

LOW ENERGY ELECTRODYNAMICS IN SOLIDS 2008



VANCOUVER WHISTLER

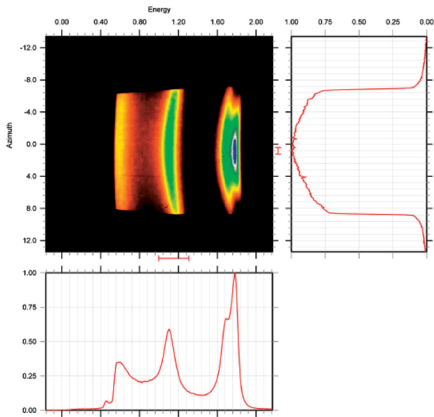
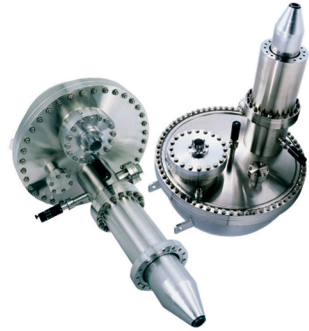
JUNE 30 - JULY 4 2008



Components and Systems for High Resolution and Low Energy Electron Spectroscopy

The PHOIBOS series of hemispherical energy analyzers with 100, 150 and 225 mm mean radius set a new standard with the highest resolution and transmission possible.

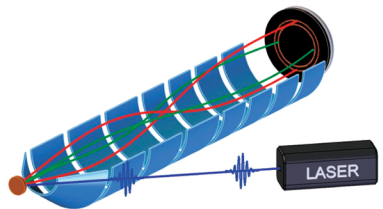
This instrument combines excellent performance and highest reliability for the largest possible variety of experimental conditions. Due to the modular concept of the construction it can be easily adapted to meet special requirements.



Quantum-well-states of Ag(15 ML) on Cu(111). Data taken in snap shot mode with a PHOIBOS 150 2D-CCD at $E_{kin} = 1$ eV and $E_{pass} = 20$ eV. Photon energy is 5.8 eV.

Data courtesy of S. Mathias, M. Bauer and M. Aeschlimann, University Kaiserslautern, Germany.

The THEMIS time-of-flight spectrometer series complements the SPECS photoemission spectrometer line with an instrument ideally suited for pulsed photon sources. It allows parallel angle and energy detection with up to $\pm 13^\circ$ and 70 eV windows.



About The LEES 08 Conference:

LEES 08, organized by the University of British Columbia and Simon Fraser University, will be a forum for the interdisciplinary discussion of the low-energy electrodynamics of solids, at both the theoretical and experimental level, with specific emphasis on the electronic and magnetic properties of quantum materials.

Invited and contributed oral presentations of 30 minutes are planned for the daytime sessions and symposia. Ample time will be dedicated to questions and discussion, to facilitate exchange of ideas and cross-fertilization. Poster presentations will be held in the evenings. There will be no parallel sessions and attendance is limited to approximately 100 participants. Students are encouraged to participate.

List of Topics

- Microwave, terahertz, infrared, and optical spectroscopy
- Spin and angle-resolved photoemission
- X-ray and neutron scattering
- Ultrafast, time-resolved spectroscopies
- Scanning Tunneling Spectroscopy
- Spectroscopy under extreme conditions
- Low-dimensional electronic systems
- Giant and colossal magnetoresistance materials
- Unconventional superconductivity
- Novel correlated materials and metamaterials
- Multilayers, surfaces, and interfaces
- Carbon nanotubes, graphene, and fullerenes
- Bose-Einstein condensation
- Quantum phase transitions

Organizers and Contacts:**Conference Co-Chairmen:**

Andrea	Damascelli	(UBC)
David	Broun	(SFU)
Douglas	Bonn	(UBC)

Local organizing committee:

Kim	Tkaczuk	(UBC)
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Acknowledgement of Sponsors:

