HACETTEPE ÜNİVERSİTESİ

MATEMATİK BÖLÜMÜ

GENEL SEMİNER

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YAŞAR ATAMAN SALONU

Gökhan Yıldırım

Bilkent Üniversitesi, Türkiye

How Order Emerges from Disorder: Spin Glasses and the Parisi Formula

One of the great intellectual achievements of modern science has been the discovery that disorder does not preclude structure. On the contrary, some of the most complex and random systems in nature obey deep and surprising mathematical principles. The effort to uncover these principles has brought together physicists, mathematicians, and computer scientists, and has been recognized at the highest level, including the Nobel Prize awarded to Giorgio Parisi (2021) and the Abel Prize awarded to Michel Talagrand (2024). In this talk, I will describe a small part of this remarkable story, centered on spin glasses and the Parisi formula. After introducing the basic framework of the Sherrington–Kirkpatrick model, including configurations, Gibbs measure, and free energy, I will explain in general terms the meaning and significance of the Parisi formula, and why it has become one of the landmarks of modern probability and mathematical physics.

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