

WORKSHOP “APPLICATIONS IN INVERSE PROBLEMS”

Milan, Department of Mathematics F. Enriques, Università degli Studi di Milano
January 26 – 29, 2015



Aim. Main aim of the workshop is to present recent developments in inverse problems with special attention to applications.

Location. Department of Mathematics F. Enriques, Via Saldini 50, Milano, Sala di Rappresentanza

SCHEDULE	Monday 26	Tuesday 27	Wednesday 28	Thursday 29
10.00 – 11.00		Open problems and discussions	Minicourse 1	Minicourse 1
11.00 – 11.30			Coffee break	Coffee break
11.30 – 12.30			Minicourse 2	Minicourse 2
12.30 – 14.00	Lunch (Aula C)	Lunch (Aula C)	Lunch (Aula C)	Lunch (Aula C)
14.00 – 15.00	Minicourse 1	Minicourse 1	Open problems and discussions	Open problems and discussions
15.00 – 15.30	Coffee break	Coffee break		
15.30 – 16.30	Minicourse 2	Minicourse 2		

MINICOURSE 1: A qualitative approach to the inverse scattering problem for inhomogeneous media. The transmission eigenvalue problem.

MINICOURSE 2: Some ideas on inverse geometrical problems and shape differentiation

Organizing Committee:

Cecilia Cavaterra (Università degli Studi di Milano)
Francesca Messina (Università degli Studi di Milano)
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Information and registration: milanworkshop@unimi.it

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MINICOURSE 1:

**A qualitative approach to the inverse scattering problem for inhomogeneous media.
The transmission eigenvalue problem.**

Abstract. Since the introduction of the linear sampling method in 1996 followed by the factorization method in 1998 and later the first proof of the existence of transmission eigenvalues in 2008, qualitative methods have become a popular method for solving inverse scattering problems. Interest in this area has exploded and the vast amount of literature currently available is an indication of the myriad directions that this research has taken. In this series of lectures we consider the inverse scattering problem for an inhomogeneous (possibly anisotropic) media and show how to obtain information about the support as well as the physical properties of the media based on the investigation of the corresponding far field operator. In particular, we will discuss the relevance and state of the art of the transmission eigenvalue problem and present what type of information transmission eigenvalues provide about the inhomogeneity. More specifically, our presentation will include uniqueness results, reconstruction techniques such as linear sampling and factorization methods, the analysis of the transmission eigenvalue problem, isoperimetric inequalities for the transmission eigenvalue and their determination from the scattering data.



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MINICOURSE 2:

Some ideas on inverse geometrical problems and shape differentiation.

Abstract: In this short course we introduce some ideas on shape differentiation and the regularity of solutions of PDE with respect to the domain. We will see some applications and we will focus on the so called Geometrical Inverse Problems. We use the shape derivatives to write the optimality conditions of a suitable minimization problem and we can obtain a reconstruction algorithm for the inverse problem.