The organizers gratefully acknowledge the support of the following institutions, organizations, and companies:

University of British Columbia
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AMPEL – (Advanced Material and Processing Engineering Laboratory)
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Conference Program:**Monday, June 30**

- 08.15-08.30 **Welcome and Opening**
- Advances in Manganites** Chair – Peter Littlewood
- 08.30-09.00 **Daniel Dessau** ARPES studies of bilayer CMR manganites
- 09.00-09.30 **Norman Mannella** CMR Manganites and HTSCs: so different, ... yet so similar
- 09.30-10.00 **Mark Golden** Electronic structure studies of bilayer CMR manganites
- 10.00-10.30 **Jeroen van den Brink** Multiferroicity in charge and orbital ordered manganites
- 10.30-11.00 **Coffee**
- Developments in Optics I** Chair – Leonardo Degiorgi
- 11.00-11.30 **Natalia Drichko** Interplay between superconductivity and charge order in β "-(BEDT-TTF)₂SF₅CH₂CF₂SO₃: optical study
- 11.30-12.00 **Toomas Rõõm** Quantum dynamics and infrared absorption of H₂ molecule trapped inside a C₆₀ cage
- 12.00-12.30 **Joseph Orenstein** Spin propagation in the two-dimensional electron gas: observation of the persistent spin helix
- 12.45-02.00 **Lunch**
- Novel Functional Interfaces I** Chair – Bernhard Keimer
- 02.00-02.30 **Jochen Mannhart** The electron gas at the LaAlO₃/SrTiO₃ interface: ground state, carrier generation mechanism, and first devices
- 02.30-03.00 **Ilya Elfimov** Novel aspects in the physics of oxide's surfaces
- 03.00-03.30 **Christian Bernhard** Competition between high-T_c superconductivity and ferromagnetism in oxide multilayers
- 03.30-04.00 **Coffee**
- Novel Functional Interfaces II** Chair – Andrei Pimenov
- 04.00-04.30 **Peter Abbamonte** Interface charge tunneling in La₂CuO₄-La_{1.64}Sr_{0.36}CuO₄ superlattices
- 04.30-05.00 **Bernhard Keimer** Spectroscopy of electronic reconstructions at oxide interfaces
- 05.00-06.30 **Posters and Exhibitions**
- 07.00-08.15 **Dinner**

Tuesday, July 1

Graphene Physics I Chair – Dirk van der Marel

- 08.30-09.00 **Alberto Morpurgo** Transport at the charge neutrality point in single- and bi-layer graphene
- 09.00-09.30 **Eli Rotenberg** Many body effects in graphene and related materials
- 09.30-10.00 **Eva Andrei** Scanning tunneling spectroscopy and transport measurements in graphene
- 10.00-10.30 **Allan MacDonald** Spectral properties of gated graphene

10.30-11.00 **Coffee**

Graphene Physics II Chair – Jules Carbotte

- 11.00-11.30 **Michael Martin** IR spectromicroscopy of charge injection in graphene and organic FETs
- 11.30-12.00 **Alexey Kuzmenko** Infrared spectroscopy of electrostatically gated bilayer graphene
- 12.00-12.30 **Gordon Semenoff** Domain walls as quantum wires in graphene-like structures

12.45-02.00 **Lunch**

Two Gaps in the HTSCs I Chair – Vidya Madhavan

- 02.00-02.30 **Eric Hudson** Gaps in our understanding of high temperature superconductors
- 02.30-03.00 **Ali Yazdani** Electronic origin of inhomogeneous pairing interaction in the high-Tc superconductor BiSrCaCuO
- 03.00-03.30 **Joel Mesot** Neutron and ARPES evidences for 2 energy scales in La₂-xSrxCuO₄

03.30-04.00 **Coffee**

Two Gaps in the HTSCs II Chair – Michael Norman

- 04.00-04.30 **Tonica Valla** “Kinks”, gaps and pseudogaps in cuprate superconductors
- 04.30-05.00 **Alain Sacuto** Gaps in Cuprates
- 05.00-05.30 **Thomas Devereaux** Two gaps scenario in HTSCs: overview and perspective

