Fourier Transform Spectroscopy (FTS)

OSA Topical Meeting and Tabletop Exhibit

Collocated with

Digital Holography and Three-Dimensional Imaging (DH)
Hyperspectral Imaging and Sensing of the Environment (HISE)
Novel Techniques in Microscopy (NTM)
Optical Trapping Applications (OTA)

Technical Conference: April 26-30, 2009
Exhibition: April 27-29, 2009
Sheraton Vancouver Wall Centre Hotel
Vancouver, BC, Canada

PDP Submissions Deadline: April 2, 2009, 12:00 p.m. noon, EDT (16.00 GMT)
Housing Deadline: March 25, 2009
Pre-Registration Deadline: April 1, 2009

2009 Meeting Chairs

Peter Bernath, *York Univ.*, *UK,* Chair
Jerome Genest, *Univ. Laval*, *Canada,* Chair

About Fourier Transform Spectroscopy

The FTS topical meeting welcomes all scientists who use or develop Fourier transform spectrometers. Fourier transform spectrometry is the technique of choice in all research areas that require high accuracy, sensitivity, and resolution over a wide spectral range. Its scope includes laboratory, Earth, planetary and astronomical spectroscopy. This meeting is the only international conference covering FTS instrumental development, technology and applications from the submillimeter to the ultraviolet.

Fourier transform spectrometry is the spectroscopic technique of choice in all research areas that require high accuracy, sensitivity, and resolution, and it continues to grow in application and utilization. This is especially true for new research areas, such as meteorology and chemical microscopy, where such attributes are mandatory. This FTS Topical Meeting is the only international conference on Fourier transform spectrometry covering the whole range of FTS technology and applications. Its scope will include laboratory spectroscopy, Earth and planetary remote sensing, and astronomy as well as new instrumental developments.

Topics To Be Considered

- Instrument Technology
  - Novel FTS concepts and designs
  - FTS in the sub-millimeter, infrared, visible, and ultraviolet
  - Time-resolved Fourier transform spectroscopy
  - Imaging Fourier transform spectroscopy
  - FTS using multiheterodyne and frequency combs
  - New technologies for FTS
  - Laboratory instruments
  - Space-based instruments
  - Astronomical instruments
- Analysis
  - New methods for radiometric accuracy
  - New methods for line shape determination

    - New methods for improving frequency accuracy
    - Improvements in atmospheric retrievals
    - New approaches for spectral calibration
    - Observations of particulate and gaseous absorption
- Applications
    - Atomic and molecular spectroscopy
    - FT Raman spectroscopy
    - Medical and biological *in-situ* spectroscopy
    - Earth remote sensing from the ground, air and space
    - Planetary spectroscopy from the ground, air and space
    - Astronomical spectroscopy of the sun, stars, the interstellar medium, and the cosmic background

About Fourier Transform Spectroscopy

This meeting will welcome all researchers who use Fourier transform spectrometry in their work or who have developed competing technologies within the historic application areas of FTS. The wide scope will include innovative techniques and instrumentation, laboratory research, imaging spectroscopy, remote sensing, space from the air and in space. The meeting will focus particularly on new instruments, new applications and new techniques.

Fourier transform spectrometry has been the central method in many research areas that require high accuracy, sensitivity, and resolution and continues grow in usage. Increasingly, Fourier transform spectrometry is becoming the technique of choice in new research areas, such as meteorology and chemical microscopy, where such attributes are needed. The breadth of applicability of FTS provides a common bond between researchers in otherwise disparate fields.

Topics to Be Considered

- Instrument Technology
  - Novel FTS concepts and designs
  - FTS in the sub-millimeter, infrared, visible, and ultraviolet
  - Time resolved Fourier transform spectroscopy
  - Imaging Fourier transform spectroscopy
  - New technologies for FTS
  - Laboratory instruments
  - Space-based instruments
  - Astronomical instruments
- Analysis
  - New methods for radiometric accuracy
  - New methods for line shape determination
  - New methods for improving frequency accuracy
  - Improvements in atmospheric retrievals
  - New approaches used for spectral calibration
  - Simultaneous observations of particulate and gaseous absorption
- Applications
  - Atomic and molecular spectroscopy
  - Raman FT spectroscopy
  - Medical and biological *in- situ* spectroscopy
  - Earth remote sensing from the ground, air and space
  - Planetary spectroscopy from the ground, air and space
  - Astronomy: the sun, stars, the interstellar medium, and the cosmic background

Program Committee

Program Chairs

Peter Bernath, *York Univ, UK*
Jerome Genest, *Univ. Laval, Canada*

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Henry Buijs, *ABB BOMEM Inc., Canada*
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Felix Friedl-Vallon, *Inst. für Meteorologie und Klimaforschung, Germany*
Guy Guelachvili, *Univ. Paris-Sud, France*
Don Jennings, *NASA Goddard Space Flight Ctr., USA*
Akihiko Kuze, *Japan Aerospace Exploration Agency, Japan*
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Chris Manning, *Manning Applied Technology, USA*
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Joe Taylor, *Univ. of Wisconsin-Madison, USA*
Pierre Tremblay, *Univ. Laval, Canada*

Exhibitor Listings

ADVANCES in IMAGING

2009 OSA OPTICS AND PHOTONICS CONGRESS

April 26-30, 2009
Vancouver, BC
Canada

Collated Meetings:

Digital Holography and Three-Dimensional Imaging (DH)

Fourier Transform Spectroscopy (FTS)

Hyperspectral Imaging and Sensing of the Environment (HISE)

Novel Techniques in Microscopy (NTM)

Optical Trapping Applications (OTA)

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The organizers of the Advances in Imaging Congress and Tabletop Exhibit wish to acknowledge the following for their support:

Grants:

- Air Force Office of Scientific Research (AFOSR)
- National Aeronautics and Space Administration (NASA)
- National Institute of Biomedical Imaging and Bioengineering/Department of Health and Human Services / National Institutes of Health
- The OSA Foundation

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Special Events

Meet the Applied Optics Editors Dinner

Date: April 28, 2009
Time: 7:00 PM
Where: The Relish Restaurant & Lounge, 888 Nelson ST. (Between Hornby & Howe), Vancouver, BC, Canada (Website: http://www.relishrestaurants.com/relish/index.asp).

Don’t miss this great opportunity to meet Applied Optics Information Processing Editors:

Prof. T.-C. Poon (Division Editor, Virginia Tech)
Prof. Partha P. Banerjee (Topical Editor, Univ. of Dayton)
Prof. Byoungho Lee (Topical Editor, Seoul National Univ., Korea)

All conference attendees, especially students, are invited to this casual networking dinner. You can sign-up onsite at the OSA Registration Desk at the Grand Ballroom Foyer Coatroom. Please RSVP by Tuesday, April 28 by 1:00 pm. **Please note: Participants pay for their own dinners.**

2009 OSA Optics & Photonics Congress
Advances In Imaging
April 26-30, 2009
Vancouver, British Columbia, Canada

OSA GROUP DINNER

Have Dinner with *Applied Optics* Editors

Students are Welcome!

All OSA conference attendees are invited to a casual networking dinner where you will have the opportunity to meet *Applied Optics Information Processing* Editors:

Prof. T.- C. Poon (Division Editor, Virginia Tech)
Prof. Partha P. Banerjee (Topical Editor, Univ. of Dayton)
Prof. Byoungho Lee (Topical Editor, Seoul National Univ., Korea)

Tuesday, April 28, 2009, 7:00 p.m.

