Rice Quantum Institute
Annual Research Colloquium
2007

Welcome to the 21st Annual RQI Research Colloquium. There are 82 papers presented in 8 oral sessions submitted by graduate students and postdoctoral fellows this year. The mid-day Undergraduate Research Symposium consists of 42 poster presentations by students from Rice and other schools, including participants in the NSF-funded Research Experience for Undergraduates (REU) and NanoJapan programs and the Nanophotonics IGERT REU program. Special presentation prizes, in addition to those from RQI) are being sponsored by Schlumberger and Micron Technology. As this is printed, there are other companies also considering sponsoring prizes.

All talks are in Duncan Hall McMurtry Auditorium and Room 1064. Each talk will be eight minutes long, with two minutes allowed for questions. The poster session is in Martel Hall, the lobby just outside McMurtry Auditorium.

Sandwich lunches will be provided at 12:00 p.m. for those people who have signed up in advance. After the Colloquium is over, we will move to the area outside Duncan Hall for a dinner catered by Goode Company Barbecue. Coupons for lunch and dinner will be included in the registration packets.

Schedule

IA. *Nanostructures*, 8:00 a.m., McMurtry
IB. *Biophysics*, 8:00 a.m., DH 1064

Break, 9:50-10:10 a.m., Duncan Hall Lobby

IIA. *Carbon Nanotubes*, 10:10 a.m., DH 1064
IIB. *AMO Physics*, 10:10 a.m., McMurtry

***Poster Session* & Lunch, 12:00-1:00 p.m.**

IIIA. *Nanophotonic/Plasmonic Physics*, 1:00 p.m., McMurtry
IIIB. *AMO Physics*, 1:00 p.m., DH 1064

Break, 2:50-3:10 p.m., Duncan Hall Lobby

IVA. *Quantum Materials/Magnetism*, 3:10 p.m, McMurtry
IVB. *Spectroscopy & Sensing*, 3:10 p.m., DH 1064

Barbecue Dinner, 5:00 p.m., outside Duncan Hall

IA. Nanostructures

8:00 a.m.

McMurtry Auditorium

IA–1 8:00–8:10 a.m.

SUCROSE FUNCTIONALIZED, WATER SOLUBLE CARBON NANOSTRUCTURES

Oleksandr V. Kuznetsov[1], Rui F. M. Lobo[2] and Valery N. Khabashesku[3]
[1]Department of Physics and Astronomy, Rice University, [2]Department of Physics, Faculty of Sciences and Technology, New University of Lisbon, Caparica, Portugal, [3]Department of Chemistry, Rice Quantum Institute and Smalley Institute for Nanoscale Science and Technology, Rice University

IA–2 8:10–8:20 a.m.

METAL CHALCOGENIDE NANOSTRUCTURES FROM SINGLE-SOURCE ORGANOMETALLIC PRECURSORS

T. Mandal, V.Stavila, K.H.Whitmire
Department of Chemistry, Rice University, Houston, Texas

IA–3 8:20–8:30 a.m.

THE BORON BUCKYBALL B_{80}: A NEW FAMILY OF FULLERENES?

Arta Sadrzadeh, Nevill Gonzalez Szwacki, Olga V. Pupysheva, and Boris I. Yakobson
Department of Mechanical Engineering & Materials Science, Rice University, Houston, Texas 77251, USA

IA–4 8:30–8:40 a.m.

ROLLING OF NANOCARS: A SINGLE MOLECULAR STUDY

Saumyakanti Khatua, Kevin Claytor, Jason Guerrero, James M. Tour, and Stephan Link
Department of Chemistry, Rice University, Texas, USA

IA–5 8:40–8:50 a.m.

SUBSTRATE-DEPENDENT ELECTRONIC BEHAVIOR OF POLYDIACETYLENE NANOWIRES

R. Giridharagopal, L. Wang, K. F. Kelly
Department of Electrical and Computer Engineering, Rice University

IA–6 8:50–9:00 a.m.

STM STUDY OF POLYDIACETYLENE NANOWIRES ON Au/GRAPHITE

Lili Wang, Rajiv Giridaragopal and Kevin F. Kelly
Department of Electrical and Computer Engineering, Rice University, Houston, Texas

IA–7 9:00–9:10 a.m.

NANOMETER LENGTH-SCALE CONTACT EFFECTS IN POLY 3-HEXYLTHIOPHENE

J. Worne[1] and D. Natelson[1,2]
[1]Department of Electrical and Computer Engineering, Rice University
[2]Department of Physics and Astronomy, Rice University

IA–8 9:10–9:20 a.m.

HIGH-ASPECT-RATIO NANOGAPS FABRICATION

A. Fursina[1], S. Lee[2], D. Natelson[2]
[1]Department of Chemistry, Rice University, 6100 Main St., Houston, TX 77005
[2]Department of Physics and Astronomy, Rice University, 6100 Main St., Houston, TX 77005

IA–9 9:20–9:30 a.m.

DETECTION OF A SMALL NUMBER OF MOLECULES ON ELECTROMIGRATED NANOGAPS USING SURFACE-ENHANCED RAMAN SPECTROSCOPY

D. Ward, D. Natelson
Department of Physics, Rice University

IA–10 9:30–9:40 a.m.

RADIATION-ENHANCED SUPERPLASTICITY IN NANOTUBES AND 2D-CRYSTALS

Yu Lin, Feng Ding, and Boris I. Yakobson
Department of Mechanical Engineering & Materials Science, Rice University, Houston TX 77005, USA

IA–11 9:40–9:50 a.m.

SPECTROSCOPIC MONITORING OF A DEHYDROCHLORINATION REACTION ON CATALYTICALLY ACTIVE Pd ISLANDS INTEGRATED ON PLASMONIC SUBSTRATES

Kimberly Heck[1], Ben Janesko[2], Gustavo E. Scuseria[2], Naomi J. Halas[2,3] and Michael S. Wong[1,2]
[1]Department of Chemical and Biomolecular Engineering, [2]Department of Chemistry, [3]Department of Electrical and Computer Engineering, Rice University, Houston, TX

IB. Biophysics

8:00 a.m.