05.30-06.30 **Business Meeting**

07.00-08.15 **Dinner**

08.30-10.00 **Posters and Exhibition**

Wednesday, July 2

Multiferroics Chair – Martin Dressel

- 08.30-09.00 **Andrei Pimenov** Magnetolectric effects and excitations in rare-earth manganites
09.00-09.30 **Rolando Valdes Aguilar** Magnetic field phase diagram of electromagnon excitations in multiferroic manganites
09.30-10.00 **Peter Littlewood** Electronically soft matter
10.00-10.10 **Ludwig-Genzel-Prize**
10.10-10.40 **Ricardo Lobo** Far-infrared response of BiFeO₃ and TbMnO₃ multiferroic materials

10.40-11.00 **Coffee**

Developments in Optics II Chair – Tae-Won Noh

- 11.00-11.30 **Leonardo Degiorgi** Infrared and Raman study of the charge-density-wave state in the rare-earth polychalcogenides RTen
11.30-12.00 **Alfred Leitenstorfer** Microscopic origin for the ultrafast insulator-metal phase transition in VO₂ studied via femtosecond field-resolved mid-infrared spectroscopy
12.00-12.30 **Aharon Kapitulnik** Time reversal symmetry breaking in unconventional superconductors

12.45-06.00 **Lunch, Excursion, etc.**

06.00-09.00 **Banquet**

Thursday, July 3

Attosecond and X-ray Spectroscopy I Chair – Dimitri Basov

- 08.30-09.00 **Adrian Cavaliere** Attosecond spectroscopy in condensed matter
 09.00-09.30 **Martin Wolf** Time-resolved ARPES Studies of Correlated Materials
 09.30-10.00 **Matteo Rini** Femtosecond spectroscopy from terahertz to x-rays: time-resolved studies of phase transition dynamics in strongly correlated electron systems
 10.00-10.30 **Stefan Eisebitt** X-ray holography: from snapshots to movies
 10.30-11.00 **Coffee**

Attosecond and X-ray Spectroscopy II Chair – Martin Wolf

- 11.00-11.30 **Kelly Gaffney** Ultrafast X-ray Studies of Atomic and Electronic Dynamics
 11.30-12.00 **Fulvio Parmigiani** Frontiers of time resolved experiments in condensed matter with EUV and x-ray free electron laser

Polaron Liquids I Chair – Martin Wolf

- 12.00-12.30 **Dirk van der Marel** Polaron liquid in electron doped strontium titanate
 12.45-02.00 **Lunch**

Polaron Liquids II Chair – Thomas Devereaux

- 02.00-02.30 **Kyle M. Shen** Polaron formation in undoped cuprates as studied by x-ray absorption and ARPES
 02.30-03.00 **Mona Berciu** Spectral weight transfer in polaronic systems
 03.00-03.30 **Emmanuele Cappelluti** Optical properties of lattice/spin polarons in underdoped cuprates
 03.30-04.00 **Coffee**

Ruthenates, Rhodates, Iridates Chair – Aharon Kapitulnik

- 04.00-04.30 **Felix Baumberger** Nested Fermi surface and electronic instability in Ca₃Ru₂O₇
 04.30-05.00 **Changyoung Kim** Octahedral rotation and spin-orbit coupling effects on the electronic structures of 4d and 5d transition metal oxides.
 05.00-05.30 **Maurits Haverkort** Strong spin-orbit coupling effects on the Fermi surface of Sr₂RuO₄ and Sr₂RhO₄
 05.30-06.00 **Tae-Won Noh** Cooperative interplay between spin-orbit coupling and electron correlation and the realization of novel Jeff=1/2 Mott insulator in layered iridates
 07.00-08.45 **Dinner and Evening Talk by George Gruner**