THE RELISH RESTAURANT & LOUNGE
888 Nelson St. (between Hornby & Howe) Vancouver, BC
Website: http://www.relishrestaurants.com/relish/index.asp

Sign up at the OSA Registration Desk
[Grand Ballroom Foyer, Coat Room]
by 1:00 p.m. on Tuesday, April 28

Note: Participants pay for their own dinners

Sponsored by the OSA External Relations Advisory Group

Invited Speakers

Fourier Transform Spectroscopy (FTS)/ Hyperspectral Imaging and Sensing of the Environment (HISE) Joint Session

MIPAS Status and Latest Results, Herbert Fischer; *Inst. für Meteorologie und Klimaforschung, Univ. Karlsruhe, Germany.*

Hyperspectral and Multispectral Infrared Sounding of the Environment: A Brief Overview, Allen Huang; *Univ. of Wisconsin-Madison, USA.*

High Spectral Resolution IR Instrument Developments for CLARREO, Hank Revercomb; *Univ. of Wisconsin-Madison, USA.*

The Total Carbon Column Observing Network, Geoff Toon; *JPL, USA.*

Invited Speakers

Instrumental Aspects of IASI, Denis Blumstein; *Ctr. Natl. d'Etudes Spatiales (CNES), France.*

A FTS for a Future Titan Mission, John Brasunas; *NASA, Goddard Space Flight Ctr., USA.*

An Historical Perspective on the Development of Fourier Transform Spectrometry, Henry Buijs; *ABB BOMEM Inc., Canada.*

Recent Instrument Development at Telops, Martin Chamberland; *Telops Inc., Canada.*

Frequency Comb Spectroscopy, Ian R. Coddington; *NIST, USA.*

A FTS for VUV Absorption Spectroscopy on the Synchrotron DESIRS Beamline: First Results, Nelson de Oliveria; *Synchrotron Soleil, France.*

The Mark 1 Spatial Heterodyne Spectrometer, Laurent Drissen; *Univ. Laval, Canada.*

Airborne / Balloonborne Imaging FTS, Felix Friedl-Vallon; *Inst. für Metorologie und Klimaforschung, Univ. Karlsruhe, Germany.*

Practical and Accurate Frequency Comb Spectroscopy, Jerome Genest; *Univ. Laval, Canada.*

The Doppler Asymmetric Spatial Heterodyne (DASH) Interferometer, John M. Harlander; *St. Cloud State Univ., USA.*

Spatial Heterodyne Spectrometer (SHS), James E. Lawler; *Univ. of Wisconsin, USA.*

A New Lilliputian Generation of Fourier Spectrometer, Étienne Le Coarer; *Univ. Grenoble I, France*.

Recent Laboratory Work Relevant to Atmospheric Science, Johannes Orphal; *Univ. de Paris - 12, France.*

Laboratory Fourier Transform Zeeman Spectroscopy, Amanda Ross; *CNRS & Univ. de Lyon, France.*

HIS and the New CLARREO Mission, Hank Revercomb; *Univ. of Wisconsin-Madison, USA.*

MTG-IRS: Status, Specifications and Technical Concept, Rolf Stuhlmann; *European Organization for the Exploitation of Meteorological Satellites, Germany*

	Grand Ballroom A	*Junior Ballroom D*	*Junior Ballroom C*	*Grand Ballroom B*	*Junior Ballroom A/B*
Sunday, April 26					
3:00 p.m.–6:00 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
Monday, April 27					
7:30 a.m.–6:30 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**DMA • Advances in Digital Holography**	**JMA • FTS/HISE Joint Session**		**NMA • Superresolution I**	**OMA • Transport, Guiding and Sorting**
10:30 a.m.–11:00 a.m.	**Coffee Break,** *Grand Ballroom C/D*				
10:30 a.m.–4:30 p.m.	**Exhibits Open,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.	**DMB • Novel Technologies in Holography (ends at 1:00 p.m.)**	**FMA • James W. Brault Memorial Session**	**HMA • Climate Absolute Radiance and Refractivity Observatory**	**NMB • Superresolution II**	**OMB • Physics Insights by Means of Optical Trapping I**
12:30 p.m.–2:00 p.m.	**Lunch Break (on your own)**				
2:00 p.m.–4:00 p.m.	**JMB • DH/OTA Joint Session**	**FMB • Combs and Static FTS**	**HMB • Clouds and Aerosols I**	**NMC • Nonlinear Microscopy I**	
4:00 p.m.–4:30 p.m.	**Coffee Break/Exhibits,** *Grand Ballroom C/D*				
4:30 p.m.–6:00 p.m.	**DMC • Metrology by Digital Holography and Profilometry (ends at 6:15 p.m.)**	**FMC • Space and Flight Projects**	**HMC • Future Missions and Sensor Calibration**	**NMD • Nonlinear Microscopy II**	**OMC • Physics Insights by Means of Optical Trapping II**
6:30 p.m.–8:00 p.m.	**Conference Reception,** *Junior Ballroom Foyer*				
Tuesday, April 28					
7:30 a.m.–6:30 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**JTuA • DH/NTM Joint Session: Digital Holographic Microscopy**	**FTuA • FTS for Astronomy and Astrophysics**	**HTuA • Interpretation of Hyperspectral/Multispectral Data Through Observations and Simulations**		**OTuA • Biophotonics Applications**
10:30 a.m.–11:00 a.m.	**Coffee Break,** *Grand Ballroom C/D*				
10:30 a.m.–6:00 p.m.	**Exhibits Open,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.	**DTuA • Holographic Microscopy**	**FTuB • Combs, Optical Fiber and Fast-Scanning**	**HTuB • Particle Scattering Models**	**NTuA • Phase Microscopy and Tomography**	**OTuB • Novel Uses and Applications**
12:30 p.m.–2:00 p.m.	**Lunch Break (on your own)**				
2:00 p.m.–4:00 p.m.	**DTuB • Holography Applications**	**FTuC • Gosat and Akari**	**HTuC • New Remote Sensing Perspectives**	**NTuB • Optical Coherence Tomography**	**OTuC • Dynamics of Multiple and Parallel Trapping (ends at 3:30 p.m.)**
4:00 p.m.–4:30 p.m.	**Coffee Break/Exhibits,** *Grand Ballroom C/D*				
4:30 p.m.–6:00 p.m.	**JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session,** *Grand Ballroom C/D*				
6:00 p.m.–6:45 p.m.	**DTuC • Optical Scanning Holography**				

	Grand Ballroom A	*Junior Ballroom D*	*Junior Ballroom C*	*Grand Ballroom B*	*Junior Ballroom A/B*
Wednesday, April 29					
7:30 a.m.–6:30 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**DWA • Three-Dimensional Imaging and Display**	**FWA • Earth Sensing**	**HWA • Hyperspectral IR and Imager Data Analyses (ends at 10:00 a.m.)**	**NWA • New Techniques I**	
10:30 a.m.–11:00 a.m.	**Coffee Break,** *Grand Ballroom C/D*				
10:30 a.m.–12:30 p.m.	**Exhibits Open,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.	**DWB • DH Poster Session,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.		**FWB • Visible and Ultra Violet**	**HWB • Clouds and Aerosols II**	**NWB • Superresolution III**	
12:30 p.m.–2:00 p.m.	**Lunch Break (on your own)**				
2:00 p.m.–4:00 p.m.	**DWC • Computer-Generated Holograms**	**FWC • Spatial Heterodyne**	**HWC • Validation of Cloud and Aerosol Products**	**NWC • Endomicroscopy**	
4:00 p.m.–4:30 p.m.	**Coffee Break,** *Grand Ballroom C/D*				
4:30 p.m.–6:30 p.m.	**DWD • Electro-Holography and Computer-Generated Holography**	**FWD • Laboratory and Miniature FTS (ends at 6:00 p.m.)**	**HWD • Hyperspectral Applications (ends at 6:00 p.m.)**	**NWD • New Techniques II (ends at 5:30 p.m.)**	
Thursday, April 30					
7:30 a.m.–10:30 a.m.	**Registration Open**, *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**FThA • Spectral Imaging,** *Grand Ballroom A*				

Key to Shading	
DH Sessions	No Shading
FTS Sessions	
HISE Sessions	
NTM Sessions	
OTA Sessions	

Fourier Transform Spectroscopy (FTS) Abstracts

• Sunday, April 26, 2009 •

Grand Ballroom Foyer Coatroom
3:00 p.m.–6:00 p.m.
Registration Open

• Monday, April 27, 2009 •

Grand Ballroom Foyer Coatroom
7:30 a.m.–6:30 p.m.
Registration Open

JMA • FTS/HISE Joint Session

Junior Ballroom D
8:30 a.m.–10:30 a.m.
Peter Bernath; Univ. of York, UK, Presider

JMA1 • 8:30 a.m. **Invited**
Hyperspectral and Multispectral Infrared Sounding of the Environment: A Brief Overview, *Allen Huang; Univ. of Wisconsin-Madison, USA.* Hyperspectral and multispectral sensors are the backbone of the atmospheric and surface remote sensing community. Over the past few decades these sensors have provided crucial measurements of the Earth environment from multiple satellite platforms.

JMA2 • 9:00 a.m. **Invited**
MIPAS Aboard ENVISAT: Status and Latest Results, *Herbert Fischer, MIPAS-Team ; Inst. für Meteorologie und Klimaforschung, Univ. Karlsruhe, Germany.* The status of the MIPAS experiment onboard ENVISAT will be described. The latest scientific results will be presented and an outlook will be given.

JMA3 • 9:30 a.m. **Invited**
Total Column Carbon Observing Network (TCCON), *Geoff Toon[1], Jean-Francois Blavier[1], Rebecca Washenfelder[2,3], Debra Wunch[3], Gretchen Keppel-Aleks[3], Paul Wennberg[3], Brian Connor[4], Vanessa Sherlock[4], David Griffith[5], Nick Deutscher[5], Justus Notholt[6]; [1]JPL, Caltech, USA, [2]Earth System Res. Lab, NOAA, USA, [3]Caltech, USA, [4]Natl. Inst. of Water and Air, New Zealand, [5]Univ. of Wollongong, Australia, [6]Univ. of Bremen, Germany.* A network of ground-based, sun-viewing, near-IR, Fourier transform spectrometers has been established to accurately measure atmospheric greenhouse gases such as CO_2, CO, N_2O, and CH_4.