Duncan Hall 1064

IB–1 8:00–8:10 a.m.

TOTALLY ASYMMETRIC SIMPLE EXCLUSION PROCESS WITH LOCAL POINT INHOMOGENEITY

K.Tsekouras and A.B.Kolomeisky
Department of Chemistry, Rice University, Houston TX

IB–2 8:10–8:20 a.m.

THEORETICAL INVESTIGATION OF THE EFFECTS OF STEP-SIZE FLUCTUATIONS ON THE DYNAMICS OF MYOSIN-V

R.K. Das and A.B. Kolomeisky
Department of Chemistry, Rice University, Houston, Texas, USA

IB–3 8:20–8:30 a.m.

EFFECT OF DENATURANT ON SINGLE MOLECULE FORCE SPECTROSCOPY

E.Botello, N. Harris and C.H. Kiang
Department of Physics and Astronomy, Rice University, Houston, TX

IB–4 8:30–8:40 a.m.

THE EFFECT OF CANTILEVER SPRING CONSTANT ON FORCE MEASUREMENT IN SINGLE-MOLECULE FORCE SPECTROSCOPY

C. J. Richard, N. C. Harris, and C.-H. Kiang
Department of Physics and Astronomy, Rice University, Houston, Texas

IB–5 **8:40–8:50 a.m.**

IMPROVEMENT OF X-RAY CRYSTALLOGRAPHIC STRUCTURES WITH NORMAL-MODE-BASED REFINEMENT

Xiaorui Chen, Billy Poon, Qinghua Wang and Jianpeng Ma
Graduate Program of Structural and Computational Biology and Molecular Biophysics,
Verna and Marrs McLean Department of Biochemistry and Molecular Biology,
Baylor College of Medicine, Houston, TX
Department of Bioengineering, Rice University, Houston, TX

IB–6 **8:50–9:00 a.m.**

A NOVEL STATISTICAL POTENTIAL BASED ON SIDE-CHAIN PACKING (PSP) AND ITS APPLICATION ON SIDE-CHAIN MODELING

Mingyang Lu[1], Athanasios Dousis[2], and Jianpeng Ma[1,2]
[1]Verna and Marrs McLean Department of Biochemistry and Molecular Biology,
Baylor College of Medicine, One Baylor Plaza, Houston, TX 77030
[2]Department of Bioengineering, Rice University, Houston, TX 77005

IB–7 **9:00–9:10 a.m.**

LABEL-FREE DETECTION OF DNA HYBRIDIZATION USING SURFACE ENHANCED RAMAN SPECTROSCOPY

Aoune Barhoumi[1,3], Dongmao Zhang[2,3] and N. J. Halas[1,2,3]
[1]Department of Chemistry, [2]Department of Electrical and Computer Engineering [3]Laboratory for Nanophotonics
Rice University, Houston, Texas

IB–8 **9:10–9:20 a.m.**

MEASURING DIPOLE DENSITY OF ZWITTERIONIC LIPID MEMBRANES BY ATOMIC FORCE MICROSCOPE

Yi Yang, Kathryn M. Mayer, Jason H. Hafner
Department of Physics & Astronomy, Department of Chemistry, Rice University

IB–9 **9:20–9:30 a.m.**

AN LSPR-BASED IMMUNOASSAY

K. Mayer, A. Fuentes, S. Lee, B. Rostro, and J. Hafner
Department of Physics and Astronomy, Rice University, Houston, TX

IB–10 **9:30–9:40 a.m.**

SPECTROSCOPIC STUDIES ON CONFORMATIONAL CHANGES OF APTAMER INDUCED BY TARGET MOLECULES

O. Neumann[1,2,3], D. Zhang[1,3], S. Lal[1,2,3], A. Barhoumi[3,4], J. D. Hartgerink[3,4], and N. J. Halas[1,3,4]
[1]Department of Electrical and Computer Engineering, [2]Rice Quantum Institute, [3]Laboratory for Nanophotonics,
[4]Department of Chemistry
Rice University, Houston, Texas

IB–11 **9:40–9:50 a.m.**

MICROFABRICATED DEVICES FOR CONTROL OF ELECTRIC AND MAGNETIC FIELDS ON CELLULAR LENGTH SCALES

Daniel Stark[1], Laura Timmerman[3], Lisa Biswal[3], Robert Raphael[2], Thomas Killian[1]
[1]Department of Physics and Astronomy [2]Department of Bioengineering, [3]Department of Chemical Engineering
Rice University, Houston, TX 77005

Morning Break
9:50 - 10:10 a.m.
Refreshments in Duncan Hall Lobby

IIA. Carbon Nanotubes
10:10 a.m.
Duncan Hall 1064

IIA–1 10:10–10:20 a.m.

30 MeV AND 40 MeV PROTON RADIATION EFFECTS ON FUNCTIONALIZED CARBON NANOTUBES

M. X. Pulikkathara[a], R. Wilkins[b], Beatriz Brando[c], Branon Veal[d], Y. Lu[e], J. Li[e], M. Meyyappan[e], V. N. Khabashesku[a]
[a] Department of Chemistry and Smalley Institute for Nanoscale Science and Technology, Rice University, Houston, TX; [b] Department of Electrical Engineering and Center for Applied Radiation Research, Prairie View A&M University, Prairie View, TX; [c] Harvard University, Boston, MA; [d] Texas A&M University, College Station, TX; [e] NASA Ames Research Center, Center for Nanotechnology, Moffett Field, CA.

IIA–2 10:20–10:30 a.m.

BULK AND SINGLE-MOLECULE REACTIONS OF SINGLE-WALLED CARBON NANOTUBES WITH ARENE DIAZONIUM SALTS AS MONITORED BY FLUORESCENCE QUENCHING

Condell D. Doyle[1], John-David R. Rocha[1], Dmitri A. Tsyboulski[1], Laurent Cognet[1], James M. Tour[1,2], and R. Bruce Weisman[1]
Departments of Chemistry[1] and Mechanical Engineering and Materials Science[2], Center for Biological and Environmental Nanotechnology, and R. E. Smalley Institute for Nanoscale Science and Technology
Rice University, 6100 Main St., Houston, TX 77005, USA

IIA–3 10:30–10:40 a.m.

