2024 MATH IS KEY LECTURE

MATHEMATICS AS THE UNIVERSAL LANGUAGE OF OBSERVATION

Professor of mathematics Irene Gamba leads the Applied Math Group in the Oden Institute for Computational Engineering and Sciences at the University of Texas, Austin. She earned her PhD in mathematics at the University of Chicago in 1989 under the supervision of Jim Douglas. After postdoctoral studies at Purdue University and an NSF postdoctoral fellowship at the Courant Institute, she was an assistant and associate professor at NYU before coming to Texas in 1997.

Her scientific interests are analytical and computational issues in collisional kinetic theory including the evolution Boltzmann and Landau type equations in mean field regimes, gas mixture systems and quantum Boltzmann condensation in low temperatures regimes. Applications of these models range from plasma dynamics such as electron runaway transport, charged transport in nanodevices, approximations to classical fluid dynamics models and coupling of quantum gas system in the formation of condensates.

IRENE GAMBA

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Mathematics emerges as the universal language at the nexus of human curiosity, expressed through observation-based inference and guided by logical reasoning conveyed through drawings and writings. This process leads to conclusions rooted in experimental evidence and forms the basis of highly broad scientific methods, encompassing models articulated by mathematical language across physical, chemical, biological, and computing sciences, as well as social dynamics and financial mathematical tools.

This lecture will focus on the rapid evolution of this language, initially rooted in the need for counting, into a sophisticated tool that enables us to formulate models and solve associated problems driven by our innate quest for knowledge.

Recent statistical physics modeling of charged particle systems in electrostatics and highly magnetized plasma systems in weak turbulence regimes will serve as an state-of-the-art example in the ability to articulate different aspects of the interplay between rigorous mathematical analysis and scientific computing modeling using the elaborated tools of the mathematics language available today.

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MATHEMATICS BUILDING, ROOM 175

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