JMA4 • 10:00 a.m. **Invited**
High Spectral Resolution IR Instrument Developments for CLARREO, *Hank E. Revercomb[1], Fred A. Best[1], John A. Dykema[2], Joe Taylor[1], David C. Tobin[1], Robert O. Knuteson[1], Douglas Adler[1], Mark Mulligan[1]; [1]Univ. of Wisconsin-Madison, USA, [2]Harvard Univ., USA.* The infrared component of the CLimate Absolute Radiance Refractivity Observatory (CLARREO) benchmark climate system under development at NASA will include on-orbit standards and test equipment to directly verify very high end-to-end instrument accuracy on-orbit.

Grand Ballroom C/D
10:30 a.m.–11:00 a.m.
Coffee Break/ Exhibits

FMA • James W. Brault Memorial Session

Junior Ballroom D
11:00 a.m.–12:30 p.m.
Jerome Genest; Univ. Laval, Canada, Presider

FMA1 • 11:00 a.m. **Invited**
An Historical Perspective on the Development of Fourier Transform Spectrometry, *Henry Buijs; ABB Bomem Inc., Canada.* Fourier Transform Spectroscopy has achieved considerable maturity since its beginning in the nineteen fifties. Early on it benefitted from a significant sensitivity advantage. Today the precision of measurement achievable is its most important advantage.

FMA2 • 11:30 a.m. **Invited**
HIS and the New CLARREO Mission, *Hank Revercomb, Fred A. Best, David C. Tobin, Robert O. Knuteson, Joe K. Taylor, Dan LaPorte, Steve Dutcher, Bob Holz, Fred Nagle; Univ. of Wisconsin-Madison, USA.* The High-resolution Interferometer Sounder (HIS) aircraft spectrometers have validated the accuracy of IR satellite instruments and helped form a foundation for the CLimate Absolute Radiance and Refractivity Observatory (CLARREO) benchmark climate mission (NRC Decadal Survey).

FMA3 • 12:00 p.m.
Thermal Infrared Spectroscopy of Saturn and Titan from Cassini, *Donald E. Jennings[1], J. C. Brasunas[1], R. C. Carlson[2], F. M. Flasar[1], V. G. Kunde[3], A. A. Mamoutkine[4], C. A. Nixon[3], J. C. Pearl[1], P. N. Romani[1], A. A. Simon-Miller[1], G. L. Bjoraker[1]; [1]NASA Goddard Space Flight Ctr., USA, [2]Catholic Univ. of America, USA, [3]Univ. of Maryland, USA, [4]Adnet Systems, Inc., USA.* The Cassini spacecraft completed its nominal mission at Saturn and Titan in 2008 and began its extended mission. Cassini carries the Composite Infrared Spectrometer that measures composition, thermal structure and dynamics.

FMA4 • 12:15 p.m.
Analysis of the CrIS Flight Model 1 Radiometric Linearity, *Joe K. Taylor, Dave C. Tobin, Henry E. Revercomb, Robert O. Knuteson, Lori Borg, Fred A. Best; Univ. of Wisconsin-Madison, USA.* The CrIS Flight Model 1 has recently completed thermal vacuum testing. Here we present the independent UW-SSEC analyses of various test data to assess the radiometric linearity of the sensor.

12:30 p.m.–2:00 p.m.
Lunch Break (on your own)

FMB • Combs and Static FTS

Junior Ballroom D
2:00 p.m.–4:00 p.m.
Pierre Tremblay; Univ. Laval, Canada, Presider

FMB1 • 2:00 p.m. **Invited**
Frequency Comb Spectroscopy, *Ian R. Coddington, William C. Swann, Nathan R. Newbury; NIST, USA.* A stabilized frequency comb provides a broadband array of highly resolved comb lines. Using a multiheterodyne technique, we measure the amplitude and phase of every comb line, allowing for massively parallel, high-resolution spectroscopy.

FMB2 • 2:30 p.m.
Frequency Comb Fourier Transform Spectroscopy with kHz Optical Resolution, *Patrick Jacquet[1], Julien Mandon[1], Birgitta Bernhardt[2], Ronald Holzwarth[2], Guy Guelachvili[1], Theodor W. Hänsch[2,3], Nathalie Picqué[1]; [1]CNRS, France, [2]Max-Planck-Inst. für QuantenOptik, Germany, [3]Ludwig-Maximilians-Univ. München, Germany.* Michelson-less Fourier spectra, comprising 500,000,000 spectral elements spanning 1 nm with 2.3 kHz (7.7 10^-8 cm^-1) resolution, are recorded within 6s. Moving mirror of equivalent interferometers should cover 130 km at 78,000 km/hour velocity.

FMB3 • 2:45 p.m.
GHz Yb-Fiber Laser Frequency Comb for Spectroscopy Applications, *Ingmar Hartl, H. A. McKay, R. Thapa, B. K. Thomas, A. Ruehl, L. Dong, M. E. Fermann; IMRA America, Inc., USA.* We demonstrate a fully stabilized GHz-spaced Yb-fiber laser frequency comb using a Yb-fiber femtosecond oscillator with 1.04 GHz fundamental repetition rate designed for comb spectroscopy applications.

FMB4 • 3:00 p.m. **Invited**
SWIFTS: A New Lilliputian Family of Fourier Transform Spectrometer, *Étienne Le Coarer; Univ. Joseph Fourier Grenoble I, France.* SWIFTS is a new family of micro-Fourier-spectrometers without any moving part. This is an association of a a set of small detectors that samples a stationary wave in the evanescent field of a single-mode waveguide.

FMB5 • 3:30 p.m.
From the Concept to the Definition of the SIFTI Instrument: Static Infrared Fourier Transform Interferometer, *Philippe Hébert, E. Cansot, C. Pierangelo, C. Buil, F. Brachet, F. Bernard, J. Loesel, T. Trémas, L. Perrin, E. Courau, C. Casteras, I. Maussang; Ctr. Natl. d'Etudes Spatiales, France.* SIFTI, a static interferometer using a pair of crossed staircase fixed mirrors, will provide high quality TIR spectra of O_3 and CO. At phase a mid-term, we review main technical choices, preliminary budgets and performances.

FMB6 • 3:45 p.m.
First Results from *Mistere*, a Cryogenic Static Fourier-Transform Spectroradiometer, *Yann Ferrec, Sylvain Rommeluère, Didier Henry, Nicolas Guérineau; ONERA, France.* Mistere is an infrared spectroradiometer, developed to make field measurements at different incidences. The requirements led to design a cryogenic static Michelson interferometer. We present in this paper the first laboratory results.

Grand Ballroom C/D
4:00 p.m.–4:30 p.m.
Coffee Break/ Exhibits

FMC • Space and Flight Projects

Junior Ballroom D
4:30 p.m.–6:00 p.m.
Akihiko Kuze; Japan Aerospace Exploration Agency, Japan, Presider

FMC1 • 4:30 p.m. **Invited**
MTG-IRS: Status, Specifications and Technical Concept, *Rolf Stuhlmann[1], Antonio Rodriguez[1], Stephen Tjemkes[1], Donny M. Aminou[2], Hendrik Stark[2], Wolfgang Schumann[2]; [1]European Organisation for the Exploitation of Meteorological Satellites, Germany, [2]Directorate of the Earth Observation Programmes, Earth Observation Future Programmes Dept., European Space Agency, Germany.* MTG-IRS will be Europe's first hyperspectral sounder in a geo-stationary orbit. It covers two bands (700-1210 and 1600-2175 cm^{-1}) and measures with a spatial sampling of 4 km the full Earth disc in 60 minutes.

FMC2 • 5:00 p.m. **Invited**
Instrumental Aspects of IASI, *Denis Blumstein[1], E. Péquignot[1], L. Buffet[1], C. Buil[1], P. Hébert[1], C. Larigauderie[1], C. Camy-Peyret[2], D. Siméoni[3]; [1]Ctr. Natl. d'Etudes Spatiales, France, [2]Lab de Physique Moléculaire pour l'Atmosphère et l'Astrophysique, France, [3]ALCATEL Space, France.* This paper gives the status of the IASI instrument after more than two years in orbit. It details aspects like stability of the instrument, decontaminations and anomalies caused by radiative-environment.

