

Mathematical Sciences Colloquium. Monday September 28<sup>th</sup> @ 4:30 PM.

**Speaker:**

**Gunther Uhlmann**

Walker Family Endowed Professor of Mathematics

University of Washington.

**Title:**

**Journey to the Center of the Earth**

**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 and medical imaging among others.

The problem can be recast as a geometric problem: Can one determine the Riemannian metric of a Riemannian manifold with boundary by measuring the distance function between boundary points? This is the boundary rigidity problem. The linearization of this problems involves the integration of a tensor along geodesics, similar to the X-ray transform.

We will also 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.

No previous knowledge of Riemannian geometry will be assumed.

**Short Biography:**

Gunther Uhlmann is currently the Walker Family Professor of Mathematical Sciences at UW.

He has done pioneering research in Inverse Problems and Imaging, Partial Differential Equations, Microlocal Analysis, and Scattering Theory.

**Education:**

Licenciado en Matemáticas, Univ. de Chile, Santiago, Chile 1973.

Ph.D., M.I.T., September 1976

Gunther has held numerous distinguished positions around the world, including:

Si-Yuan Professor, IAS, HKUST, Hong Kong, 2014-2018.

Finnish Distinguished Professor, University of Helsinki, 2012-2017.

University of California Irvine Excellence in Teaching Endowed Chair, 2010-2012.

Chancellor Professor, University of California, Berkeley, Fall, 2010.

More Selected Awards, Honors and Fellowships:

Senior Clay Scholar at MSRI, Fall 2019

Distinguished Visitor, National University of Singapore, August, 2018.

Solomon Leffschetz Medal, Mathematical Council of the Americas, 2017.

Plenary Lecture, V Latin America Congress of Mathematics, Barranquilla, Colombia, July, 2016.

Plenary Lecture International Congress of Mathematical Physics, Santiago, Chile, July 2015.

Senior CARMIN position, IHES and IHP, Paris, France, Spring 2015.

Foreign Member of the Finnish Academy of Sciences, elected 2013.

Simons Fellow, 2013-2014.

Finnish Distinguished Professor, 2013-2017.

AMS Fellow, elected 2012.

Member Washington State Academy of Sciences, elected 2012.1

Chaire d'Excellence 2012-2013 of the Fondation Sciences Mathématiques de Paris.

Einstein Public Lecture, AMS, March 2012.

Ordway Distinguished Visitor, 2011-2012, University of Minnesota.

Rothschild Distinguished Visiting Fellow, Cambridge University and Isaac Newton Institute for Mathematical Sciences, Cambridge, England, Fall 2011.

Kleinman Prize, Society of Industrial and Applied Mathematics, 2011.

Bocher Prize, American Mathematical Society, 2011.

Clay Senior Scholar at MSRI, Fall 2010.

Chancellor Professor, University of California, Berkeley, Fall 2010.

Fellow American Academy of Arts and Sciences, elected 2009.

Plenary Lecturer, International Congress of Industrial and Applied Mathematics 2007, Zurich, Switzerland, July, 2007.

"Highly Cited Author" designation by Thomson/ISI, 2001 list.

Fellow, Institute of Physics, elected 2004.

PIMS Distinguished Chair, University of British Columbia, November 2002.

John Simon Guggenheim Fellowship, 2001-2002.

Corresponding Member of the Chilean Academy of Sciences, elected 2001.

International Congress of Mathematicians, Invited Speaker, Berlin, 1998.

Conference Board of Mathematical Sciences (CBMS), Principal Speaker, 1995.

Alfred P. Sloan Research Fellowship, 1984.

Annual Prize of Mathematics, Venezuela, 1982

Gunther has mentored 44 PhD students, and 33 Post-doctoral Fellows.

In addition to being an outstanding lecturer, I regard Gunther Uhlmann as the world's leader in the field of Inverse problems.