TERAHERTZ DYNAMIC CONDUCTIVITY OF METALLIC SINGLE-WALLED CARBON NANOTUBES

L. Ren, D. J. Hilton, X. Wang, and J. Kono
Department of Electrical and Computer Engineering, Rice University, Houston, TX, USA

IIA–4 10:40–10:50 a.m.

MAGNETIC BRIGHTENING OF DARK EXCITONS IN (6,5) SINGLE-WALLED CARBON NANOTUBES

J. Shaver[1], T. A. Searles[1], D. H. Hilton[1], J. Kono[1], J. A. Fagan[2], E. K. Hobbie[2], S. A. Crooker[3]
[1]Department of Electrical and Computer Engineering, Rice University, Houston, TX.
[2]National Institute of Standards and Technology, Gaethersburg, MD.
[3]National High Magnetic Field Laboratory, Los Alamos, NM.

IIA–5 10:50–11:00 a.m.

SPECTROSCOPIC STUDIES OF AXIAL STRAIN AND LOAD TRANSFER FOR SINGLE-WALLED CARBON NANOTUBES IN A POLYMER MATRIX

Tonya K. Leeuw, Dmitri A. Tsyboulski, Pavel N. Nikolaev, Sergei M. Bachilo, Sivaram Arepalli and R. Bruce Weisman
Department of Chemistry, Rice University, Houston Texas, ERC Inc and NASA Johnson Space Center, Houston, TX

IIA–6 **11:00–11:10 a.m.**

GROWTH AND REGROWTH OF MILLIMETER LONG, VERTICALLY ALIGNED ARRAYS OF SINGLE-WALL CARBON NANOTUBES

Cary Pint, Sean Pheasant, Nolan Nicholas, Matteo Pasquali, and Robert Hauge
Richard E. Smalley Institute for Nanoscale Science and Technology

IIA–7 **11:10–11:20 a.m.**

MICRO-PHOTOLUMINESCENCE SPECTROSCOPY OF CARBON NANOTUBES IN MAGNETIC FIELDS

Ajit Srivastava and Junichiro Kono
Department of Electrical and Computer Engineering, Rice University

IIA–8 **11:20–11:30 a.m.**

ENERGY TRANSFER IN PORPHYRIN/CARBON NANOTUBE COMPLEXES: SEARCHING FOR NANOTUBE TRIPLET EXCITONS

John P. Casey, Sergei M. Bachilo, and R. Bruce Weisman
Department of Chemistry, Richard E. Smalley Institute for Nanoscale Science and Technology, and Center for Biological and Environmental Nanotechnology
Rice University, Houston Texas

IIA–9 **11:30–11:40 a.m.**

TWO-COLOR PUMP-PROBE SPECTROSCOPY OF SINGLE-WALLED CARBON NANOTUBES IN THE DILUTE LIMIT

L.G. Booshehri, D. J. Hilton, E. H. Hároz, and J. Kono
Department of Electrical and Computer Engineering, Rice University

IIA–10 **11:40–11:50 a.m.**

EFFECT OF TEMPERATURE ON NEAR-IR FLUORESCENCE OF SEMICONDUCTING SINGLE-WALLED CARBON NANOTUBES

Saunab Ghosh, Sergei M. Bachilo, Anton Naumov, and
R. Bruce Weisman.
Department of Chemistry and Smalley Institute for Nanoscale Science and Technology
Rice University, Houston, TX

IIA–11 **11:50 a.m–12:00 p.m.**

BROWNIAN DYNAMICS SIMULATIONS OF SINGLE-WALL CARBON NANOTUBE SEPARATION BY TYPE USING DIELECTROPHORESIS

Manuel J. Mendes, Howard K. Schmidt and Matteo Pasquali
Richard E. Smalley Institute for Nanoscale Science and Technology, Rice University, 6100 Main Street, Houston, Texas 77005, USA

IIB. Atomic, Molecular and Optical Physics

10:10 a.m.

McMurtry Auditorium

IIB–1 **10:10–10:20 a.m.**

TEMPERATURE DEPENDENT STUDIES OF NEGATIVE ION LIFETIMES

M. Cannon, Y. Liu, L. Suess, F. B. Dunning
Department of Physics, Rice University, Houston, TX

IIB–2 10:20–10:30 a.m.

ENGINEERING RYDBERG WAVEPACKETS USING A CHIRPED HALF-CYCLE PULSE TRAIN

Jeff Mestayer, B.Wyker, J. C. Lancaster, F. B. Dunning,
[1] Department of Physics and Astronomy and the Rice Quantum Institute, Rice University, Houston, Texas 77005-1892, USA

IIB–3 10:30–10:40 a.m.

ELECTRIC DIPOLE ECHOES IN RYDBERG ATOMS†

J. J. Mestayer, B. Wyker, W. Zhao, J. C. Lancaster, and F. B. Dunning
Department of Physics and Astronomy and the Rice Quantum Institute, Rice University, Houston, TX
S. Yoshida and J. Burgdörfer
Institute for Theoretical Physics, Vienna University of Technology, Vienna, Austria
C. O. Reinhold
Physics Division, Oak Ridge National Laboratory, Oak Ridge, TN

IIB–4 10:40–10:50 a.m.

IONIZATION OF XENON RYDBERG ATOMS AT OXIDIZED Si(100) SURFACES

D. Neufeld, H. Dunham, J. Lancaster, F. B. Dunning
Department of Physics and Astronomy, Rice University, Houston, Texas

IIB–5 10:50–11:00 a.m.

BISTABILITY IN RESONANT FERMI SUPERFLUID

Lei Jiang[1], Han Pu[1] , Andrew Robertson[2], Hong Y. Ling[2]
[1]Department of Physics and Astronomy, and Rice Quantum Institute, Rice University, Houston, TX 77251-1892, USA
[2]Department of Physics and Astronomy, Rowan University, Glassboro, New Jersey *08028-1700*

IIB–6 11:00–11:10 a.m.

