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上海



SHANGHAI

纽约大学

NYU-ECNU

Institute of Mathematical Sciences
at NYU Shanghai

SPECIAL LECTURE SERIES

- TOPIC:** Topics in Mathematical Physics in View of Differential Equations
- SPEAKER:** Yisong Yang, New York University
- TIME:** Every Tuesday, 13:45-16:15, till 16 December
- VENUE:** Room 357, Geography Building, 3663 Zhongshan Road North, Shanghai
(中山北路校区, 地理楼 357 室)

ABSTRACT OF THE LECTURE

This is an introductory graduate course treating a broad range of fundamental concepts and formalisms in theoretical physics from the viewpoint of mathematical analysts in general and of differential equations in particular. The course consists of seven units.

- Unit 1 Classical and quantum many-body problems
- Unit 2 Maxwell equations, electromagnetic duality, and Dirac monopoles
- Unit 3 Gauge fields, symmetry breaking, and Higgs mechanism
- Unit 4 Mathematics of superconductivity: The Ginzburg-Landau and BCS equations
- Unit 5 Non-Abelian gauge fields, 't Hooft-Polyakov monopoles, and the electroweak theory of Glashow-Weinberg-Salam
- Unit 6 The Einstein equations for gravitation, inflationary universe, blackholes, and ADM mass problems
- Unit 7 Charged solitons, the Julia-Zee theorem, and vortices in the Chern-Simons models

As the course unfolds itself, we will see how phenomena such as DNA denaturation, mass creation, electric charge quantization, quark confinement, big-bang cosmology, dark energy, etc, are understood in terms of mathematical analysis of various differential equations. Numerous problems of future research interest will also be described.

BIOGRAPHY

Yisong Yang is a professor of mathematics at Polytechnic School of Engineering of NYU and an affiliated professor at NYU Shanghai. His areas of research are nonlinear partial differential equations and mathematical physics.