

F. 1999

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FACULTAD DE CIENCIAS EXACTAS Y NATURALES

U.B.A

- 1 .- DEPARTAMENTO: FISICA
- 2 .- CARRERA de: a) Licenciatura en..... ORIENTACION.....
 b) Doctorado y/o Post-Grado en... Doctorado.....
 c) Profesorado en.....
 d) Cursos Técnicos en Meteorología.....
 e) Cursos de Idiomas.....
- 3 .- 1er. CUATRIMESTRE/2do. CUATRIMESTRE Año: 19-7-99 al 30-7-99
- 4 .- N° DE CODIGO DE CARRERA:
- 5 .- MATERIA. ESCUELA DE INVIERNO JUAN JOSE GIAMBIAGI N° DE CODIGO
- 6 .- PUNTAJE PROPUESTO: 1,5 puntos
- 7 .- PLAN DE ESTUDIO; 1987
- 8 .- CARACTER DE LA MATERIA: Optativo
- 9 .- DURACION: 19-7-99 al 30-7-99
- 10 .- HORAS DE CLASES SEMANAL: 30 hs
 - a) Teóricas.....30 hs..... hs.
 - b) Problemas..... hs.
 - c) Laboratorio..... hs.
 - d) Seminarios..... hs.
 - e) Teórico-problemas..... hs.
 - f) Teórico-prácticas..... hs.
 - g) Totales Horas:..... hs.
- 11.- CARGA HORARIA TOTAL:.....hs.
- 12.- ASIGNATURAS CORRELATIVAS:
- 13.- FORMA DE EVALUACION: Examen Escrito - Monografía
- 14.- PROGRAMA ANALITICO: (Se adjunta)
- 15.- BIBLIOGRAFIA:

FECHA: 23 JUL 1999

FIRMA PROFESOR:

FIRMA DIRECTOR:

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Allan MacDonald 's Preliminary Program:

QUANTUM HALL EFFECT. QUANTUM HALL FERROMAGNETS

- i) 2D Electron Systems in Strong Fields and the Integer Quantum Hall Effect
- ii) Overview of the Fractional Quantum Hall Effect
- iii) Quantum Hall Ferromagnets: Hartree-Fock Approach
- iv) Quantum Hall Ferromagnets: Effective Lagrangian Approach
- v) Quantum Hall Ferromagnets: Spin-Dependent Transport

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APROBADO POR RESOLUCION CD 126/00

FIRST WINTER SCHOOL "J. J. GIAMBIAGI"

RECENT ADVANCES IN CONDENSED MATTER PHYSICS

Buenos Aires, July 19-30, 1999

First Week Program (July 19-23)

HOUR	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9:00-10:30	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
11:00-12:30	Devoret	Devoret	Devoret	Devoret	Devoret
12:30-14:00	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break

14:00-14:45	Invited talk I. Schuller	Invited talk O.Rodriguez	Invited talk A. Fainstein	Invited talk A. Ceccatto	Invited talk M.Weissmann
15:00-16:30	Lee	Lee	Lee	Lee	Lee

Second Week Program (July 26-30)

HOUR	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9:00-10:30	Pickett	Pickett	Pickett	Pickett	Pickett
11:00-12:30	Gefen	Gefen	Gefen	Gefen	Gefen
12:30-14:00	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break

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Yuval Gefen's Preliminary Program.

1. MACROSCOPIC CONDUCTORS

1.1 Review of homogeneously disordered conductors. The Anderson transition. Metals and insulators. Weak localization. Characteristic parameters.

1.2 Why interaction is important. Characteristic parameters. Applications (for weak interaction): tunneling density of states and the Altshuler -Aronov corrections (heuristic; perturbation theory). Corrections to conductance. Heat capacity. Lifetime of quasiparticles :inelastic time and dephasing time.

2. MESOSCOPIC FINITE-SIZE CONDUCTORS

2.1 Mesoscopics without e-e interactions: Aharonov-Bohm interferometry; Altshuler-Aronov-Spivak theory; conductance fluctuations. Persistent currents.

2.2 Naive models with interactions: the constant interaction models (Coulomb Blockade). Addition spectrum; conductance at resonance; cotunneling.

2.3 Effective single particle picture (Hartree-Fock). Breakdown of the Koopmans picture. Ground state energy and the addition spectrum -experimental dilemmas, theory.

2.4 Non-linear phenomena : excitation spectrum (experiment and theory). Average tunneling density of states and the Altshuler-Aronov anomaly in zero dimensions (qualitative; exact treatment).

2.5 Particle life-time and the breakdown of Landau Fermi liquid theory (optional).

2.6 Beyond zero-dimensional geometries: perturbation theory treatment (optional)

2.7 The effect of the interaction on the transmission phase (optional)

Yuval Gefen

e-mail: fngafen@wicc.weizmann.ac.il



Michel Devoret's Program:

TUNNELING OF SINGLE ELECTRONS AND SINGLE COOPER PAIRS

1. General overview of single charge phenomena

1.1 Basic principles of single electron transfer: the single electron box

1.2 The single electron transistor and its applications to ultrasensitive electrometry

1.3 Controlled transfer of charge in an external circuit: single electron pumps and turnstiles

1.4 Metrological applications

2. Quantum dynamics of tunnel junction circuits

2.1 Description of the electromagnetic environment of the junction

2.2 Dynamical Coulomb blockade

2.3 Strong tunneling effects

3. Even-odd effects

3.1 The electron box with a superconducting island

3.2 The even-odd free energy 3.3 The superconducting single electron transistor

3.4 Coulomb blockade of Andreev reflection

4. Quantum coherence with a single Cooper pair

4.1 Basics of Cooper pair tunneling. The phase-Cooper pair number conjugation. Macroscopic Quantum Tunneling.

4.2 Bloch oscillations. Dual Josephson effects

4.3 The Cooper pair box

4.4 Experiments testing the decoherence time of the Cooper pair box



Allan MacDonald 's Preliminary Program:

QUANTUM HALL EFFECT. QUANTUM HALL FERROMAGNETS

- i) 2D Electron Systems in Strong Fields and the Integer Quantum Hall Effect
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Warren Pickett's Preliminary Program

1. Exchange Interactions in Low Dimensional Magnetic Insulators: Li_2CuO_2 ; CaV_4O_9
2. Half-Metallic Ferromagnetism: An Overview
3. Half-Metallic Ferromagnets: Examples and Possibilities
4. Heavy Fermion Formation from 3d Electrons in LiV_2O_4
5. Coexistence of Superconductivity and Ferromagnetism.

 

Patrick Lee's Preliminary Program:

HIGH T_c SUPERCONDUCTORS VIEWED AS DOPPED MOTT INSULATORS

SP

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14:00-15:30	Invited talk J. Riera	Invited talk L. Civale	Students Seminars	Invited talk F. Claro	Invited talk H. Pastawski
16:00-16:45	Minicourse E. Miranda	Minicourse E. Miranda	Students Seminars	Invited talk C. Acha	Happy End

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