LOADING DYNAMICS AND CHARACTERISTICS OF A FAR OFF-RESONANCE OPTICAL DIPOLE TRAP

Pascal G. Mickelson, Y.N. Martinez, S.B. Nagel, and T.C. Killian,
Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, Texas.

IIB–7 11:10–11:20 a.m.

FLUORESCENCE SPECTROSCOPY AND SELF-SIMILAR EXPANSION STUDIES IN ULTRACOLD NEUTRAL PLASMAS

J. A. Castro, H. Gao, P. Gupta, S. Laha, C. E. Simien and T. C. Killian
Department of Physics and Astronomy and Rice Quantum Institute,
Rice University, Houston, TX 77005, USA

IIB–8 11:20–11:30 a.m.

OPTICAL PUMPING IN ULTRACOLD NEUTRAL PLASMA

H. Gao, J. Castro, C.E. Simien, S. Laha, and T.C. Killian
Rice University, Department of Physics and Astronomy, Houston, TX 77005

IIB–9 11:30–11:40 a.m.

CALCULATING EXCITATION ENERGIES OF PERIODIC SYSTEMS

Edward N. Brothers and Gustavo E. Scuseria
Department of Chemistry, Mail Stop 60
Rice University, Houston, Texas 77005-1892

Poster Session & Lunch

12:00–1:00 p.m.

Duncan Hall Lobby

P–1

FABRICATION OF NANODOTS USING MICROPHASE SEPARATION OF BLOCK COPOLYMER

A. Bradshaw, T. Tanaka, N. Takeyasu, A. Taguchi, S. Kawata
Nanophotonics Laboratory, RIKEN, Wako, Japan

P–2

USING RAMAN SPECTROSCOPY TO IDENTIFY METALLIC SWNTs

S. Wiele and C. Kittrell
Rice Quantum Institute, Carbon Nanotechnology Laboratory, Rice University, Houston, Texas

P–3

FABRICATION AND CHARACTERIZATION OF InAs BALLISTIC RECTIFIERS

N. Brooks, M. Koyama, S. Sasa, T. Maemoto, and M. Inoue
Prof. Shigehiko Sasa & Prof. Masataka Lab, Osaka Institute of Technology

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Construction of a Mechanically Controllable Break Junction for Studies of Electronic Properties on the Atomic/ Molecular Scale

Nicholas King and Dr. Doug Natelson
Department of Physics and Astronomy, Rice University, Houston, Texas

P–5

FORMING NANOSCALE METAL OBJECTS USING EVAPORATIVE VAPOR DEPOSITION ON A FOCUSED ION BEAM MILLED SUBSTRATE

M. Carlson, Y. Saito, T.Ichimura, S.Yasugi, S Kawata
Laboratory for Scientific Instrumentation and Engineering, Osaka University, Osaka, Japan

P–6

LSPR BIOSENSORS FOR ANTIBODY-ANTIGEN AND LIPID SYSTEMS ON GOLD NANORODS

A. Fuentes, K. Mayer, J. Hafner
Department of Physics & Astronomy, Rice University, Houston, Texas.

P–7

MEASURING THE SPATIAL RESOLUTION OF THE LASER TERAHERTZ EMISSION MICROSCOPE SYSTEM

K. Charan, S. Kim, M. Tonouchi
Institute of Laser Engineering, Osaka University, Osaka, Japan

P–8

CHARACTERIZATION OF dsDNA-POLYPEPTIDE INTERACTIONS FOR NANOSHELL-BASED GENE DELIVERY APPLICATIONS

R. Kellogg[1,3], O. Neumann[1,2,3], D. Zhang[1,3], A. Barhoumi[3,4], F. Wei[3,4], J. D. Hartgerink[3,4], and N. J. Halas[1,3,4]
[1]Department of Electrical and Computer Engineering, [2]Rice Quantum Institute, [3]Laboratory for Nanophotonics, [4]Department of Chemistry, Rice University, Houston, Texas

P–9

OBSERVING INTRINSIC TRANSPORT PROPERTIES OF SINGLE-CRYSTAL ORGANIC SEMICONDUCTORS USING AIR-GAP DIELECTRIC FETS

C. Corcoran, T. Takenobu, and Y. Iwasa
Institute for Materials Research, Tohoku University, Sendai, Japan

P–10

EFFECTS OF AN OPTICAL RANDOM POTENTIAL ON A 1D BOSE-EINSTEIN CONDENSATE

J. Hougland, H. Pu, S. Bhongale and H. Lu
Department of Physics, Rice University, Houston, Texas

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A SPECTRAL WAVELET ALGORITHM FOR SOLVING MAXWELL'S EQUATIONS

M. Turner, R. Acevedo, R. Lombardini, B. R. Johnson
Rice Quantum Institute, Rice University, Houston, Texas

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GRAPHENE AS A SUPERCONDUCTING WEAK LINK

Valla Fatemi, Tsubasa Ishizaki, Konishi Keita, Kanji Yoh
Research Center for Integrated Quantum Electronics, Hokkaido University, Sapporo, Japan

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COUPLED ATOM-MOLECULE ON A RING

Luca Sabbatini and Han Pu
Department of Physics and Astronomy, Rice University, Houston, Texas

P–14

DETECTION AND MANIPULATION OF NUCLEAR SPINS VIA ELECTRICAL AND OPTICAL METHODS

S. Goebel, J. Hayakawa, G. Yusa
Department of Physics, Tohoku University, Sendai, Japan

P–15

WAVELENGTH DEPENDENCE OF SURFACE-ENHANCED RAMAN SCATTERING (SERS) ON 1-DODECANETHIOL AND GOLD NANOSPHERES

T. Kinney, J. L. Kinsey, C. Kittrell, B.R. Johnson
Rice Quantum Institute, Rice University, Houston, Texas

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CATALYST LOCATION FOR CONTINUED GROWTH OF SINGLE-WALLED CARBON NANOTUBES

B. Zientek, C. Pint, N. Nicholas, and C. Kittrell
Carbon Nanotechnology Laboratory, Rice Quantum Institute, Houston, Texas

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IDENTIFYING NANOTUBE PERMITTIVITY THROUGH MICROWAVE CAVITY TECHNIQUES

A. Head, Y. Oshima, and H. Nojiri
Institute for Materials Research, Tohoku University, Sendai, Japan

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SPECTROSCOPIC ANALYSIS OF SINGLE-WALLED CARBON NANOTUBES SORTED BY DENSITY-GRADIENT ULTRACENTRIFUGATION

Liang Liu, Yuhei Miyauchi, Zhengyi Zhang, Junichiro Shiomi and Shigeo Maruyama
Department of Mechanical Engineering, The University of Tokyo, Tokyo, Japan

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THERMAL EVAPORATION SYSTEM FOR ANTI-REFLECTION COATING OF LASER DIODES

M. Martinetti, A. Shashi, J. Hitchcock, T. Killian, R. G. Hulet
Department of Physics and Astronomy, Rice University, Houston, Texas.