FMC3 • 5:30 p.m.
A Small Surface-Based Infrared Spectrometer for the Exploration of the Moon and Other Planetary Bodies, *Louis M. Moreau[1], John G. Spray[2], Philippe Giaccari[1], Suporn Boonsue[2], Lucy Thompson[2]; [1]ABB Bomem Inc., Canada, [2]Univ. of New Brunswick., Canada.* A concept for a small broadband Fourier transform spectrometer mounted on a surface platform such as rover for a lunar exploration mission is presented. The characteristics and performance of the instrument are given.

FMC4 • 5:45 p.m.
Modelling of the Beamsplitter Properties within the Tropospheric Airborne Fourier Transform Spectrometer (TAFTS) and Associated Effect on Instrument Calibration, *Caroline V. Cox, Paul Green, Juliet Pickering, Jon Murray, John E. Harries, Alan Last; Imperial College London, UK.* A polarising far infrared spectrometer has been simulated to investigate the effect of Mylar substrates on polarisers. Procedural errors were found to the calibration in certain spectral regions. Comparisons with laboratory measurements are discussed.

Junior Ballroom Foyer
6:30 p.m.–8:00 p.m.
Conference Reception

NOTES

• Tuesday, April 28, 2009 •

Grand Ballroom Foyer Coatroom
7:30 a.m.–6:30 p.m.
Registration Open

FTuA • FTS for Astronomy and Astrophysics

Junior Ballroom D
8:30 a.m.–10:30 a.m.
Jean-Pierre Maillard; Inst. d'Astrophysique de Paris, France, Presider

FTuA1 • 8:30 a.m. Invited
CIRS-*lite*: A Fourier Transform Spectrometer for a Future Mission to Titan, *John C. Brasunas, F. Michael Flasar, Donald E. Jennings; NASA Goddard Space Flight Ctr., USA.* The CIRS FTS, aboard the NASA/ESA Cassini-Huygens mission to Saturn, has been returning exciting science since 2004. CIRS-lite, a lightweight CIRS successor, is being designed for a follow-up Titan mission.

FTuA2 • 9:00 a.m. Invited
SPIOMM, a FTS for Astrophysics, *Laurent Drissen; Dept. de Physique, Univ. Laval, Canada.* SpIOMM is an imaging FTS designed to obtain the visible spectrum of every light source in a 12 arcminute field of view. We present here some results highlighting SpIOMM's capabilities to map astrophysical objects.

FTuA3 • 9:30 a.m.
Laboratory Astrophysics: High-Resolution Fourier Transform Spectroscopy for Cool Stars and Brown Dwarfs, *Richard J. Blackwell-Whitehead, Hampus Nilsson, Henrik Hartmann; Lund Observatory, Sweden.* We describe our measurements using high-resolution Fourier transform spectroscopy to improve the laboratory atomic database for cool star analysis and discuss the adaptation of our Fourier transform spectrometers for atomic measurements.

FTuA4 • 9:45 a.m.
Dispersed Interferometer for Doppler Planet Search at Mt. Palomar 200 Inch Telescope, *David J. Erskine[1], Jerry Edelstein[2], Ed Wishnow[2], James P. Lloyd[3], Philip S. Muirhead[3], Jason T. Wright[3], Matthew W. Muterspaugh[4]; [1]Lawrence Livermore Natl. Lab, USA, [2]Space Sciences Lab, USA, [3]Cornell Univ., USA, [4]Tennessee State Univ., USA.* An interferometer mounted in the Cassegrain opening of Mt. Palomar's 200 inch telescope and dispersed by Cornell's Triplespec near infrared spectrograph has been field tested for M-star Doppler planet search and high resolution spectroscopy.

FTuA5 • 10:00 a.m.
Characterization and Suppression of Electrical Interference - Spikes, Periodic Waves, and Ripples - From Cassini Composite Infrared Spectrometer (CIRS) Spectra, *Ronald C. Carlson[1,2], Ever A. Guandique[1,3], Donald E. Jennings[1], Stuart H. Pilorz[4], Virgil G. Kunde[1,5]; [1]NASA Goddard Space Flight Ctr., USA, [2]Catholic Univ. of America, USA, [3]Adnet Systems, Inc., USA, [4]JPL, USA, [5]Univ. of Maryland, USA.* Interferograms from the CIRS far- and mid-IR detectors are contaminated by electrical noise spikes, as well as by a single frequency ("sine wave") feature. It was therefore necessary to develop algorithms to suppress this interference.

FTuA6 • 10:15 a.m.
Broadband Measurements of the Absolute Brightness of Jupiter and Saturn at Submillimeter Wavelengths, *Juan R. Pardo[1], Eugene Serabyn[2]; [1]CSIC, Spain, [2]Div. of Physics, Mathematics and Astronomy, Caltech, USA.* We present the first measurements ever of the spectrum of Jupiter and Saturn across the 0.3 to 1.3 mm wavelength range. The measument procedure and calibration will be described in detail, and the results discussed.

Grand Ballroom C/D
10:30 a.m.–11:00 a.m.
Coffee Break/ Exhibits

FTuB • Combs, Optical Fiber and Fast-Scanning

Junior Ballroom D
11:00 a.m.–12:30 p.m.
Ian R. Coddington; NIST, USA, Presider

FTuB1 • 11:00 a.m. Invited
Practical and Acurate Frequency Comb Spectroscopy, *Jerome Genest, P. Giaccari, J- D. Deschênes, G. Taurand; Univ. Laval, Canada.* A technique to optically reference the multiheterodyne beat note produced by two mode-locked lasers is presented. The technique is similar to using a reference laser in a conventional Fourier transform spectrometer. Spectroscopy results are presented.

FTuB2 • 11:30 a.m.
Vector Frequency-Comb Fourier Transform Spectrometer Measuring Artificial Dielectrics, *T. Ganz[1,2], Markus Brehm[1], Hans-Georg von Ribbeck[1,3], Frtiz Keilmann[1,2], Daniel van der Weide[4]; [1]Max-Planck-Inst. für Biochemie and Ctr. for NanoScience, Germany, [2]Max-Planck-Inst. für Quantenoptik and Ctr. for NanoScience, Germany, [3]Inst. für Angewandte Photophysik, Technische Univ., Germany, [4]Univ. of Wisconsin-Madison, USA.* We determine infrared and terahertz transmission amplitude and phase spectra of structured artificial dielectrics at well-defined incidence and polarization with a vector frequency-comb Fourier transform spectrometer (c-FTS) that uses no moving elements.

FTuB3 • 11:45 a.m.
Optical Low Coherence Reflectometry Measurements Using a Comb Fourier Transform Spectrometer, *Geneviève Taurand, Jérôme Genest, Jean-Daniel Deschênes; Univ. Laval, Canada.* A fibre Bragg grating is characterized using a comb Fourier transform spectrometer. By measuring its reflectance a complex spectrum is

retrieved, allowing a dispersion analysis, which is used to recover its time domain characteristics.

FTuB4 • 12:00 p.m.
An Mid-Infrared Fourier Transform Spectrometer for a Modal Characterization on Silver Halide Fiber, *Romain Grille[1], Tomer Lewi[2], Pierre Kern[1], Brahim Arezki[1], Guillermmo Martin[1], Abraham Katzir[2]; [1]Lab d'Astrophysique de Grenoble, France, [2]Tel Aviv Univ., Israel.* An IR Fourier transform spectrometer was designed and built in order to characterize the spectral response of IR waveguides in the 3-14 μm range. It contains a specific signature related to the transmitted modes.

FTuB5 • 12:15 p.m.
High Resolution Ultra-Rapid-Scanning Fourier Transform Spectrometry, *Jinsong Zhou[1], Ruyi Wei[1], Siyuan Li[1], Xiaohui Gao[1], Juanjuan Jing[1], Qiongshui Wu[2]; [1]Lab of Spectral Imaging Technology, Xi'an Inst. of Optics and Precision Mechanics, China, [2]Electronic Information School, Wuhan Univ., China.* A new interferometer without cube corner used in ultra-rapid-scanning Fourier transform spectrometry is described, which is possible to produce much higher spectral resolution with much less bulk, as well as with lower technological requirement.

