

CORM-CIE 2019 Final Program

CORM 2019 Annual Technical Conference and 12th Biennial Joint Meeting of the CNC/CIE and CIE-USNC Technical Program – October 28 -30, 2019, NRC Sussex Auditorium, 100 Sussex Drive

28 October

Monday Morning *8:00-8:30 AM*

8:00 – 8:30 **Registration**

8:30-8:45 **Welcome:** by Dr. Alan Steele, Director-General, NRC Metrology

Short Introduction by Organizing Committee (J. Zwinkels, T. Moggridge)

8:45-10:30

Session I: Current Research Activities at NMIs

Session Chair: Angela Gamouras (NRC)

CCPR K3 Key Comparison of Luminous Intensity

Arnold Gaertner (NRC Metrology, Ottawa, ON, Canada)

Recent developments in photometry at NIST

Yuqin Zong and C. Cameron Miller (NIST Sensor Science Division, Gaithersburg, MD, USA)

Applications of spectrophotometry in emerging nanomaterials

Li-Lin Tay, John Hulse, Shawn Poirier, and Jeff Fraser (NRC Metrology, Ottawa, ON, Canada)

Current research in high-accuracy radiometers for solar and earth observation

Michelle Stephens¹, Nathan Tomlin¹, Chris Yung¹, Malcolm White¹, Anna Vaskuri¹, John Lehman¹, Dave Harber², Eric Richard², Karl Heuerman², Joel Rutkowski², Cameron Straatsma², and Greg Kopp² (¹ NIST Boulder; ² Laboratory for Atmospheric and Space Physics)

10:30-11:00 Coffee break and vendor exhibit

Session I: Current Research Activities at NMIs (continued)

Progress in few-photon metrology at NRC

Jeongwan Jin, Dan Dalacu, Robin Williams, and Angela Gamouras (NRC, Ottawa, ON, Canada)

Session II: Environmental Radiometry

Session Chair: Carol Johnson (NIST)

Improving non-dispersive infrared (NDIR) sensors for greenhouse gas monitoring

Howard Yoon and George Eppeldauer (NIST, Sensor Science Division, Gaithersburg, USA)

Single particle soot photometer measurements of light-absorbing carbon produced by biomass combustion

Joel C. Corbin¹ and Martin Gysel-Beer² (¹NRC Metrology, Ottawa, Canada; ²Paul Scherrer Institute, Villigen, Switzerland)

Performing tower-based solar induced fluorescence retrievals in the context of physiological, environmental, and hardware-based sources of uncertainty

Julia Marrs¹, Lucy R. Hutyra¹ and David W. Allen² (¹ Boston University, Dept. of Earth and Environment; ² NIST, Sensor Science Division)

12:40-1:40 Lunch (provided) in vendor exhibit area

Monday Afternoon 1:40-5:40

Session II: Environmental Radiometry (continued)

Measurements of downwelling irradiance using a diffuse reflectance standard and calibrated radiometer for validation of modeled bias errors

B. Carol Johnson and Thomas Larason (NIST, Sensor Science Division)

Mid-infrared tunable diode laser spectroscopy for the detection of fugitive methane emissions

Jalal Norooz Oliae, N. Sabourin, J. A. Gupta, P. Lobo, K. Thomson and G. Smallwood (NRC Metrology, Ottawa)

Session III – UV and IR Radiation – Measurements, Concerns & Applications

Session Chair: David Sliney

Asymptotics of diffraction corrections in radiometry

Eric L. Shirley (NIST Sensor Science, Gaithersburg, MD, USA)

Combined out-of-range and in-band stray light correction for array spectroradiometers

R. Zuber, and M. Ribnitzky (Gigahertz-Optik GmbH, Türkenfeld, Germany) to be presented by James Leland (Gigahertz-Optik, USA)

Measurement errors due to limitations of lenses to focus wide wavelength light

Tim Moggridge (Westboro Photonics, Ottawa, ON, Canada)

3:45-4:15 Coffee break and vendor exhibit

Session III – UV and IR Radiation – Measurements, Concerns & Applications (continued)

Status Update of the NIST Infrared Optical Properties of Materials Program

Leonard Hanssen, Simon Kaplan, Braden Czaplak and David Deisenroth (NIST, Gaithersburg, MD, USA)

Update on Revisions of Standards for Photobiological Safety of Lamps

David Sliney (Consulting Medical Physicist, Fallston, MD, USA)

CORM 9th Report – Invited Talks – (5 minutes each)

Chair: James Leland (CORM Director)

Four invited speakers representing: optical equipment manufacturers, optical software, lighting research and optical radiation metrology

Exhibitor Introductions (2 minutes max each)

Chair: Tim Moggridge

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Tuesday Morning 8:30-10:15

Session IV – Optical Properties of Materials

Session Chair: Heather Patrick (NIST)

