# COLOQUIO DE ANÁLISIS Y FÍSICA–MATEMÁTICA

Organizers: Dr. Rafael del Río and Dr. Ricardo Weder

## PEAKON ASYMPTOTICS FOR THE DISPERSIONLESS CAMASSA-HOLM EQUATION

**Prof. Gerald Teschl**
University of Vienna

**Abstract**

We discuss direct and inverse spectral theory for the isospectral problem of the dispersionless Camassa-Holm equation, where the weight is allowed to be a finite signed measure. In particular, we prove that this weight is uniquely determined by the spectral data and solve the inverse spectral problem for the class of measures which are sign definite. The results are applied to deduce several facts for the dispersionless Camassa-Holm equation. In particular, we show that initial conditions with integrable momentum asymptotically split into a sum of peakons as conjectured by McKean.

*1 de agosto de 2013*

◊

## RESOLVENT EXPANSION FOR THE DISCRETE ONE DIMENSIONAL SCHRÖDINGER OPERATOR

**Prof. Arne Jensen**
Aalborg University

**Abstract**

Given a discrete Schrödinger operator (Hu)[n]=-(u[n+1]+u[n-1]-2u[n])+(Vu)[n] with a fairly general (nonlocal) interaction on V we obtain asymptotic expansions around the two thresholds 0 and 4 of the resolvent of H. The main results concern a classification of solutions to Hu=0 and Hu=4u.

Joint work with K. Itu, Tsukuba University, Japan.

*23 de mayo de 2013*

◊

## THE FERMI GOLDEN RULE AT THRESHOLDS

**Porf. Arne Jensen**
Aalborg University

**Abstract**

I will give an overview of work with G. Nenciu (Bucharest) concerning perturbation of an eigenvalue at a threshold for a Schrödinger operator in odd dimensions. It leads to a modified version of the Fermi Golden Rule in a time-dependent formulation.

*21 de mayo 2013*

◊

## AN INVERSE SPECTRAL PROBLEM WITH TRANSMISSION EIGENVALUES

**Porf. Tuncay Aktosun**
University of Texas at Arlington

**Abstract**

The unique reconstruction of a spherically-symmetric wave speed is considered in a bounded spherical region from the set of so-called transmission eigenvalues. Some uniqueness results are presented as well as a reconstruction procedure. Some similar results are provided for the unique reconstruction of the potential from the transmission eigenvalues for a related Schrodinger equation.

*9 de mayo de 2013.*

◊

## REDUCED MHD MODELS

**Porf. Bruno Després**
Jacques-Louis Lions Laboratory
University Paris 6.

**Abstract**

Reduced magnetohydrodynamics (MHD) systems provide a simplified reduced modeling of the dynamics of magnetic flows in some specific geometrical situations. These models are called reduced because they derive from a simplification (i.e. a reduction) of the system of full MHD. For this reason they are highly attractive in astrophysics, and for the modeling of Tokamaks in axisymmetric geometries for which we refer to the seminal works of Strauss. I will detail some recent results on the use of reduced MHD models in the context of Tokamak modeling, and focus on mathematical questions related to the derivation of hierarchies of well- posed reduced MHD models.

*30 de abril de 2013*

◊

## A VLASOV EQUATION FOR MAGNETIC PLASMAS

**Porf. Bruno Després**
Jacques-Louis Lions Laboratory
University Paris 6.

**Abstract**

The mathematical description of laboratory fusion plasmas produced in Tokamaks is still challenging. Complete models for electrons and ions, as Vlasov-Maxwell systems, are computationally too expensive because they take into account all details and scales of magneto- hydrodynamics. In particular, for most of the relevant studies, the mass electron is negligible and the velocity of material waves is much smaller than the speed of light.

In this direction we study a simplified model which keeps both the complexity of the Vlasov equation for ions and the Hall effect in Maxwell's equation. Based on energy dissipation, a fundamental physical property, we show that the model is nonlinear stable.

Boundary conditions will also be discussed.

*25 de abril de 2013*