12:30 p.m.–2:00 p.m.
Lunch Break (on your own)

FTuC • Gosat and Akari

Junior Ballroom D
2:00 p.m.–4:00 p.m.
Raphaël Desbiens; ABB Bomem Inc., Canada, Presider

2:00 p.m.–2:30 p.m.
Postdeadline Presentations, *To Be Announced*

FTuC1 • 2:30 p.m. Invited
AKARI Far-IR FTS: A Space Application of the Imaging FTS with Photoconductive Detector Arrays, *Mitsunobu Kawada[1], Hidenori Takahashi[2], Noriko Murakami[3], Yoko Okada[4], Akiko Yasuda[1,4], Takafumi Ootsubo[4], Hidehiro Kaneda[1], Takao Nakagawa[4], Hiroshi Shibai[5]; [1]Nagoya Univ., Japan, [2]Gunma Astronomical Observatory, Japan, [3]Bisei Astronomical Observatory, Japan, [4]Inst. of Space and Astronautical Science, Japan, [5]Graduate School of Sciences, Osaka Univ., Japan.* The Japanese infrared astronomical satellite AKARI has a far-infrared Fourier transform spectrometer (FTS), which is the first FTS with photoconductive detector arrays operated in space and provided unique datasets in astrophysics.

FTuC2 • 3:00 p.m. Invited
Initial Onboard Performance of TANSO-FTS on GOSAT, *Akihiko Kuze, Hiroshi Suto, Masakatsu Nakajima, Takashi Hamazaki; Japan Aerospace Exploration Agency, Japan.* Thermal And Near infrared Sensor for carbon Observation (TANSO) Fourier-Transform Spectrometer (FTS) onboard GOSAT monitors CO_2 and CH_4 globally from space. GOSAT will be launched in January, 2009. The initial onboard performance will be presented.

FTuC3 • 3:30 p.m.
Overview of the Test Activities Performed on the Interferometer of GOSAT / TANSO-FTS, *Louis M. Moreau[1], Raphael Desbiens[1], James Veilleux[1], Dominique Duquette[1], Luc Levesque[1], Marc-Andre Soucy[1], Takahiro Kawashima[2], Jun Tanii[2]; [1]ABB Bomem Inc., Canada, [2]NEC Toshiba Space Systems Ltd., Japan.* We present an overview of the tests performed on the flight unit of the modulator of TANSO-FTS for GOSAT mission. The results include tests on the interferometer module before and after integration to the sensor.

FTuC4 • 3:45 p.m.
Beamsplitter Emission in the Herschel/SPIRE Fourier Transform Spectrometer, *Locke D. Spencer[1], David A. Naylor[1], Peter A. R. Ade[2], Jin Zhang[2]; [1]Dept. of Physics and Astronomy, Univ. of Lethbridge, Canada, [2]School of Physics and Astronomy, Cardiff Univ., UK.* Performance studies of the Herschel/SPIRE FTS show a significant contribution to the measured interferogram from beamsplitter emission when both input ports are well balanced. We describe results from further exploration of this effect.

Grand Ballroom C/D
4:00 p.m.–4:30 p.m.
Coffee Break/ Exhibits

JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session

Grand Ballroom C/D
4:30 p.m.–6:00 p.m.

JTuB8
Using High-Order Harmonic Generation for EUV Fourier Transform Spectroscopy, *Milutin Kovacev[1,2], Uwe Morgner[1,2], Pascal Salieres[3]; [1]Leibniz Univ. Hannover, Germany, [2]QUEST, Ctr. for Quantum Engineering and Space-Time Res., Germany, [3]CEA/DSM/DRECAM/ Service des Photons, Atomes et Molecules, France.* We demonstrate a new scheme for extreme ultraviolet (EUV) Fourier transform spectroscopy. The technique is based on high-order harmonic generation from a fundamental IR driving field.

JTuB9
Calibration and Data Reduction of a Stationary Wave Integrated Fourier Transform Spectrometer (SWIFTS), *Jerome Ferrand[1], Guillaume Custillon[2], Pierre Benech[2], Alain Morand[2], Etienne Le Coarer[1]; [1]Lab d'Astrophysique, Observatoire de Grenoble, CNRS, France, [2]L'Inst. de Microélectronique Electromagnétisme et Photonique et le LAboratoire d'Hyperfréquences et de Caractérisation, CNRS, France.* SWIFTS is a new technology for FTS which allows the realization of small FTS

(5cm*10cm*15cm) with the same performances as standard spectrometers (better than 0.5 cm-1). Here, we present the method of calibration and data-reduction.

JTuB10
A Read-Out Electronic System for Imaging FTS, *Tom Neubert[1], Heinz Rongen[1], Karl Ziemons[1], Felix Friedl-Vallon[2], Thomas Gulde[2], Guido Maucher[2], Anne Kleinert[2]; [1]Forschungszentrum Jülich, Germany, [2]Forschungszentrum Karlsruhe, Germany.* A high performance read-out system for imaging FTS instruments based on equal time sampling designs with data post processing is presented. It can perform a data storage throughput up to 160 MByte/s.

JTuB11
A Solar-Occultation Fourier Transform Spectrometer for Mars, *Louis M. Moreau[1], Jacques Giroux[1], Marc-Andre Soucy[1], James R. Drummond[2], Lisa Leblanc[2], Kaley A. Walker[3]; [1]ABB Bomem Inc., Canada, [2]Dalhousie Univ., Canada, [3]Univ. of Toronto, Canada.* We present a summary of a feasibility study that investigated the possibility of adapting the ACE-FTS, a solar occultation FTS in orbit around Earth, to an orbiter around Mars.

JTuB12
Wavelength Calibration Sources for Instruments on Extremely Large Telescopes, *Florian Kerber[1], Maria Aldenius[1], Paul Bristow[1], Sandro D'Odorico[1], Gillian Nave[2], Yu. Ralchenko[2], Craig J, Sansonetti[2]; [1]European Southern Observatory, Germany, [2]NIST, USA.* ESO and NIST are using FT spectroscopy to survey the near-IR spectra of 20 elements in order to identify the best calibration sources and establish wavelength standards for instruments on extremely large astronomical telescopes.

JTuB13
Super Resolution for an Imaging Fourier Transform Spectrometer, *Thanh Nguyen[1], Ahmed Mahgoub[1], Raphaël Desbiens[2], André Zaccarin[1]; [1]Lab de Vision et Systèmes Numériques, Univ. Laval, Canada, [2]ABB Bomem Inc., Canada.* A Fourier-based motion estimation followed by a square regularized super-resolution algorithm to reconstruct a high spatial resolution hyper spectral cube from several low spatial resolution hyper spectral cubes.

JTuB14
Tracking the Signed Velocity of an Interferometer Carriage Using an Extended Kalman Filter, *Simon Potvin[1], Jérôme Genest[1], Benjamin Couillard[3], Simon Savary[2], Martin Chamberland[2]; [1]Univ Laval., Canada, [2]Telops Inc., Canada, [3]Canada.* An extended Kalman filter, which tracks the signed speed the moving carriage, is presented. The filter uses quadrature-less reference laser fringes. Performances are evaluated on the speed estimate using experimental data highly stained by vibrations.

JTuB15
Non-Linear Behavior of Bolometric Detectors in Fourier Spectroscopy, *David A. Naylor, Brad G. Gom, Scott C. Jones, Locke D. Spencer; Dept. of Physics and Astronomy, Univ. of Lethbridge, Canada.* The non-linear behavior of bolometric detectors can lead to significant radiometric errors in Fourier spectroscopy if left uncorrected. We discuss preliminary investigation of this effect and its correction.

JTuB16
Interferogram Resampling for GLORIA-AB, *Anne Kleinert, Felix Friedl-Vallon, Anton Lengel; Forschungszentrum Karlsruhe, Germany.* Interferograms measured by GLORIA-AB are recorded equidistantly in time and then resampled equidistantly in space. Simulations with different settings for the resampling procedure are performed and the impact on the data quality is quantified.

Posters JTuB1–JTuB7 can be found in the DH abstracts section.
Posters JTuB17–JTuB21 can be found in the HISE abstracts section.
Posters JTuB22–JTuB29 can be found in the NTM abstracts section.
Posters JTuB30–JTuB35 can be found in the OTA abstracts section.

• Wednesday, April 29, 2009 •

Grand Ballroom Foyer Coatroom
7:30 a.m.–6:30 p.m.
Registration Open

FWA • Earth Sensing

Junior Ballroom D
8:30 a.m.–10:30 a.m.
Felix Friedl-Vallon; Inst. fuer Meteorologie und Klimaforschung, Univ., Germany, Presider

FWA1 • 8:30 a.m. Invited
Atmospheric Chemistry Experiment (ACE): Latest Results, *Peter Bernath; Univ. of York, UK.* ACE is a Canadian-led satellite mission that is measuring atmospheric composition by solar occultation using an infrared FTS. A mission update and latest results will be presented.

FWA2 • 9:00 a.m. Invited
Recent Laboratory Work Relevant to Atmospheric Science, *Johannes Orphal; Univ. de Paris - 12, France.* Atmospheric remote sensing requires spectroscopic reference data. Therefore, parallel to the preparation of atmospheric sensors, laboratory studies need to be developed. We discuss progress in this field by three examples: ozone, chlorine-nitrate, and water vapour.