P–20

MEASUREMENT AND SIMULATION OF I-V PROPERTIES OF TRIPLE BARRIER RESONANT TUNNELING DIODE

Jeffrey Russom, Kristjan Stone and Takaaki Koga
Nanoelectronics Laboratory, Graduate School of Information Science and Technology,
Hokkaido University, Sapporo, Japan

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ALKANEDITHIOL MEDIATED FABRICATION OF Au NANOSHELL DIMERS

Luis I. Hernandez[4], Britt Lassiter[1,4], Naomi J. Halas[2,3,4]
[1]Department of Physics and Astronomy, [2]Department of Chemistry, [3]Department of Electrical and Computer Engineering, and [4]Laboratory for Nanophotonics
Rice University, Houston TX

P–22

THE EFFECT OF THE CHANGING TEMPERATURE AND CATALYST ON THE GROWTH OF CARBON NANOTUBES

Kanes Sutuntivorakoon, Kazunori Fujisawa, and Morinobu Endo
Department of Electrical and Electronic Engineering
Shinshu University, Nagano, Japan

P–23

RAMAN SPECTROSCOPY OF GRAPHENE IN HIGH MAGNETIC FIELDS

A. Edwards, E H. Haroz, A. Srivastava, and J. Kono
Department of Electrical and Computer Engineering, Rice University, Houston, Texas

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THE EFFECT OF A NEMATIC LIQUID CRYSTAL ENVIRONMENT ON THE CONFORMATION OF MEH-PPV AS A FUNCTION OF POLYMER CHAIN LENGTH

David Solis Jr.[1], Alexei Tcherniak[1], Andrew Tangonan[2], T. Randall Lee[2], Stephan Link[1]
[1]Department of Chemistry, Rice University, Houston, Texas
[2]Department of Chemistry, University of Houston, Houston, Texas

P–25

INTRODUCTION OF GOLD ION SOLUTION INTO LIVING CELLS: UPTAKE MECHANISM AND APPLICATIONS

P. Thompson, S. Fujii, N. Smith, K. Fujita, S. Kawata
Laboratory for Scientific Instrumentation and Engineering, Osaka University, Suita, Japan

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FREQUENCY STABILIZATION OF LASERS USING TUNABLE ATOMIC VAPOR LASER LOCK

A. Shashi, T. Killian, S. Nagel, P. Mickelson, Y. Martinez and A. Traverso
Physics & Astronomy Department, Rice University, Houston, Texas.

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PROBING THE SOLID-LIQUID PHASE TRANSITION IN N-OCTADECANE WITH TERAHERTZ TIME-DOMAIN SPECTROSCOPY

Aaron Hallquist[1], Jonathan Laib[2], and Daniel Mittleman[1]
[1]Department of Electrical and Computer Engineering
[2]Department of Chemistry
Rice University

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OPTICAL REPUMPING OF ^{88}SR

A. Dunn, T. Killian, A. Traverso, S. Nagel, N. Martinez, P. Mickelson
Department of Physics and Astronomy, Rice University, Houston, Texas

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ELECTRONIC TRANSPORT PROPERTIES OF POLY 3-HEXYLTHIOPHENE AND TIP-PENTACENE

L. Quon[1], J. Worne[1] and D. Natelson[1,2]
[1]Department of Electrical and Computer Engineering, Rice University
[2]Department of Physics and Astronomy, Rice University

P–30

DEVELOPMENT OF ISOTOPIC SPIN AND FIELD EFFECT TRANSISTOR QUANTUM COMPUTERS

A. Walker, Y. Shimizu, Y. Shiren, Y. Kawamura, J. Ozawa, K. Itoh
Department of Applied Physics And Physico-Informatic, Keio University, Tokyo, Japan

P–31

THE EFFECT OF POLY(ETHYLENE GLYCOL) ON GIANT UNILAMELLAR VESICLE SURFACE AREA AS AN INDICATION OF ITS ROLE IN LIPID MEMBRANE FUSION

Jeffrey Tang, Yen Sun, Huey Huang
Physics and Astronomy Department, Rice University, Houston, Texas

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A STUDY ON THE NUCLEATION OF FERROMAGNETIC MnSB CRYSTALLITES ON A GaAs (001) SURFACE

Yiming Wang, Yusuke Ogawa, and Hiro Munekata
Imaging and Science Engineering Laboratory, Tokyo Institute of Technology, Tokyo, Japan

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NEAT SINGLE WALLED CARBON NANOTUBE FIBER PROCESSING

J. Allison, R. Booker, C. Pint, W.F. Hwang, M. Pasquali
Department of Chemistry, Rice University, Houston, Texas

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OPTIMIZATION OF FABRICATION OF ATOMIC SCALE GOLD JUNCTION BY ELECTROPLATING USING A COMMON DISINFECTANT

S. Woo*§, A. Umeno§, and K. Hirakawa§
*Department of Electrical engineering, University of Pittsburgh, Pittsburgh, USA
§Department of Electrical engineering, University of Tokyo, Tokyo, Japan

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EXTERNAL CAVITY DIODE LASER FOR NARROW LINEWIDTH COOLING OF Li

J. Bernier, D. Dries, T. Paprotta, and R. G. Hulet
Department of Physics and Astronomy, Rice University, Houston, Texas

P–36

THE MOLECULAR MECHANISM OF HEARING: A BIOCHEMICAL APPROACH

Lisa Atkins, Louise Organ, Ramsey Kamar and R. Raphael
Raphael Auditory and Membrane Bioengineering Group

