MATH-IMS Joint Applied Mathematics Colloquium Series
The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

Date: Nov 11, 2021 (Friday)
Time: 16:00-17:00 (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/92775210812

Learned Solvers for Forward and Backward Image Flow Schemes
Speaker: Professor Simon Arridge
University College London

Abstract: It is increasingly recognized that there is a close relationship between some network architectures and iterative solvers for partial differential equations. In this talk we present a network architecture for forward and inverse problems in non-linear diffusion. By design the architecture is non-linear, learning an anisotropic diffusivity function for each layer from the output of the previous layer. The performed updates are explicit, by which we obtain better interpretability and generalizability compared to classical architectures. Since backward diffusion is unstable, a learned regularization is implicitly learned to stabilize this process. We test results on synthetic image data sets that have undergone edge-preserving diffusion and on experimental data of images view through variable density scattering media. This is a joint work with Andreas Hauptmann, Giuseppe di Sciacca, and Iwan Mehanda.

Bio: Prof. Simon ARRIDGE completed his BA in Physics at the University of Cambridge in 1981 and his PhD in Medical Physics at the University College London (UCL) in 1992. He subsequently joined the Department of Computer Science at UCL as a Lecturer and has been a Professor of Image Processing since 2001. He has also been a Visiting Professor in the Department of Mathematics of UCL since 2011. He is widely known as one of the originators of the field of diffuse optical tomography (DOT). A special focus of his research in the last decade has been imaging from coupled physics and in particular photoacoustic tomography (PAT). He has been a member of the editorial board of the Institute of Physics journal, Inverse Problems since 2000, and was the Editor-In-Chief in 2015-2019. He was elected a Fellow of the Institute of Physics in 2005. He is also a member of the Foreign Advisory Board of the Finnish Inverse Problems Society.