Friday, July 4

Developments in Optics II Chair – Christian Bernhard

- 08.30-09.00 **Stefano Lupi** Low-energy electrodynamics and metal to insulator transition in strongly correlated VO₂, V₂O₃ and V₃O₅ vanadium oxides
- 09.00-09.30 **Dimitri Basov** Infrared spectroscopy of correlated electron matter at the nano-scale

Fermi Pockets in Underdoped HTSCs I Chair – Christian Bernhard

- 09.30-10.00 **Seamus Davis** Quasiparticle extinction with approaching Mottness in Bi₂Sr₂CaCu₂O_{8+d}
- 10.00-10.30 **Nicolas Doiron-Leyraud** Fermi surface and carrier density in hole-doped cuprates

10.30-11.00 **Coffee**

Fermi Pockets in Underdoped HTSCs II Chair – Joseph Orenstein

- 11.00-11.30 **Douglas Bonn** Recent progress in the phase diagram of YBCO
- 11.30-12.00 **Dennis Drew** IR Hall effect in underdoped cuprates
- 12.00-12.30 **Michael Norman** Fermi arcs and Fermi pockets

12.30-12.45 **Concluding Remarks and Farewell**

Chair / time	Monday June 30	Tuesday July 1	Wednesday July 2	Thursday July 3	Friday July 4
P. Littlewood 8.15 8.30 9.00 9.30 10.00	Manganites Welcome Daniel Dessau Norman Mannella Mark Golden J. van den Brink	D. v.d. Marel 8.30 9.00 9.30 10.00	Multiferroics Andrei Pimenov R. Valdes Aguilar Peter Littlewood Ludwig Genzel Prize Ricardo Lobo	D. Basov 8.30 9.00 9.30 10.00	C. Bernhard 8.30 9.00 C. Bernhard 9.30 10.00
10.30-11.00	Coffee	10.30-11.00	Coffee	10.30-11.00	Coffee
L. Degiorgi 11.00 11.30 12.00	Optics I Natalia Drichko Toomas Rõõm Joseph Orenstein	J. Carbotte 11.00 11.30 12.00	Optics II Leo Degiorgi Alfred Leitenstorfer Aharon Kapitulnik	M. Wolf 11.00 11.30 M. Wolf 12.00	J. Orenstein 11.00 11.30 12.00 12.30
12.45 - 2.00	Lunch	12.45 - 6.00	Lunch & Excursion	12.45 - 2.00	Lunch
B. Keimer 2.00 2.30 3.00	Interfaces I Jochen Mannhart Ilya Elfimov Christian Bernhard	V. Madhavan 2.00 2.30 3.00		T. Devereaux 2.00 2.30 3.00	Polaron Liquids II Kyle Shen Mona Berciu E. Cappelluti
3.30-4.00	Coffee	3.30-4.00		3.30-4.00	Coffee
A. Pimenov 4.00 4.30 5.00-6.30	Interfaces II Peter Abbamonte Bernhard Keimer Posters & Exhibitions	M. Norman 4.00 4.30 5.00 5.30-6.30		A. Kapitulnik 4.00 4.30 5.00 5.30	Ru, Rh, Ir Oxides Felix Baumberger Changyoung Kim Maurits Haverkort Tae-Won Noh
7.00-8.15	Dinner	7.00-8.15	Dinner	7.00-8.15	Dinner
		8.30-10.00	Posters & Exhibitions	8.15-8.45	George Gruner

Ludwig Genzel Prize:

The Ludwig Genzel Prize, sponsored by Bruker Optics, is awarded to a young scientist for exceptional contributions to the field of condensed-matter spectroscopy. The 2008 award will be handed over during the LEES 08 Conference in Vancouver - Whistler.

This years Ludwig Genzel Prize is awarded to Dr. Ricardo Lobo for his contributions to the optical spectroscopy of superconductors and the development of far-infrared pump-probe experiments.