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SPECTRAL MANIFESTATIONS OF CONTROLLABLE CHEMICAL REACTIONS IN SINGLE-WALLED CARBON NANOTUBES

Kenneth M. Evans, Sergei M. Bachilo and R. Bruce Weisman
Department of Chemistry and R. E. Smalley Institute of Nanoscale Science and Technology, Rice University, Houston, TX

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CONSTRUCTION OF A WIDE-FIELD FOUR-COLOR FLUORESCENCE MICROSCOPE

C. T. Bucher, R. F. Curl, K. Daly, C. H. Moran, and M. Thakur
Department of Chemistry and Rice Quantum Institute, Rice University, Houston, TX

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TRACKING NANOCARS USING SINGLE MOLECULE SPECTROSCOPY

Kevin Claytor, Saumyakanti Khatua, Jason Guerrero, James M. Tour, and Stephan Link
Department of Chemistry, Rice University, Houston, Texas

P–40

SIMPLE CALCULATION AND VISUALIZATION OF CARBON NANOTUBE BAND STRUCTURE

G. Zhelezov and R. Saito
Department of Physics, Tohoku University, Sendai, Japan

P–41

OPTO-MECHANICAL MOTION IN COMPLEX NIPAAm-co-Am POLYMER STRUCTURES

Mel Hainey, Jr.[1, 3], Joseph Cole[1, 3], Carly Levin[2, 3], Naomi Halas[1, 2, 3]
[1] Department of Electrical and Computer Engineering, Rice University
[2] Department of Chemistry, Rice University
[3] Laboratory for Nanophotonics, Rice University

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REDUCTION OF SINGLE-WALLED CARBON NANOTUBE BUNDLING VIA DENSITY GRADIENT ULTRACENTRIFUGATION SEPARATION

T. Yang, W. D. Rice, E. H. Hároz, and J. Kono
Department of Electrical & Computer Engineering, Rice University, Houston, TX 77005

IIIA. Nanophotonic/Plasmonic Physics

1:00 p.m.

McMurtry Auditorium

IIIA–1 1:00–1:10 p.m.

2D HEXAGONAL ARRAYS OF Au NANOSHELLS AS INTEGRATED SUBSTRATES FOR SURFACE ENHANCED SPECTROSCOPY STUDIES

Fei Le, Hui Wang, Janardan Kundu, Naomi Halas, Peter Nordlander
Dept. of Physics and Astronomy
Dept. of Chemistry
Rice University, Houston, Texas, 77005

IIIA–2 1:10–1:20 p.m.

NANOPARTICLE-MEDIATED COUPLING OF LIGHT INTO A NANOWIRE

M.W. Knight,[1,4] N.K. Grady,[1,4] R. Bardhan,[2,4] F. Hao,[3,4] P. Nordlander,[1,3,4] N.J. Halas[1,2,4]
[1]Department of Electrical and Computer Engineering, [2]Department of Chemistry,
[3]Department of Physics and Astronomy, [4]Laboratory for Nanophotonics, Rice University, Houston, Texas

IIIA–3 1:20–1:30 p.m.

EFFICIENT DIELECTRIC FUNCTION FOR FDTD SIMULATION OF THE OPTICAL PROPERTIES OF SILVER AND GOLD NANOSTRUCTURES

Feng Hao, Peter Nordlander
Department of Physics and Astronomy, MS 61, Laboratory for Nanophotonics
Rice University, Houston, TX 77005-1892, USA

IIIA–4 1:30–1:40 p.m.

TETRAMERS: A NEW APPROACH TO NEGATIVE-INDEX METAMATERIALS

D. W. Brandl*, P. Nordlander*, Yaroslav A. Urzhumov** and Gennady Shvets**
*Dept. of Physics and Astronomy, M.S. 61, Rice University, P.O. Box 1892, Houston, TX 77251
**Dept. of Physics, The University of Texas at Ausin, Austin, TX 78712

IIIA–5 1:40–1:50 p.m.

PLASMONIC PROPERTIES OF NANOROD DIMERS

Britain A. Willingham, D. W. Brandl and Peter Nordlander
Dept. of Physics and Astronomy, Rice University 6100 Main Street, Houston, TX 77005

IIIA–6 1:50–2:00 p.m.

PLASMONIC PROPERTIES OF NANOSTRUCTURED METALLIC FILMS

T.-H. Park and P. Nordlander
Department of Physics and Astronomy Rice University, Houston, TX 77005-1892, USA

IIIA–7 2:00–2:10 p.m.

PLASMON-ENHANCED TERAHERTZ NEAR-FIELD MICROSCOPY

Victoria Astley, Hui Zhan, and Daniel M. Mittleman
Department of Electrical and Computer Engineering, Rice University, Houston, TX
Feng Hao and Peter Nordlander
Department of Physics and Astronomy, Rice University, Houston, TX

IIIA–8 2:10–2:20 p.m.

CONTROLLED LOADING OF Au NANOPARTICLES INTO SUBMICRON HOLES

Nikolay A.Mirin[1,3], Mel Hainey Jr[2,3], and Naomi J.Halas[1,2,3]
[1]Department of Chemistry, Rice University
[2]Department of Electrical and Computer Engineering, Rice University
[3]Laboratory for Nanophotonics, Rice University

IIIA–9 2:20–2:30 p.m.

SURFACE ENHANCED INFRARED ABSORPTION SPECTROSCOPY (SEIRA) USING INFRARED RESONANT Au NANOSHELL AGGREGATE SUBSTRATES

J. Kundu[1,2], F. Le[2,3], O. Neumann[2,4], P. Nordlander[2,3], and N. J. Halas[1,2,5]
[1]Department of Chemistry, [2]Laboratory for Nanophotonics, [3]Department of Physics and Astronomy, [4]Department of Applied Physics, and [5]Department of Electrical and Computer Engineering
Rice University, 6100 Main St., Houston, TX 77005

IIIA–10 2:30–2:40 p.m.

