Welcome to a paradise for science geeks!

iTHEMS

directors

—How did the Universe begin?

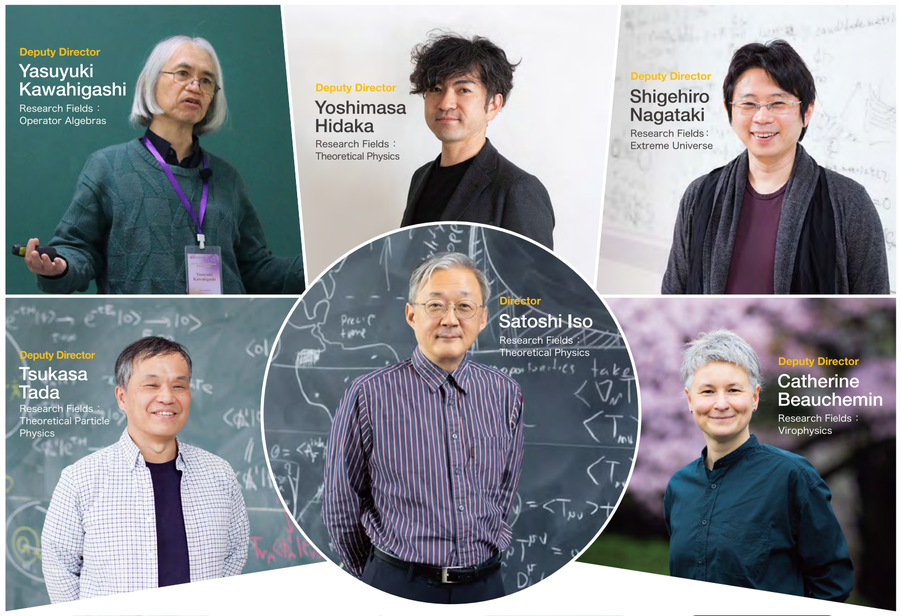
—What is the origin of life?

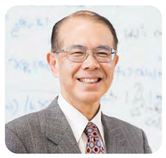
—Will artificial intelligence ever be able to surpass the human brain?

—What will be the mathematics of the 22nd century?

—What is the future of humanity?

RIKEN Center for Interdisciplinary Theoretical and Mathematical Sciences (iTHEMS) is an international research platform where mathematics serves as a common language, fostering collaborations at the forefront of research in physics, chemistry, biology, medical science, engineering, information science, computational science and mathematics. Our mission is to develop fundamental ideas based on free thinking.





Scientific Advisors
Yoh Iwasa
Research Fields : Mathematical Biology

Scientific Advisors
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Research Fields : Theoretical Particle Physics

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Shigefumi Mori
Research Fields : Mathematics, Algebraic Geometry

iTHEMS

overview

iTHEMS is a research hub grounded in mathematics and theoretical sciences, creating new knowledge and value across diverse fields such as nature, life, society, and information.

From fundamental questions about the origin of the universe and the mechanisms of life to complex contemporary challenges including social dynamics, AI, and quantum technologies, we approach them through the language of mathematics. History has repeatedly shown that basic research, though it may seem to have no immediate application, can underpin society even 100 years later. The technologies and theories that shape our lives today were unimaginable a century ago, and no one can foresee how today' s research will shape the next hundred years. By deepening fundamental science and fostering intersections across disciplines, iTHEMS generates unexpected discoveries and innovations.

Advancing Interdisciplinary Research in Mathematical Sciences

With the rapid advancement of science and technology, we now face phenomena of unprecedented scale and complexity. Challenges such as climate change, infectious diseases, economic systems, artificial intelligence, and quantum information science cannot be fully addressed by any single discipline. Meeting them requires connecting insights across physics, life sciences, social sciences, and information science. At the core of this integrative approach lie the mathematical sciences.

Just as Einstein' s theory of relativity became indispensable to the accuracy of GPS, the impact of basic research may take decades to emerge. For this reason, research driven by pure intellectual curiosity, rather than immediate utility, is increasingly vital. John von Neumann was one of the most remarkable mathematicians of the 20th century, and also a pioneering physicist, engineer, and computer scientist. He established the foundations of modern computer architecture and made major contributions to fields ranging from quantum statistical mechanics to socioeconomics and weather prediction. He believed that mathematical sciences should generate new mathematics inspired by nature and society. At iTHEMS, we carry forward this vision, engaging complex real-world challenges with a spirit of pure inquiry and creating new mathematical frameworks.

The Organization and Evolution of iTHEMS

In April 2025, iTHEMS evolved from a program into a research center within RIKEN, adopting a more integrated organizational structure. With fundamental sciences such as mathematics, physics, and biology at its core, iTHEMS promotes research that also looks toward societal challenges and future technologies. The knowledge created through collaboration across divisions is one of the defining strengths of the center.

SUURI ENGINE :
Division of Fundamental Mathematical Science
This division forms the intellectual core of iTHEMS, bringing together researchers across mathematics, physics, chemistry, life sciences, computational science, and information science. Through daily interaction, they tackle fundamental questions about the universe, matter, and life.

SUURI WING :
Division of Applied Mathematical Science
This division advances the outcomes of fundamental research toward societal challenges and future-oriented technologies, including AI for Science, quantum computing, predictive science, and mathematical social science.

SUURI COOL :
Division of Global Collaborations and Research Talent Development
This division promotes domestic and international collaborations while fostering the next generation of researchers, strengthening global academic networks.

SUURI CONNECT :
Division of Social Cooperation and Outreach
This division connects science and society through industry partnerships and outreach, communicating the value and societal impact of mathematical sciences.

Facilitating Daily Interactions

Collaboration across disciplines does not happen automatically. The specialized language of each field can sound like a different language altogether, creating barriers to mutual understanding.
To overcome these barriers, researchers need regular opportunities to meet face to face and explain their work in accessible terms. One such initiative is our weekly Friday Coffee Meeting. After a short presentation, members gather for informal discussion over coffee and tea. These conversations deepen mutual understanding, broaden perspectives, and sometimes grow into new collaborations.

The mathematical sciences are not merely about accumulating knowledge; they plant the seeds that will shape humanity' s intellectual legacy and the future of society. Serving as a bridge between today' s inquiry and discoveries a century from now, fundamental science carries a profound responsibility.
At iTHEMS, we connect people and ideas across disciplines, institutions, and borders to create new value through mathematical sciences. We invite you to see what new science will emerge from iTHEMS.

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RIKEN Center for Interdisciplinary Theoretical and Mathematical Sciences

RIKEN 2026-008

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Coffee Time!

iTHEMS is an international, interdisciplinary research center that connects diverse fields through mathematics as a common language.

Building on mathematics and theoretical sciences, we promote collaborative research that transcends traditional disciplinary boundaries across a wide range of areas, including nature, life, the universe, AI, quantum science, condensed matter physics, society, and information.

Through regular gatherings such as our Coffee Meetings, researchers from different fields speak openly with one another and engage in lively discussions.

Euclid Ave
Hearst Ave