Ricardo Lobo's achievements include investigations of kinetic-energy changes across the superconducting transition in hole-doped cuprates by measuring the optical response from the far-infrared to the deep-UV. His work on the normal state gap in electron-doped materials also brings new insight in this controversial issue. Ricardo Lobo significantly contributed to the realization of novel pump-probe experiments at Brookhaven National Laboratories utilizing a Ti:sapphire laser synchronized to the VUV synchrotron storage ring. This allowed him to investigate the pair recombination dynamics in superconductors and gap energy shift in the photo-excited state. His most recent achievements are in the field of multiferroics, in particular the investigation of the lattice dynamics.



Table of Posters:

L. Baldassarre	Quasiparticle evolution and pseudogap formation in V2O3: an infrared study
A. Beiki-Ardakani	Metamagnetic quantum criticality in Sr3Ru2O7 probed by microwave spectroscopy
S. Blanc	Doping dependence of the ratio between the quasi-particle spectral weight and the slope of the superconducting gap in the cuprates: a Raman point of view
J.S. Bobowski	Broadband microwave spectroscopy of unconventional superconductors
V. Brouet	Strong many-body effects observed by angle-resolved photoemission study in "misfit cobaltates"
D.M. Broun	Microwave spectroscopy of highly underdoped YBa2Cu3O6.333
W.S. Choi	Optical spectroscopic investigations on multiferroic hexagonal RMnO3 thin films
R. Claessen	Electron-doping a Mott insulator: alkaline intercalation into Ti oxohalides
S. de Jong	Electronic structure of bilayered colossal magnetoresistant manganates
R. de Sousa	Optical coupling to spin waves in multiferroic materials
J.D. Denlinger	3D electronic structure of multi-layer Sr ruthenates
M. Dressel	Quasiparticle dynamics in superconducting aluminum
D. Fournier	In-situ doping control of the surface of high-Tc cuprates
M. García-Fernández	A resonant soft X-ray powder diffraction study to determine the orbital ordering in half doped A-site ordered manganites
L. Gasparov	Electronic Raman scattering in magnetite: spin vs. charge gap
P.J. Hirschfeld	Local quasiparticle lifetimes in a d-wave superconductor
C.C. Homes	Optical properties of the first high-temperature superconductor: La2-xBaxCuO4
M.A. Hossain	Crystal-field level inversion in lightly Mn-doped Sr3Ru2O7
H.J. Im	Direct observation of dispersive Kondo resonance peaks in a heavy-fermion system
N.J.C. Ingle	Cleaving-temperature dependence of layered-oxide surfaces
T. Ito	VUV 3-dimensional angle-resolved photoemission study on CeTe2
M. Jörger	Raising the bars in vacuum FT-IR spectroscopy: design advances and research applications

S.I. Kimura	Excitonic instability in SmS: an infrared study on the black-to-golden phase transition under pressure
F. Massee	Scanning tunneling microscopy on $\text{La}_{2-2x}\text{Sr}_{1+2x}\text{Mn}_2\text{O}_7$
H. Miyazaki	Direct photoelectrical observation of electronic structure modification of EuO due to the ferromagnetic ordering
E.J. Nicol	Optical conductivity of biased bilayer graphene
A. Nicolaou	Metal-insulator transition in “misfits” cobaltates investigated by angle-resolved photoemission
H. Okamura	Pressure-tuning of the f electron localization and hybridization probed with infrared spectroscopy under high pressure
D.C. Peets	Single-crystal growth and X-ray absorption spectroscopy of $\text{Tl}_2\text{Ba}_2\text{CuO}_{6+x}$
J.C. Petersen	Ultrafast transient photoconductivity of the undoped cuprate $\text{Sr}_2\text{CuCl}_2\text{O}_2$
T.Z. Regier	A high resolution X-ray absorption investigation of the polyaromatic hydrocarbons
E. Ritz	Frequency-dependent hopping transport in Si:P
S. Schuppler	Doping cobaltate with electrons: $\text{La}_{1-x}\text{Ce}_x\text{CoO}_3$
S.S.A. Seo	Infrared spectroscopy on oxide superlattice of a Mott insulator LaTiO_3 and a band insulator SrTiO_3 : An evidence of metallic interface
K. Takubo	Electronic structure of triangular lattices in NiGa_2S_4 , FeGa_2S_4 , and $\text{Fe}_2\text{Ga}_2\text{S}_5$
L. Tassini	Charge ordering phenomena and superconductivity in cuprates
J.L.M. van Mechelen	Electron-phonon interaction and charge carrier mass enhancement in electron doped alkali earth titanate semiconductors
H. Wadati	Electronic structure of the $\text{SrTiO}_3/\text{LaAlO}_3$ interface revealed by resonant soft x-ray scattering
T. Yamauchi	Prime-numbers sequence in vanadium oxides
A.M. Zagoskin	Quantum metamaterials: Electromagnetic waves in a Josephson qubit line
X.Q. Zhou	Microwave flux-flow resistivity of $\text{YBa}_2\text{Cu}_3\text{O}_{6.333}$ and $\text{Tl}_2\text{Ba}_2\text{CuO}_{6+x}$ across the cuprate phase diagram