PLASMONIC COUPLING OF A GOLD COLLOID AND A GOLD FILM

A.T. Chang, F. Le, F. Tam, N. J. Halas, P. Nordlander, K.F. Kelly
Department of Electrical and Computer Engineering, Rice University

IIIA–11 2:40–2:50 p.m.

THE FINITE-DIFFERENCE TIME-DOMAIN (FDTD) STUDY OF ELECTROMAGNETIC ENHANCEMENTS AND HOTSPOTS IN ELECTROMIGRATED GAPS

Y. Wu, D. Ward, D. Natelson, and P. Nordlander
Laboratory for Nanophotonics, Rice University, Houston, Texas, USA

IIIB. Atomic, Molecular and Optical Physics

1:00 p.m.

Duncan Hall 1064

IIIB–1 1:00–1:10 p.m.

SIMULATION AND OPTIMIZATION OF EVAPORATIVE COOLING OF BOSONIC ^{7}LI ATOMS IN AN OPTICAL DIPOLE TRAP

Shuaiping Ge, Yong P. Chen, Randall G. Hulet
Department of Physics and Astronomy, Rice University

IIIB–2 1:10–1:20 p.m.

A MEASUREMENT OF THE INTERATOMIC INTERACTIONS IN A ^{7}LI BOSE-EINSTEIN CONDENSATE

D. Dries, M. Junker, J. Hitchcock, C. Welford, Y.P. Chen, and R.G. Hulet
Department of Physics and Astronomy, Rice University, Houston, Texas

IIIB–3 1:20–1:30 p.m.

PHASE DIAGRAM OF A POLARIZED FERMI GAS IN THE BEC-BCS CROSSOVER

Y. A. Liao, W. Li, G. B. Partridge, R. G. Hulet
Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005

IIIB–4 1:30–1:40 p.m.

PHOTOASSOCIATION OF A BOSE-EINSTEIN CONDENSATE NEAR A FESHBACH RESONANCE

M. Junker, D. Dries, Y. Chen, C. Welford, J. Hitchcock and R.G. Hulet
Physics and Astronomy Department and the Rice Quantum Institute

IIIB–5 1:40–1:50 p.m.

A DIODE LASER SYSTEM FOR THE TRAPPING OF FERMIONIC ^{6}LI

C. Welford, D. Dries, M. Junker, J. Hitchcock, Y. Chen and R.G. Hulet
Physics and Astronomy Department and the Rice Quantum Institute

IIIB–6 1:50–2:00 p.m.

A SIDE OF FILTER TECHNIQUE FOR FREQUENCY OFFSET LOCKING OF LASERS

T. Paprotta, C. J. Welford, D. Dries, and R. G. Hulet
Rice University Department of Physics & Astronomy and Rice Quantum Institute, Rice University, Houston, Texas

IIIB–7 2:00–2:10 p.m.

BEC "LEVEL" FOR MEASURING SMALL FORCES

[1]S.G. Bhongale[1] and Eddy Timmermans[2]
[1]Rice University, Houston., [2]Los Alamos National Laboratory, NM

IIIB–8 2:10–2:20 p.m.

ROTON INSTABILITY IN DIPOLAR CONDENSATES

H. Lu and H. Pu
Department of Physics & Astronomy, Rice University, Houston, Texas, USA

Afternoon Break
2:50 - 3:10 p.m.
Refreshments in Duncan Hall Lobby

IVA. Quantum Materials/Magnetism

3:10 p.m.

McMurtry Auditorium

IVA–1 3:10–3:20 p.m.

QUANTIZED CONDUCTION IN STM CREATED GOLD BREAK JUNCTIONS

Patrick Wheeler, Andrew Koller, and Douglas Natelson
Department of Physics Rice University

IVA–2 3:20–3:30 p.m.

TERAHERTZ APERTURELESS NEAR-FIELD MICROSCOPY OF A VANADIUM DIOXIDE THIN FILM

Hui Zhan[1], Victoria Astley[1], Daniel M. Mittleman[1], Y. Lim[2]
[1]Department of Electrical and Computer Engineering, Rice University, USA
[2]Department of Applied Physics, Konkuk University, Republic of Korea

IVA–3 3:30–3:40 p.m.

MAGNETO-OPTICAL KERR SPECTROSCOPY OF FERROMAGNETIC GaMnAs

C. Sun and J. Kono
Department of Electrical and Computer Engineering, Rice University
H. Munekata
Imaging Science and Engineering Laboratory, Tokyo Institute of Technology
L. Cywinski and L. J. Sham
Department of Physics, University of California, San Diego

IVA–4 3:40–3:50 p.m.

ELECTRON PARAMAGNETIC RESONANCE OF INDIVIDUALIZED SINGLE-WALLED CARBON NANOTUBES

W. D. Rice[1], M. Fabian[1], S. Cox[2], R. McDonald[2], Q. Si[1], J. Kono[1]
[1]Rice University, Houston, Texas 77005, USA
[2]Los Alamos National Lab, Los Alamos, New Mexico 87544, USA

IVA–5 3:50–4:00 p.m.

DIFFUSION OF MAGNETITE NANOPARTICLES STUDIED BY FLUORESCENCE CORRELATION SPECTROSCOPY

Alexei Tcherniak, Arjun Prakash, Vicki L. Colvin, Stephan Link
Department of Chemistry, Rice University, Houston, TX

IVA–6 4:00–4:10 p.m.

MEASURING CYCLOTRON RESONANCE LINEWIDTHS IN A 2-DIMENSIONAL ELECTRON SYSTEM THROUGH TIME-DOMAIN THz SPECTROSCOPY

X. Wang, D. J. Hilton, L. Ren, D. M. Mittleman, J. Kono, and J. L. Reno
Department of Electrical and Computer Engineering, Rice University

IVA–7 4:10–4:20 p.m.

LOW TEMPERATURE MAGETOTRANSPORT ON A RASHBA TWO-DIMENSIONAL ELECTRON GAS IN InP/$In_{0.53}Ga_{0.47}As$ QUANTUM WELLS

Yanhua Dai, Zhuoquan Yuan, and Rui-Rui Du
Department of Physics and Astronomy, Rice Quantum Institute , Rice University

IVA–8 4:20–4:30 p.m.