FWA3 • 9:30 a.m.
Upper Tropospheric and Stratospheric Measurements of Atmospheric Chemistry and Trends by the Atmospheric Chemistry Experiment (ACE) Fourier Transform Spectrometer, *Curtis Rinsland[1], Linda Chiou[2], Peter Bernath[3], Chris Boone[4]; [1]NASA Langley Res. Ctr., USA, [2]Science Systems and Applications, Inc., USA, [3]Univ. of York, UK, [4]Univ. of Waterloo, Canada.* We highlight atmospheric composition and trend studies that have including detections of new species and the measurement of trends for the key climate change-related species CO_2 and CH_4.

FWA4 • 9:45 a.m.
Observations of Climate Radiative Forcing from Ground and Space, *Wayne F. Evans; NorthWest Res. Associates, USA.* The observation and monitoring of the radiative forcing of climate from greenhouse gases at the top of the atmosphere and at the surface by FTS is presented.

FWA5 • 10:00 a.m.
Target Factor Analysis for Trace Agent Detection, *Peter R. Griffiths[1], Limin Shao[2]; [1]Univ. of Idaho, USA, [2]Univ. of Science and Technology of China, China.* Target factor analysis (TFA) can be used to identify trace atmospheric agents by open-path Fourier transform infrared (OP/FT-IR) spectrometry under conditions of battlefield clutter provided that a high-pass filter is applied to the interferograms.

FWA6 • 10:15 a.m.
Absolute Infrared Cross Sections of Gas-Phase H_2O_2 Using Fourier Transform Mid-Infrared Spectroscopy, *Timothy Johnson, Thomas A. Blake, Robert L. Sams, Sarah D. Burton; Pacific Northwest Natl. Lab, USA.* We report quantitative-spectra of pressure-broadened H_2O_2 vapor. An 83%-solution was flowed into a disseminator and diluted with N_2gas; water-lines were subtracted. The H_2O_2 spectrum spans the IR and compares well with HITRAN-values for ν_6 band.

Grand Ballroom C/D
10:30 a.m.–11:00 a.m.
Coffee Break/ Exhibits

FWB • Visible and Ultra Violet

Junior Ballroom D
11:00 a.m.–12:30 p.m.
Gillian Nave; NIST, USA, Presider

FWB1 • 11:00 a.m. Invited
A FTS for VUV Absorption Spectroscopy on the Synchrotron DESIRS Beamline: First Results, *Nelson de Oliveria[1], D. Joyeux[2], D. Phalippou[2], J. C. Rodier[2], M. Roudjane[1], M. Vervloet[1], L. Nahon[1], K. Ito[3]; [1]Synchrotron Soleil, France, [2]Lab Charles Fabry de l'Inst. d'Optique, France, [3]KEK, Photon Factory, Japan.* A Fourier transform spectrometer dedicated to Vacuum Ultra-Violet [180-40nm] photoabsorption has been developed. The first experimental results, presented here, show unprecedented resolving power, above 700000. The instrument is an endstation on the DESIRS synchrotron beamline.

FWB2 • 11:30 a.m.
Atomic Spectroscopy for Astrophysics Applications by High Resolution UV and VUV Fourier Transform Spectrometry, *Juliet C. Pickering[1], Darren G. Smillie[1], Anne P. Thorne[1], Gillian Nave[2], Richard Blackwell-Whitehead[3], Peter L. Smith[4]; [1]Imperial College London, UK, [2]NIST, USA, [3]Lund Observatory, Sweden, [4]Harvard-Smithsonian Ctr. for Astrophysics, USA.* Accurate high resolution UV/VUV atomic data are required for interpretation of astrophysical spectra acquired by modern spectrographs on astronomical telescopes. Atomic spectroscopy studies by high resolution Fourier transform spectrometry at Imperial College are described.

FWB3 • 11:45 a.m.
High Resolution UV Photoabsorption Cross Sections of SO_2 at 198 K, 213 - 325 nm, *Douglas Blackie[1], Juliet C. Pickering[1], James Rufus[1], Anne Thorne[1], Richard Blackwell-Whitehead[2], Glenn Stark[3], Peter L. Smith[4]; [1]Imperial College London, UK, [2]Lund Observatory, Sweden, [3]Wellesley College, USA, [4]Harvard-Smithsonian Ctr. for Astrophysics, USA.* High resolution measurements of SO_2 photoabsorption cross-

sections at 198K between 213-325nm are presented, together with an outline of planned measurements of spectra of SO_2 isotopologues with applications in the study of the ancient Earth atmosphere.

FWB4 • 12:00 p.m.
Imaging Fourier Transform Spectrometer Based on a Beam-Folding Position-Tracking Technique, *Jianping Li, Robert K. Y. Chan; Dept. of Physics, Hong Kong Baptist Univ., Hong Kong.* A near UV-near IR imaging Fourier transform spectrometer based on a beam-folding position-tracking technique is reported. Preliminary measurement results on plant foliage's fluorescence emission show its potential in biological and chemical applications.

FWB5 • 12:15 p.m.
Wavelength Calibration of Atomic Spectra Obtained by FTS, *Gillian Nave, Craig J. Sansonetti; NIST, USA.* We discuss the wavelength calibration of atomic spectra obtained by Fourier transform spectroscopy. Wavelength standards, their uncertainties and practical application are also discussed.

12:30 p.m.–2:00 p.m.
Lunch Break (on your own)

FWC • Spatial Heterodyne

Junior Ballroom D
2:00 p.m.–4:00 p.m.
Christoph R. Englert; NRL, USA, Presider

FWC1 • 2:00 p.m. **Invited**
Spatial Heterodyne Imager for Mesospheric Radicals (SHIMMER): Results from the First Satellite Borne SHS Spectrometer, *Christoph R. Englert[1], Michael H. Stevens[1], David E. Siskind[1], John M. Harlander[2], Fred L. Roesler[3]; [1]NRL, USA, [2]St. Cloud State Univ., USA, [3]Univ. of Wisconsin-Madison, USA.* SHIMMER was launched in 2007 on board the STPSat-1 satellite. We present a brief look at the spectroscopic data analysis and summarize recent results from the mesospheric hydroxyl (OH) and polar mesospheric cloud (PMC) observations.

FWC2 • 2:30 p.m. **Invited**
The Mark 1 Spatial Heterodyne Spectrometer, *James E. Lawler[1], J. Harlander[2], F. L. Roesler[1], Z. Labby[1]; [1]Dept. of Physics, Univ. of Wisconsin, USA, [2]Dept. of Physics, Astronomy, and Engineering Science, St. Cloud State Univ., USA.* Design features of the broadband, high resolution Mark 1 Spatial Heterodyne Spectrometer (SHS) which eliminate aberrations in the fringe imaging system, suppress ghosts, and enhance thermal stability are reviewed. Applications of this SHS are described.

FWC3 • 3:00 p.m. **Invited**
The Doppler Asymmetric Spatial Heterodyne (DASH) Interferometer, *John M. Harlander[1], Christoph R. Englert[2], David D. Babcock[3]; [1]St. Cloud State Univ., USA, [2]Space Science Div., NRL, USA, [3]Artep, Inc., USA.* Doppler Asymmetric Spatial Heterodyne Spectroscopy (DASH) is being developed for atmospheric Doppler wind measurements. This paper discusses the technique, the advantages and tradeoffs of DASH.

FWC4 • 3:30 p.m.
Dispersed Fourier Transform Spectrographs: The Next Generation, *Andrew Cenko[1], Jeff Meade[1], Gillian Brockett[1], Bradford Behr[1], Marc Murison[2], Robert S. McMillan[3], Arsen R. Hajian[1]; [1]Univ. of Waterloo, Canada, [2]US Naval Observatory, USA, [3]Univ. of Arizona, USA.* We compare a first and second generation dispersed FTS, which is a combination of an FTS and grating spectrometer. We include a quantitative analysis of resulting increase in sensitivity, and preliminary results.

FWC5 • 3:45 p.m.
HYPE: A Sub-Orbital Spatial Heterodyne Spectro-Polarimeter for Study of Ly-α Sources in the Solar System, *Walter Harris[1], Fred Roesler[2], Lotfi Ben-Jaffel[3], Jason Corliss[2], Yan Betremieux[1], Frederic Vincent[1]; [1]Univ. of California at Davis, USA, [2]Univ. of Wisconsin-Madison, USA, [3]Inst. d'Astrophysique de Paris, France.* We describe progress toward the development of a sounding rocket spatial heterodyne spectro-polarimeter designed for studies of H Ly-α line profiles from solar system targets.

