



Department of Mathematics
The Institute of Mathematical Sciences
The Chinese University of Hong Kong

數學系
數學科學研究所
香港中文大學

Phone: (852) 3943 7988 / 3943 7989 • Fax: (852) 2603 5154 • Email: dept@math.cuhk.edu.hk
Phone: (852) 3943 8036 / 3943 8038 • Fax: (852) 3942 1020 • Email: ims@ims.cuhk.edu.hk
Rm. 220, Lady Shaw Building, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong
Unit 601, Academic Building No. 1, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

Joint Colloquium

Journey to the Center of the Earth

Professor Gunther Uhlmann

University of Washington, USA and
Institute for Advanced Study, HKUST

Abstract

We will consider the inverse problem of determining the sound speed or index of refraction of a medium by measuring the travel times of waves going through the medium. This problem arises in global seismology in an attempt to determine the inner structure of the Earth by measuring travel times of earthquakes. It has also several applications in optics, medical imaging and ocean acoustics among others. It arises as well in the AdS/CFT correspondence.

The problem can be recast as a geometric problem: Can one determine a Riemannian metric of a Riemannian manifold with boundary by measuring the distance function between boundary points? This is the boundary rigidity problem. We will also consider the problem of determining the metric from the scattering relation, the so-called lens rigidity problem. The linearization of these problems involve the integration of a tensor along geodesics, similar to the X-ray transform.

Finally we will describe some recent results, joint with Plamen Stefanov and Andras Vasy, on the partial data case, where you are making measurements on a subset of the boundary. Time permitting we will consider a Lorentzian analog of these problem.

No background on Riemannian geometry or Lorentzian geometry will be assumed.

Date: 3 November 2017 (Friday)
Venue: Rm. 219, Lady Shaw Building,
The Chinese University of Hong Kong, Shatin
Time: 3:00 p.m. – 4:00 p.m.

All are Welcome!