Conference Participants:

Peter Abbamonte	University of Illinois
Eva Andrei	Rutgers University
N. Peter Armitage	Johns Hopkins University
Leonetta Baldassarre	University of Augsburg
Dimitri Basov	UC San Diego
Felix Baumberger	University of St. Andrews
Mona Berciu	University of British Columbia
Christian Bernhard	University of Fribourg
Sebastien Blanc	Université Paris 7
Douglas Bonn	University of British Columbia
Veronique Brouet	Université Paris Sud
David Broun	Simon Fraser University
Emmanuele Cappelluti	SMC Research Center, INFN-CNR, Rome
Jules Carbotte	McMaster University
Adrian Cavalieri	Max Planck Institute of Quantum Optics
Woo Seok Choi	Seoul National University
Ralph Claessen	University of Würzburg
Andrea Damascelli	University of British Columbia
J.C. Seamus Davis	Cornell University
Sanne de Jong	University of Amsterdam
Rogério de Sousa	University of Victoria
Leonardo Degiorgi	ETH Zurich
Jonathan Denlinger	Lawrence Berkeley National Lab
Dan Dessau	University of Colorado
Thomas Devereaux	Stanford University
Steve Dodge	Simon Fraser University
Nicolas Doiron-Leyraud	Université de Sherbrooke
Martin Dressel	University of Stuttgart
Dennis Drew	University of Maryland
Natalia Drichko	University of Stuttgart
Stefan Eisebitt	BESSY, Berlin
Ilya Elfimov	AMPEL – UBC
Kelly Gaffney	PULSE Center - Stanford

Miryam Garcia-Fernandez	Paul Scherrer Institute
Lev Gasparov	University of North Florida
Mark S. Golden	University of Amsterdam
George Gruner	UC Los Angeles
Rudi Hackl	Walther Meissner Institute
Walter Hardy	University of British Columbia
Maurits Haverkort	Max Planck Institute for Solid State Research
Peter Hirschfeld	University of Florida
Christopher Homes	Brookhaven National Lab
Eric Hudson	MIT
Hojun IM	Sungkyunkwan University
Nicholas Ingle	AMPEL - UBC
Takahiro Ito	Institute for Molecular Science
Michael Joerger	Bruker Optics Ltd.
Thorsten Kampen	SPECS GmbH
Aharon Kapitulnik	Stanford University
Bernhard Keimer	Max Planck Institute for Solid State Research
Malcolm Kennett	Simon Fraser University
Changyoung Kim	Yonsei University
Shin-ichi Kimura	Institute for Molecular Science
Peter Krygsmann	Bruker Optics Ltd.
Alexey Kuzmenko	University of Geneva
Alfred Leitenstorfer	University of Konstanz
Peter Littlewood	University of Cambridge
Ricardo Lobo	CNRS-ESPCI
Stefano Lupi	University of Rome La Sapienza
Allan MacDonald	University of Texas
Vidya Madhavan	Boston College
Norman Mannella	UTK - TN
Jochen Mannhart	University of Augsburg
Michael Martin	Lawrence Berkeley National Lab
Freek Massee	University of Amsterdam

