

# SEMINARIO DE OPERADORES Y FÍSICA-MATEMÁTICA

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

## ENTIRE FUNCTIONS AND GAP THEOREMS

**Dr. Alexei Poltoratski**

Texas A & M University

### Abstract

In my talk I will discuss solutions to two problems of classical analysis obtained using an approach recently developed in our joint papers with Nikolai Makarov.

A sequence of real numbers is called a Polya sequence if any entire function of exponential type zero that is bounded on that sequence is a constant. The first problem that I will discuss is an old problem by Polya and Levinson that asks for a description of such sequences.

This part is based on joint work with my student Mishko Mitkovski.

The second problem is the Beurling's gap problem. If  $X$  is a closed set on the real line, denote by  $G_X$  the supremum of the size of the gap in the support of the Fourier transform of  $\mu$ , taken over all non-trivial complex measures  $\mu$  supported on  $X$ .

I will present a formula for  $G_X$  in terms of metric characteristics of  $X$ .

Organizers: *Dr. Rafael del Río, Dr. Luis O. Silva y Dr. Ricardo Weder.*

*8 de diciembre de 2009.*



## TRES PROBLEMAS INVERSOS PARA LAS MATRICES DE JACOBI

**Dr. Mikhail Kudryavtsev**

Instituto de Física y Tecnologías Bajas, Ucrania

### Resumen

Se consideran tres problemas inversos de reconstrucción de una matriz finita de Jacobi, sabiendo cómo depende algún eigenvalor de la condición de la frontera (1), cómo depende la discontinuidad de la función espectral de la condición de la frontera (2), cómo depende la discontinuidad de un eigenvalor de la condición de la frontera (3).

Organizadores: *Dr. Rafael del Río, Dr. Luis O. Silva y Dr. Ricardo Weder.*

*1 de diciembre de 2009.*



## TEORÍA INVERSA ESPECTRAL PARA LAS MATRICES FINITAS DE CMV (PARTE I Y II)

**Dr. Mikhail Kudryavtsev**

Instituto de Física y Tecnologías Bajas, Ucrania

### Resumen

Se consideran las matrices finitas de CMV (Cantero, M3ral y Vel3zquez) que son matrices unitarias a cinco diagonales de una forma especial. Se resuelve el problema inverso de la reconstrucci3n de tales matrices a partir de dos espectros y el problema inverso de reconstrucci3n de la matriz a partir de una parte del espectro y una parte de los elementos de la matriz.

[1] L. Golinskii and M. Kudryavtsev. Inverse spectral problems for a class of pentadiagonal unitary matrices. Doklady Mathematics, V. 78, No. 3, pp. 811-813.

[2] L. Golinskii and M. Kudryavtsev. Rational interpolation and mixed inverse spectral problem for finite CMV matrix. J. Approx. Theory, 159 (2009), pp. 61-84.

[3] L. Golinskii and M. Kudryavtsev. An inverse spectral theory for finite CMV matrices. To appear in Inverse Problems and Imaging.

Organizadores: *Dr. Rafael del R3o, Dr. Luis O. Silva y Dr. Ricardo Weder.*

*24 y 26 de noviembre de 2009.*



## POSITIVE LYAPUNOV EXPONENT FOR ERGODIC SCHR3DINGER OPERATORS

**Dr. Helge Krueger**

Department of Mathematics, Rice University, EUA

### Abstract

The Lyapunov exponent  $L(E)$  describes the average exponential growth of the Schr3dinger equation at energy  $E$ . It is well known that for random potentials, the Lyapunov exponent is positive at all energies, and that for quasi periodic ones the Lyapunov exponent is positive once a critical coupling threshold has been passed.

I will consider a larger class of Schr3dinger operators, the ergodic ones. For these, I will describe a multiscale method to prove positive Lyapunov exponent for most energies  $E$  assuming some finite scale initial conditions. I will then discuss how this implies positive Lyapunov exponent for the doubling Schr3dinger operator at large coupling.

Organizers: *Dr. Rafael del R3o, Dr. Luis O. Silva y Dr. Ricardo Weder.*

*25 de noviembre de 2009.*



## LAS SOLUCIONES DEL PROBLEMA DE INTERPOLACI3N RACIONAL

**Dr. Mikhail Kudryavtsev**

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## Resumen

El problema de interpolación racional con polos libres tiene aplicaciones relacionadas con varios métodos numéricos. En esta plática se presenta un resultado que permite resolver problemas de interpolación racional para fracciones propias, funciones de Nevanlinna y otras clases de funciones.

Organizadores: *Dr. Rafael del Río, Dr. Luis O. Silva y Dr. Ricardo Weder.*

*13 de noviembre de 2009.*



## FORMAS NORMALES DE BIRKHOFF Y ECUACIONES A LAS DERIVADAS PARCIALES HAMILTONIANAS

**Dr. Benoît Grebert**

Universidad de Nantes, Francia

### Abstract

Our aim is to explain normal form technics that allow to study the long time behaviour of the solutions of some nolinear Hamiltonian PDEs. We are in particular interested in stability results. Our approach is centered on the Birkhoff normal form theorem that we will first state in finite dimension. Then, after giving some exemples of Hamiltonian PDEs, we present an abstract Birkhoff normal form theorem in infinite dimension and discuss the dynamical consequences for Hamiltonian PDEs.

Organizers: *Dr. Rafael del Río y Dr. Luis O. Silva.*

*24 de marzo de 2009.*