SIM K6 – The regional intercomparison for spectral transmittance

Catherine Cooksey (NIST, Gaithersburg, MD, USA)

Heading down the profiling rabbit hole

Dave Wyble (Avian Technologies, New London, NH, USA)

NIST high-accuracy index measurements of IR materials

John Burnett (NIST, Gaithersburg, MD, USA)

Development of a new absolute diffuse reflectometer at NRC: status and outlook

Luke Sandilands, Éric Côté and Joanne Zwinkels (NRC Metrology, Ottawa, ON, Canada)

9:45-10:15 **Registration for CIE-only attendees**

10:15-10:45 **Coffee break and vendor exhibit**

Poster Session for Students/ Emerging Professionals

Chair: Mark Jongewaard (LTI Optics)

10:45-11:05 **Presented Posters (3 minutes each)** in NRC Sussex auditorium

Investigation of controllable-tone lighting systems using phosphor and UV LEDs with different peak wavelengths

Narufumi Kawanobe (Kanagawa Institute of Technology, Japan)

What we do with NON-STANDARD samples in NRC Spectrophotometry Team

Stacey Lee (NRC Metrology, Ottawa, ON, Canada)

Spatial uniformity and spectral responsivity measurements of large area indium gallium arsenide and germanium photodiodes

Allison Sibley (NRC Metrology, Ottawa, ON, Canada)

A real-time spatial photobiological light monitoring and control system

Mojtaba Parsaee (École d'Architecture, Université Laval, QC, Canada)

Sensor selection and integration into a wearable sensor array for human health monitoring

Mohammed Adnan Shareef , William J. Mills III and Kevin B. Martin (Northern Illinois University, Dekalb, IL, USA)

Evaluation of calibration intervals for spectrometers and photometers

Ken Tsui, Justin Cathey, Matthew Bikun, Kevin B. Martin and William J. Mills III (Northern Illinois University, Dekalb, IL, USA)

11:05-11:15 **Set-up for CIE/CORM Poster Session**

11:15-12:00 **Poster Session** in vendor area

12:00-12:15 Judging of the Posters (by Officers representing: CORM, CNC/CIE and CIE-USNC)

12:00-1:15 Lunch (provided) in vendor exhibit area

Tuesday Afternoon 1:15-5:40 PM

Session V – LED Lighting for Specialized, Industrial or Commercial Applications

Session Chair: Yuqin Zong (NIST)

Specifying LED colors for horticultural lighting

Ian Ashdown (SunTracker Technologies, Victoria, BC, Canada)

Comparison of LM-85 LED measurement techniques

Jeff Hulett (Vektrex, San Diego, California, USA)

Solid-state lighting measurement activities at the National Research Council of Canada

Amin Rasoulof, William Neil, Éric Côté and Arnold Gaertner (NRC Metrology, Ottawa, ON, Canada)

Overcoming metamerism when calibrating colorimeters used for display measurement

Greg McKee (Labsphere Inc., North Sutton, NH, USA)

3:30-4:00 PM Coffee break and vendor exhibit

Session VI– Health and Well-Being Responses to Light and their Measurement

Session Chair: Jennifer Veitch (NRC)

Experimental evaluation of optical filters for reduction of blue light hazard and circadian stimulus

William J. Mills, III, Kevin B. Martin, Justin L. Cathey and Ken Tsui (Northern Illinois University, USA)

Evaluating the circadian experience of supportive living residents

Sandy Byers, D. Hetrick, J. Kline, D. Northcutt, Paul Ward, D. Olguin, E. Schumacher, E. Valdivia, and K. van den Wymelenberg, University of Oregon, USA)

Ameliorations in both mood and subjective sleep following light: an open-label light therapy intervention study

Ashley Nixon¹, M. Strick², N. Glozier³, K-L Fields³, R. Wallis³, D. Biddle³, C.Chan³, I. Hickie³, J. De Koninck¹ and R. Robillard¹ (1 The Royal's Institute of Mental Health Research, affiliated with University of Ottawa, Canada; ² The Royal Ottawa Mental Health Centre, Ottawa; ³ Clinical Research Unit, Brain & Mind Centre, The University of Sydney, AU)

Health and well-being responses to daylighting in northern buildings

Mojtaba Parsaee¹, C. M.H. Demers¹, M. Hébert², J-F Lalonde³ and A. Potvin¹ (¹ GRAP, École d'Architecture, Université Laval, Québec, QC, Canada; ² CERVO Brain Research Centre, Faculty of Medicine, Université Laval; ³ Computer Vision and System Lab, Dept. of Electrical and Computer Engineering, Université Laval, Canada)

