 pages, 2 figures

Subjects: **Dynamical Systems (math.DS)**; Neurons and Cognition (q-bio.NC)

MSC classes: 94D99

Physics > Physics and Society

[Submitted on 26 Jan 2026]

Mesoamerican proportional design and astronomical dualities: rational approximations consistent with ϕ and π in calendrics and architecture

Gabriel K. Kruell, Oliver López-Corona, Sergio Mendoza, Pablo Padilla, Elvia Ramírez-Carrillo, Sarahí Silva

Understanding how ancient Mesoamerican societies integrated mathematical ideas into calendrical design and monumental architecture requires approaches that acknowledge their distinct epistemological frameworks. While explicit textual evidence for concepts such as π or the golden ratio ϕ is absent, numerical patterns embedded in Mesoamerican calendars, iconography, and ritual architecture reveal a coherent system of proportional reasoning grounded in simple integer ratios. Here we show that the numbers 5 and 8, central to Venus and solar calendrical relations and widely represented in Mesoamerican cosmology, generate rational approximations that reproduce, within known construction tolerances, the geometric relations associated with decagonal layouts. Using high-resolution measurements of the Iguana structure at Guachimontones, we demonstrate that its proportions align with integer ratios consistent with those found in the calendrical system and with the practical geometry of the regular decagon, without requiring knowledge of irrational constants. These findings suggest that Mesoamerican builders employed stable proportional modules that harmonized astronomical cycles, cosmological symbolism, and architectural design. This should not be interpreted as a lack of mathematical sophistication; rather, the material record reveals a distinct mathematical tradition in which number, measure, and cosmology were mutually reinforcing elements of cultural knowledge.

Comments: 8 pages, 2 figures

Subjects: **Physics and Society (physics.soc-ph)**; History and Overview (math.HO)

MSC classes: 01A12, 70F15

Cite as: arXiv:2601.18066 **[physics.soc-ph]**

(or arXiv:2601.18066v1 **[physics.soc-ph]** for this version)

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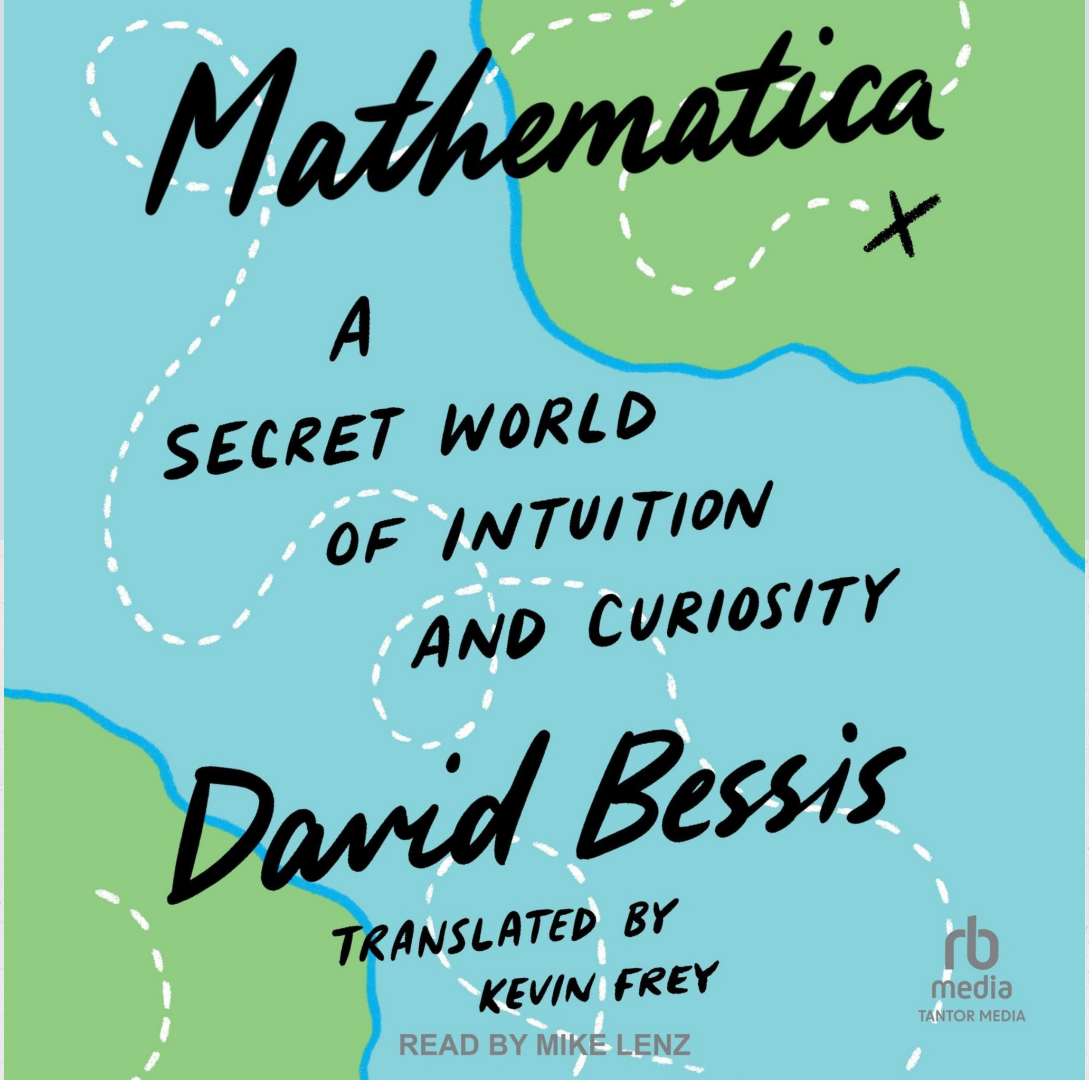
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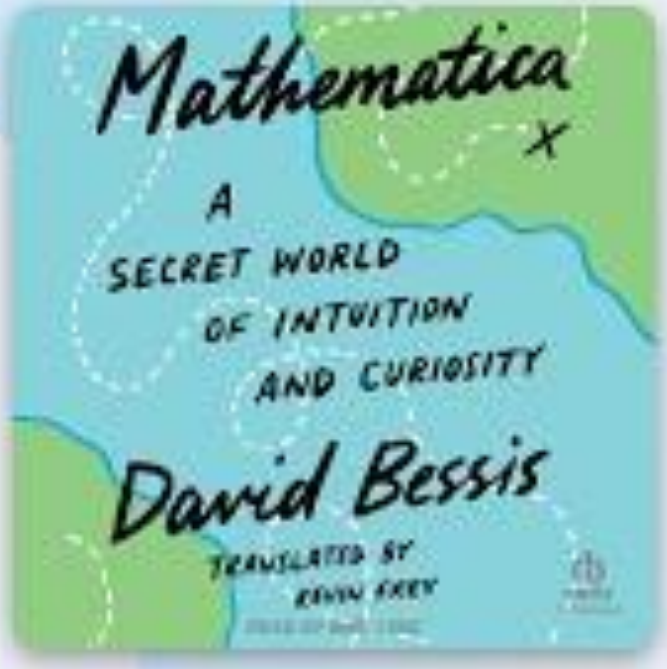

Ancestors

Identity and DNA in the Levant

Pierre Zalloua

Introduction by Nassim Nicholas Taleb