LOW TEMPERATURE SCANNING HALL PROBE MICROSCOPY OF 2D ELECTRON NANOSTRUCTURES

Z. Q. Yuan, and R. R. Du
Department of Physics and Astronomy, Rice University, Houston, USA
Rice Quantum Institute, Rice University, Houston, USA

IVA–9 4:30–4:40 p.m.

LOCAL SPECTRAL WEIGHT OF A LUTTINGER LIQUID: EFFECTS FROM EDGES AND IMPURITIES

Paata Kakashvili[1,2], Henrik Johannesson[3], and Sebastian Eggert [1,4]
[1]Department of Applied Physics, Chalmers University of Technology, Göteborg, Sweden
[2]Department of Physics and Astronomy, Rice University, Houston, TX , USA
[3]Department of Physics, Göteborg University, Göteborg, Sweden
[4]Department of Physics, University of Kaiserslautern, Kaiserslautern, Germany

IVA–10 4:40–4:50 p.m.

HEAVY FERMIONS, THE KONDO LATTICE AND QUANTUM PHASE TRANSITIONS IN STRONGLY CORRELATED SYSTEMS

S. J. Yamamoto and Q. Si
Department of Physics, Rice University, Houston, USA

IVA–11 4:50–5:00 p.m.

SCALING AND ENHANCED SYMMETRY AT THE QUANTUM CRITICAL POINT OF THE SUB-OHMIC BOSE-FERMI KONDO MODEL

Stefan Kirchner and Qimiao Si
Department of Physics & Astronomy
Rice University

IVB. Spectroscopy and Sensing

3:10 p.m.

Duncan Hall 1064

IVB–1 3:10–3:20 p.m.

RESONANT SECOND HARMONIC GENERATION OF MID-INFRARED RADIATION IN InAs/AlSb QUANTUM WELLS

D. T. Morris, J. Kono, A. Belyanin, S. Sasa, and M. Inoue
Department of Electrical and Computer Engineering, Rice University, Houston, TX

IVB–2 3:20–3:30 p.m.

ADVANCED EMBEDDED CONTROL AND DATA ACQUISITION SYSTEM FOR LASER-BASED QUARTZ-ENHANCED PHOTOACOUSTIC SPECTROSCOPY

Stephen G. So[1], Daniel Chang[2], Gerard Wysocki[1], Anatoliy A. Kosterev[1], Frank K. Tittel[1]
[1] Electrical and Computer Engineering Department, Rice University, Houston, Texas USA,
[2] Electrical and Computer Engineering Department, Princeton University, Princeton, New Jersey USA, steveso@rice.edu

IVB–3 3:30–3:40 p.m.

QEPAS BASED DETECTION OF BROADBAND ABSORBING MOLECULES USING A WIDELY TUNABLE, CW QUANTUM CASCADE LASER AT 8.4 µM

Rafal Lewicki, Gerard Wysocki, Anatoliy A. Kosterev, and Frank. K. Tittel.
Rice Quantum Institute, Rice University, 6100 Main St., Houston, TX 77005, USA

IVB–4 3:40–3:50 p.m.

PREDICTION OF SURFACE PROPERTIES OF PLANETARY ICES FROM NEAR-IR REMOTE SENSING SPECTRA WITH NEURAL NETWORKS

Lili Zhang, Erzsébet Merényi
ECE department, Rice University, Houston, TX
William M. Grundy
Lowell Observatory, Flagstaff, AZ
Eliot F. Young
Space Studies Department, Southwest Research Institute, Boulder, CO

IVB–5 3:50–4:00 p.m.

COMPRESSIVE SENSING APPLICATIONS IN IR, CONFOCAL AND RAMAN MICROSCOPY

Ting Sun, Dharmpal Takhar, Jason Laska, Marco Duarte, Richard Baraniuk, Kevin Kelly
Department of Electrical and Computer Engineering, Rice University, Houston, Texas

IVB–6 4:00–4:10 p.m.

TERAHERTZ IMAGING WITH COMPRESSED SENSING AND PHASE RETRIEVAL

W.L. Chan, M.L. Moravec, R.G. Baraniuk, and D.M. Mittleman
Department of Electrical and Computer Engineering, Rice University, Houston, Texas

IVB–7 4:10–4:20 p.m.

TERAHERTZ TIME-DOMAIN SPECTROSCOPY OF LIQUID n-ALKANES

Jonathan Laib[1] and Daniel Mittleman[2]
[1]Department of Chemistry
[2]Department of Electrical and Computer Engineering
Rice University

IVB–8 4:20–4:30 p.m.

VARIATION OF GUIDED RESONANCES IN TERAHERTZ PHOTONIC CRYSTAL SLABS

Tushar Prasad [1, 2], Vicki Colvin [2], Daniel Mittleman [3]
[1] Applied Physics Program, Department of Chemistry
[2] Department of Chemistry
[3] Department of Electrical and Computer Engineering
Rice University, Houston, TX

IVB–9 4:30–4:40 p.m.

A TERAHERTZ DUAL WIRE WAVEGUIDE

M. K. Mbonye, V. Astley, W. L. Chan, J. A. Deibel, D. M. Mittleman
Rice University, Department of Electrical and Computer Engineering, Houston, TX 77251

IVB–10 4:40–4:50 p.m.

CHIRALITY-SELECTIVE ULTRAFAST BAND GAP MODULATION OF SINGLE-WALLED CARBON NANOTUBES VIA COHERENT PHONONS

E.H. Hároz[1], Y.S. Lim[1,2], J. Kono[1]*, J.H. Kim[3], K.J. Han[3], N. J. Kim[3], D. Lee[3], and K.J. Yee[3]*
[1] Department of Electrical & Computer Engineering, Rice University, Houston, TX
[2] Department of Applied Physics, Konkuk University, Chungbuk, Korea
[3] Department of Physics, Chungnam National University, Daejeon, Korea

Barbecue Dinner
5:00 p.m.
Outside Duncan Hall