5:45 PM Bus pick-up at NRC Sussex to go to Canadian Museum of History

6:00 PM Reception and Dinner at Canadian Museum of History, Gatineau, QC

7:00 PM Franc Grum Memorial Dinner and Lecture

Guest Speaker: Ian Ashdown (President, SunTracker Technologies)

“Metric Follies, or the Folly of Metrics”

9:15 PM Bus pick-up at Canadian Museum of History to go to Chateau Laurier

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Wednesday Morning 8:30 to 12:00 PM

Session VII – Interior and Exterior Lighting

Session Chair: Venkat Venkataramanam (University of Toronto)

Photobiological lighting adaptation scenarios for healthy adaptive buildings

Mojtaba Parsaee¹, Claude M.H. Demers¹, Marc Hébert², Jean-François Lalonde³ and André Potvin¹

(¹ GRAP, École d'Architecture, Université Laval, Québec, QC, Canada, ² CERVO Brain Research Centre, Faculty of Medicine, Université Laval, ³ Computer Vision and System Lab, Dept. of Electrical and Computer Engineering, Université Laval, Canada)

Temporal light modulation: Research progresses, but questions remain

Jennifer A. Veitch (NRC Construction, Ottawa, ON, Canada)

An open service software solution for data acquisition, management and analysis for spectrometric measurements

Kevin B. Martin, William J. Mills III and Matthew Bikun (Northern Illinois University, Dekalb, IL, USA)

Session VIII – Vision and Colour

Session Chair: Jeff Hovis (University of Waterloo)

Color Discrimination

Tony Esposito (Lighting Research Solutions LLC, Boston, MA, USA)

10:15-10:45 Coffee break and vendor exhibit

Quantifying perceived chroma and hue changes of object colors in lighting due to Hunt Effect

Yuki Kawashima and Yoshi Ohno (NIST, Gaithersburg, USA)

Assessing color disagreement due to diversity in spectral sensitivity functions

Lorne Whitehead¹ and Michael Royer² (¹ University of British Columbia, Vancouver, BC Canada; ² Pacific Northwest National Laboratory, Portland, OR, USA)

Vision experiment on perception of correlated color temperature

Yoshi Ohno¹ and Semin Oh² (¹ NIST, Gaithersburg, USA; ² Ulsan National Institute of Science and Technology, Ulsan, South Korea)

Color vision challenges in perceptual displays for automobiles

Jeremie Gerhardt, Hyunjin Yoo, Tara Akhavan and Hossein Ziaei Nafchi (IRYStec Software, Inc., Montreal, QC, Canada)

Photopic and mesopic visual resolution in Parkinson's disease patients with and without freezing of gait

Jeffery K. Hovis¹, Mosaad. Alhassan² and Quincy. J. Almeida³ (¹ School of Optometry & vision Science, University of Waterloo, Waterloo, ON, Canada; ² Dept of Optometry & Vision Science, College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia; ³ Sun Life Financial Movement Disorders Research and Rehabilitation Center, Wilfrid Laurier University, Waterloo, ON, Canada)

12:05-12:20 CORM Business Meeting and Poster Award Announcement

12:20-1:20 Lunch (provided) in vendor exhibit area

1:30 PM Bus departs for NRC Montreal Road campus

2:00-4:15 PM **Tour of the NRC Photometry and Radiometry Labs at 1200 Montreal Road**

4:30 PM Bus departs for return to NRC Sussex

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Thursday Morning 8:30 – 12:00

CNC/CIE and CIE-USNC Plenary Session in Room 3001, NRC Sussex

Session Chairs: Venkat Venkataramanam (CNC/CIE President) and Jim Leland (CIE-USNC President)

Activity Reports by Country Members (Canada and USA) for CIE Divisions

Division 1 (Jeffrey Hovis, CA and Ellen Carter, USA)

Division 2 (Joanne Zwinkels, CA and Yuqin Zong, USA)

Division 3 (Jennifer Veitch, CA and Terry McGowan, USA)

10:15:10:45 **Coffee break** in the NRC Sussex Library

Division 4 (Cristian Suvagau, CA and Ronald Gibbons, USA)

Division 6 (Sami Qutob, CA and George C. Brainard, USA)

Division 8 (Tara Akhavan, CA and Max Derhak, USA)

12:00-1:30 **Lunch (provided)** in the NRC Sussex Library

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Thursday Afternoon 1:30-5:00

Separate CNC/CIE and CIE-USNC Business Meetings

CIE-USNC in Room 3001, NRC Sussex

CNC/CIE and SMC ISO TC274 in NRC Sussex Board Room, 1st floor

3:00-3:30 **Coffee break** in the NRC Sussex Library
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List of Exhibitors and Sponsors at CORM-CIE 2019 in Ottawa, Canada

Cree Lighting

Gamble Technologies

Gigahertz-Optik

Radiant Vision Systems

PCO-TECH

Westboro Photonics

National Research Council Canada