Grand Ballroom C/D
4:00 p.m.–4:30 p.m.
Coffee Break/ Exhibits

FWD • Laboratory and Miniature FTS

Junior Ballroom D
4:30 p.m.–6:00 p.m.
Guy Guelachvili; CNRS, France, Presider

FWD1 • 4:30 p.m. **Invited**
Laboratory Fourier Transform Zeeman Spectroscopy, *Amanda J. Ross; Univ. de Lyon and CNRS, France.* A laser-induced fluorescence experiment coupled to a Bomem DA3 FT spectrometer is used to measure visible spectra of metal hydrides in the presence of a magnetic field. Landé factors are obtained for several transitions simultaneously.

FWD2 • 5:00 p.m.
Fourier Transform Laser-Induced Fluorescence Spectra of the Rubidium Dimer, *Houssam Salami[1], Thomas Bergeman[1], Patrick Crozet[2], Amanda J. Ross[2]; [1]SUNY at Stony Brook, USA, [2]Univ. de Lyon, CNRS, France.* Laser-induced fluorescence from the lowest vibrational levels of the A $^1\Sigma_u^+$ state of Rb2 have been recorded on an FT spectrometer. Global depertubation gives vibrational numbering in the A $^1\Sigma_u^+$ and perturbing $b\ ^3\pi_u$ states.

FWD3 • 5:15 p.m.
Fourier Transform Infrared Photoacoustic Spectroscopy of Polymer Beads, *Qing Wen, Kirk H. Michaelian; CanmetENERGY, Natural Resources Canada, Canada.* Photoacoustic (PA) spectra of polymer beads were acquired using a Fourier transform infrared spectrometer. Absorption bands were identified in both the magnitude and phase spectra. The modulation-frequency dependence of PA intensity varied with saturation.

FWD4 • 5:30 p.m.
A Miniature Fourier Transform Spectrometer by a Large-Vertical-Displacement Microelectromechanical Mirror, *Lei Wu, Andrea Pais, Sean R. Samuelson, Shuguang Guo, Huikai Xie; Dept. of Electrical and Computer Engineering, Univ. of Florida, USA.* A microelectromechanical system (MEMS) mirror based miniature Fourier transform spectrometer is reported. A spectral resolution of 19.2 cm^{-1} has been achieved with a 261 μm physical scan range generated by the large-vertical-displacement MEMS mirror.

FWD5 • 5:45 p.m.
Non-Mechanically Scanned DFTS, *Dominic F. Murphy, Dónal A. Flavin; Waterford Inst. of Technology, Ireland.* Non-mechanically scanned dispersive Fourier transform spectrometry (DFTS) is reported for dispersion-insensitive measurements of thermally-induced change in dispersive group delay; optical path scan lengths of 260 microns yield 0.5fs resolution for a dispersive optical sample.

NOTES

•Thursday, April 30, 2009 •

Grand Ballroom Foyer Coatroom
7:30 a.m.–10:30 a.m.
Registration Open

FThA • Spectral Imaging

Grand Ballroom A
8:30 a.m.–10:30 a.m.
Donald E. Jennings; NASA Goddard Space Flight Ctr., USA, Presider

FThA1 • 8:30 a.m. Invited
Airborne / Balloonborne Imaging FTS, *Felix Friedl-Vallon; Inst. für Meteorologie und Klimaforschung, Univ. Karlsruhe, Germany.* The current status of the development of the airborne Global Limb Radiance Imager of the Atmosphere (GLORIA-AB) instrument is outlined. Characterization measurements and the road map to scientific usage are presented.

FThA2 • 9:00 a.m. Invited
Recent Instrument Development at Telops, *Martin Chamberland, Vincent Farley, Philippe Lagueux, André Villemaire, Patrick Dubois, Jean-Philippe Gagnon; Telops Inc., Canada.* Since the introduction of a LWIR imaging-FTS in 2005, Telops developed other state-of-the-art FTS instruments. An airborne imaging-FTS, real-time calibration of hypercubes, fast imaging-FTS for explosion measurements and a cryogenic FTS are presented here.

FThA3 • 9:30 a.m.
Continuous-Scan Imaging FTS with an Integrating Camera - Contributions of Sampling Jitter Noise to NESR, *Pierre Tremblay[1], Martin Chamberland[2]; [1]Univ. Laval, Canada, [2]Telops Inc., Canada.* We report a thorough analysis of the impact of sampling jitter in imaging Fourier-Transform Spectrometers operating with an externally triggered integrating camera. Through estimation of integrating parameters statistics, we can predict resulting spectral noise.

FThA4 • 9:45 a.m.
Wide-Field Imaging FTS at High Spectral Resolution, *Jean-Pierre Maillard; Inst. d'Astrophysique de Paris, France.* Astronomical spectral imaging calls in many case for wide-field instruments and high spectral resolution. These two conditions are theoretically realized with an imaging FTS. Practical examples in two different domains, visible and mid-IR, are presented.

FThA5 • 10:00 a.m.
Retrieving of a Spectrum from a Non Stationary Imaging Fourier Transform Spectrometer, *Ahmed G. Mahgoub[1], Thanh Nguyen[1], André Zaccarin[1], Raphaël Desbiens[2]; [1]Univ. Laval, Canada, [2]ABB Bomem Inc., Canada.* Motion estimation is used to align the frames resulting from a non-stationary imaging Fourier transform spectrometer. This motion correction is expected to increase the spectral resolution, or retrieve an undistorted spectrum.

FThA6 • 10:15 a.m.
Spatial Heterodyne Imager for Chemicals and Atmospheric Detection (SHIMCAD): First Brassboard Results, *David D. Babcock[1], Christoph R. Englert[2], John M. Harlander[3]; [1]Artep, Inc., USA, [2]NRL, Space Science Div., USA, [3]St. Cloud State Univ., USA.* A design overview of the Spatial Heterodyne Imager for Chemicals and Atmospheric Detection (SHIMCAD) brassboard instrument and its first long-wave infra-red transmittance measurement are presented. SHIMCAD uses a field widened Spatial Heterodyne Spectroscopy (SHS) interferometer.

Key to Authors and Presiders

(**Bold** denotes Presider or Presenting Author)

Advances in Imaging
OSA Optics & Photonics Congress and Tabletop Exhibit 2009
UPDATE SHEET

Withdrawals:

NMC6	JTuB34
FTuA4	JTuB35
OTuA5	HTuC6
JTuB23	DWA3
JTuB29	DWB2
JTuB30	HWD4

Substituted Papers:

The paper **HTuC6** that is in your program will not be presented. During this time slot, the following postdeadline paper will be presented in its place: **PHTuC6, Airborne Radiometer Measurements of Above Cloud Reflectance in the Presence and Absence of Aerosols,** *Odele Coddington[1], Peter Pilewskie[1], Tomislava Vukicevic[1], John Livingston[2], Steve Platnick[3], Gala Wind[3], Jens Redemann[4], Philip B. Russell[4]; [1]Univ. of Colorado at Boulder, USA, [2]SRI Intl., USA, [3]NASA GSFC, USA, [4]NASA AMES, USA.*

The poster **JTuB17** will be presented during the session **HWA•Hyperspectral IR and Imager Data Analyses** (April 29, 2009, 8:30 a.m.–10:30 a.m., Junior Ballroom C) as oral presentation **HWA5.**

Presider Updates:

Nickolai V. Kukhtarev; Alabama A&M Univ., USA, will preside over session **DMB• Novel Technologies in Holography,** on Monday, April 27, 2009, 11:00 a.m. –1:00 p.m. in Grand Ballroom A.

Yoshio Hayasaki; Utsunomiya Univ., Japan, will preside over session **DWC•Computer-Generated Holograms**, on Wednesday, April 29, 2009, 2:00 p.m.–4:00 p.m. in Grand Ballroom A.

Presenter Changes:

DTuA1, Harmonic Holography will now be presented by *Chia-Lung Hsieh[1,2], [1]Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, [2]Caltech, USA.*

NTuA5, Linear Phase-Gradient Imaging with Asymmetric Illumination Based Differential Phase Contrast (AIDPC), will now be presented by *Colin J. R. Sheppard, Natl. Univ. of Singapore, Singapore.*

Time Changes:

HWA will end a half hour later at 10:30 a.m.
Exhibits will end at 12:30 p.m. on Wednesday, April 29, 2009.

Postdeadline Paper Programs:

Post deadline Paper Programs are available at Registration.

Special Events:

Meet the *Applied Optics* Editors Dinner on Tuesday, April 28, 2009, 7:00 p.m. All conference attendees, especially students, are invited to this casual networking dinner. More information is available at Registration.