Joel Mesot	ETH Zurich and PSI
Hidetoshi Miyazaki	Nagoya University
Alberto Morpurgo	Delft University
Elisabeth Nicol	University of Guelph
Alessandro Nicolaou	Université Paris Sud
Tae-Won Noh	Seoul National University
Michael Norman	Argonne National Lab
Hidekazu Okamura	Kobe University
Joseph Orenstein	UC Berkeley and LBNL
Fulvio Parmigiani	University of Trieste
Andrei Pimenov	University of Würzburg
Tom Regier	University of Saskatchewan and CLS
Matteo Rini	Lawrence Berkeley National Lab
Elvira Ritz	University of Stuttgart
Toomas Rõõm	NICPB
Eli Rotenberg	Lawrence Berkeley National Lab
Alain Sacuto	Université Paris 7
Stefan Schuppler	Karlsruhe Research Centre
Gordon Semenoff	University of British Columbia
Sung Seok A. Seo	Max Planck Institute for Solid State Research
Kyle M. Shen	Cornell University
David Tanner	University of Florida
Leonardo Tassini	Walther Meissner Institute
Kim Tkaczuk	University of British Columbia
Rolando Valdes Aguilar	University of Maryland
Tonica Valla	Brookhaven National Lab
Dirk van der Marel	University of Geneva
Dook van Mechelen	University of Geneva
Jeroen van den Brink	Leiden University
Martin Wolf	Free University of Berlin
Touru Yamauchi	University of Tokyo
Ali Yazdani	Princeton University
Alexandre Zagoskin	Loughborough University

Invited Speakers:

Peter Abbamonte	Maurits Haverkort	Tae-Won Noh
Eva Andrei	Eric Hudson	Mike Norman
Dimitri Basov	Aharon Kapitulnik	Joe Orenstein
Felix Baumberger	Bernhard Keimer	Fulvio Parmigiani
Chris Bernhard	Changyoung Kim	Andrei Pimenov
Seamus Davis	Adrian Cavalieri	Matteo Rini
Leo Degiorgi	Alfred Leitenstorfer	Toomas Rõõm
Dan Dessau	Peter Littlewood	Eli Rotenberg
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Kelly Gaffney	Joel Mesot	Martin Wolf
Mark Golden	Alberto Morpurgo	Ali Yazdani

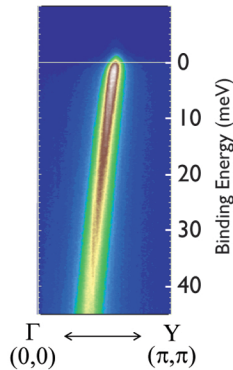
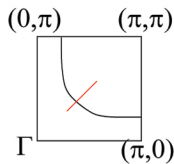
LEES History:

- LEES 08 - Vancouver, British Columbia, **Canada** (2008)
- LEES 06 - Tallinn, **Estonia** (2006)
- LEES 04 - Kloster Banz, **Germany** (2004)
- LEES 02 - Montauk, **USA** (2002)
- LEES 99 - Pécs, **Hungary** (1999)
- LEES 97 - Ascona, **Switzerland** (1997)
- LEES 95 - Trest, **Czech Republic** (1995)
- LEES 93 - Bad Honnef, **Germany**(1993)

VG Scienta HIGHLIGHT

LASER ARPES

The Scienta R4000 electron analyzer is a key component in the development of laser based ARPES. The R4000 allows the scientist to utilize the high resolution and focus properties of the photons and receive ARPES spectra of unparalleled quality. Recent publications show 250 μeV energy resolution and 0.05° angular resolution.



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