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POSTDEADLINE PAPERS

ADVANCES IN IMAGING

- Digital Holography and Three-Dimensional Imaging (DH)
- Fourier Transform Spectroscopy (FTS)
- Hyperspectral Imaging and Sensing of the Environment (HISE)
- Novel Techniques in Microscopy (NTM)
- Optical Trapping Applications (OTA)

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•Tuesday, April 28, 2009•

Junior Ballroom C
2:00 p.m.–4:00 p.m.
HTuC • New Remote Sensing Perspectives
Anthony Baran; Met Office, UK, Presider

PHTuC6 • 3:45 p.m.
Airborne Radiometer Measurements of above Cloud Reflectance in the Presence and Absence of Aerosols, *Odele Coddington[1], Peter Pilewskie[1], Tomislava Vukicevic[1], John Livingston[2], Steve Platnick[3], Gala Wind[3], Jens Redemann[4], Philip B. Russell[4]; [1]Univ. of Colorado at Boulder, USA, [2]SRI Intl., USA, [3]NASA GSFC, USA, [4]NASA AMES, USA.* We present cloud retrieval results from SSFR measurements made in the presence and absence of aerosols and show comparisons to MODIS. A method for treating aerosol bias in retrievals as systematic model uncertainty is described.

Grand Ballroom C/D
4:30 p.m.–6:00 p.m.
JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session

PJTuB36
Automated Particle Characterization Using Holographic Video Microscopy, *Fook Chiong Cheong, David G. Grier; New York Univ., USA.* With an efficient particle identification algorithm, combine with hardware acceleration and software optimization, holographic microscopy data can be analysis in near real time with sufficient accuracy to enable unattended holographic tracking and particle characterization.

PJTuB37
Incoherent Optical Imaging Using Synthetic Aperture with Fresnel Elements, *Barak Katz, Joseph Rosen; Ben-Gurion Univ. of the Negev, Israel.* We present a new lensless incoherent holographic system operating in a synthetic aperture mode. Spatial resolution exceeding the Rayleigh limit is obtained by tiling several holographic elements into a complete Fresnel hologram of observed objects.

PJTuB38
CrIS Radiance Spectra Modeling and End-to-End Error Analysis, *Nikita Pougatchev, Gregory Cantwell, Gail Bingham; Space Dynamics Lab, Utah State Univ., USA.* We present the Cross-track Infrared Sounder (CrIS) end-to-end error model consisting of instrument model and Validation Assessment Model. Models' descriptions along with examples of application are presented.

PJTuB39
SPDM - Single Molecule Superresolution of Receptor Clusters in *E. coli* Bacteria, *Thomas Ruckelshausen[1], Paul Lemmer[1], Victor Sourjik[2], Christoph Cremer[1,3,4]; [1]Kirchhoff-Inst. for Physics, Univ. of Heidelberg, Germany, [2]Ctr. for Molecular Biologie Heidelberg, Univ. of Heidelberg, Germany, [3]Inst. for Pharmacy and Molecular Biotechnology, Univ. of Heidelberg, Germany, [4]Inst. for Molecular Biophysics, The Jackson Lab, USA.* In *E. coli* bacteria the chemotaxis phosphatase protein CheZ was labeled with YFP (yellow fluorescent protein). Their reversible photobleaching is used for an optical isolation in time. An average localization precision of 22nm was achieved.

•Wednesday, April 29, 2009•

Junior Ballroom C
8:30 a.m.–10:30 a.m.
HWA • Hyperspectral IR and Imager Data Analyses
Allen Huang; Univ. of Wisconsin at Madison, USA, Presider

PHWA6 • 10:15 a.m.
Investigations of Cirrus in the Far Infrared with the Tropospheric Airborne Fourier Transform Spectrometer (TAFTS), *Caroline Cox[1], Neil Humpage[1], Paul Green[1], Juliet Pickering[1], John Harries[1], Jonathan Taylor[2], Anthony Baran[2], Alan Last[1], Jon Murray[1]; [1]Imperial College London, UK, [2]Met Office, UK.* An overview of the results of recent field campaigns performed with the Tropospheric Airborne Fourier Transform Spectrometer (TAFTS) to study the radiative properties of cirrus in the far infrared spectral region is presented.

Grand Ballroom C/D
11:00 a.m.–12:30 p.m.
DWB • DH Poster Session

PDWB37
Femtosecond Time-Resolved Off-Axis Digital Holography, *Tadas Balciunas, Andrius Melninkaitis, Andrius Vanagas, Valdas Sirutkaitis; Laser Res. Ctr., Vilnius Univ., Lithuania.* We present time-resolved off-axis digital holography for investigation of laser-induced plasma filaments in condensed media. An experimental setup with tilted reference pulse allows larger crossing angles to be used for recording of digital holograms.

PDWB38
A High-Definition Full-Parallax CGH Created by the Polygon-Based Method, *Kyoji Matsushima, Sumio Nakahara; Kansai Univ., Japan.* A large-scaled full-parallax CGH with 4 billion pixels is produced by a polygon-based method. The CGH reconstructs a fine 3-D image and gives a large sensation of depth owing to the silhouette-masking technique.

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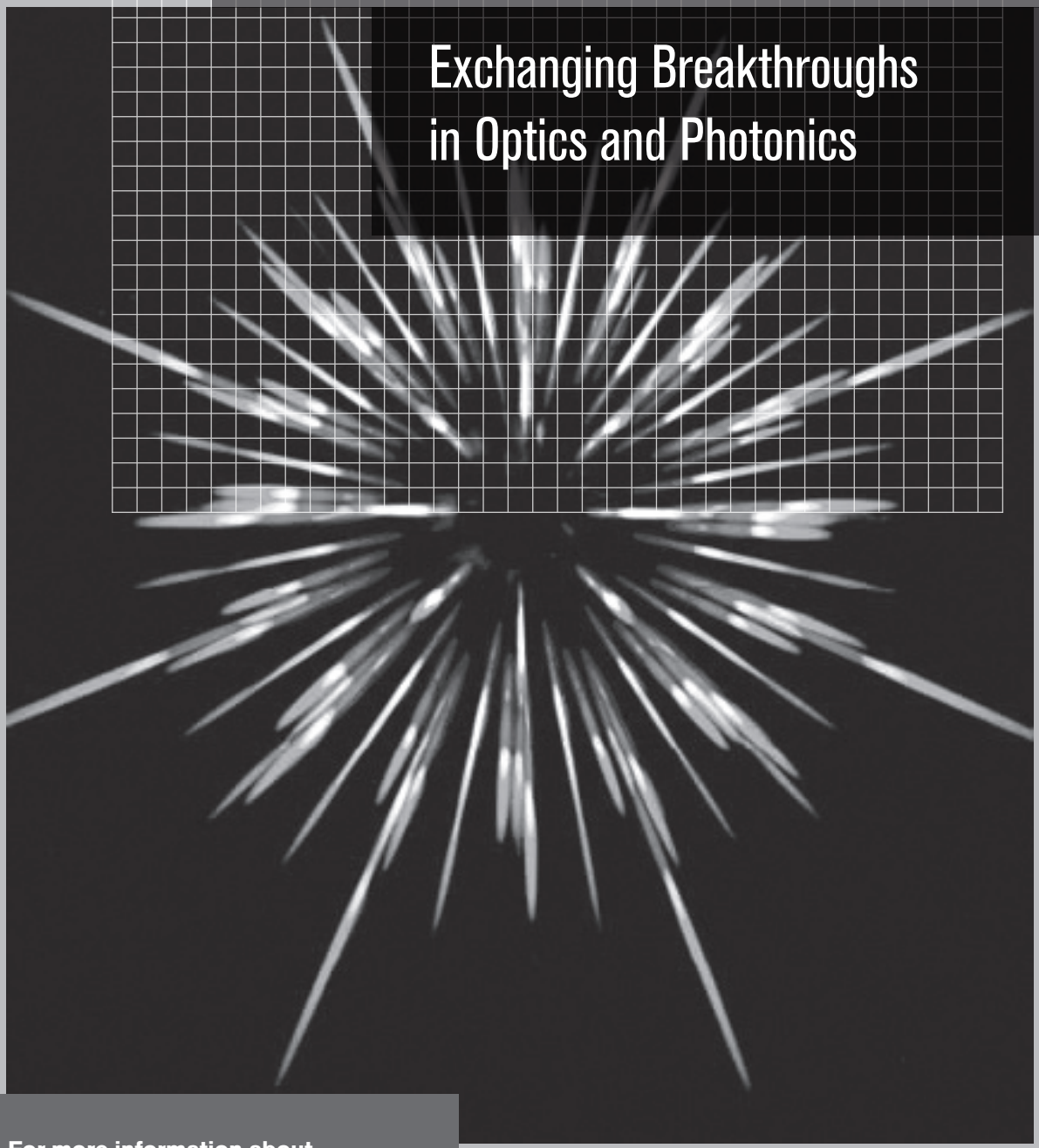

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