# Contents

- Conference Committee  
  ix  
- Introduction  

## CRYOGENIC OPTICAL PROPERTIES AND INSTRUMENT TECHNOLOGY I

6692 02  
**High-fidelity cryothermal test of a subscale large space telescope** [6692-01]  
M. DiPirro, J. Tuttle, S. Ollendorf, A. Mattern, D. Leisawitz, M. Jackson, J. Francis, T. Hait, NASA Goddard Space Flight Ctr. (USA); P. Cleveland, Energy Solutions International, LLC (USA); D. Muheim, NASA Goddard Space Flight Ctr. (USA); A. J. Mastropietro, Jet Propulsion Lab. (USA)

6692 04  
**Temperature-dependent refractive index of CaF2 and Infrasil 301** [6692-03]  
D. B. Leviton, B. J. Frey, T. J. Madison, NASA Goddard Space Flight Ctr. (USA)

6692 05  
**Cryogenic temperature-dependent refractive index measurements of N-BK7, BaLKN3, SF15, and E-SF03** [6692-04]  
B. J. Frey, D. B. Leviton, T. J. Madison, NASA Goddard Space Flight Ctr. (USA); Q. Gong, ATK (USA); M. Tecza, Univ. of Oxford (United Kingdom)

6692 06  
**Temperature evolution of exciton absorptions in Cd1-xZnxTe materials** [6692-05]  
M. A. Quijada, R. Henry, NASA Goddard Space Flight Ctr. (USA)

## CRYOGENIC OPTICAL PROPERTIES AND INSTRUMENT TECHNOLOGY II

6692 07  
**Cryogenic system for interferometric measurement of dimensional changes at 40 K: design and performance** [6692-06]  
P. Blake, F. Miller, NASA Goddard Space Flight Ctr. (USA); T. Zukowski, Research Support Instruments (USA); E. R. Canavan, NASA Goddard Space Flight Ctr. (USA); A. Crane, ATK (USA); T. Madison, NASA Goddard Space Flight Ctr. (USA); D. Miller, Bastion Technologies, Inc. (USA)

6692 08  
**A cryogenic tunable Fabry-Perot interferometer for astronomical observations** [6692-07]  

6692 09  
**Design and development of a cryogenic Michelson interferometer** [6692-08]  
P. Lagueux, M. Chamberland, F. Marcotte, A. Villermaire, Telops, Inc. (Canada)

6692 0A  
**The development of a breadboard cryogenic optical delay line for Darwin** [6692-09]  
T. C. van den Dool, F. Karphues, W. L. M. Gielesen, B. C. Braam, TNO Science and Industry (Netherlands); N. Loix, Micromega-Dynamics (Belgium); P. P. Kooijman, SRON (Netherlands); G. Velsink, Dutch Space (Netherlands); Y. Stockman, CSL (Belgium); J. Benoit, Thales Alenia Space (France); F. Sève, SAGEIS-CSO (France)
Mid-infrared instrumentation for the European Extremely Large Telescope [6692-10]
S. Kendrew, B. Brandl, Leiden Observatory, Univ. of Leiden (Netherlands); R. Lenzen, Max Planck Institute for Astronomy (Germany); L. Venema, Astron (Netherlands); H. U. Käufl, G. Finger, ESO (Germany); A. Glasse, UK Astronomy Technology Ctr. (United Kingdom); R. Stuik, Leiden Observatory, Univ. of Leiden (Netherlands)

NIRCam fold mirror and mount designs [6692-16]
A. Nordt, M. Jacoby, B. Biggs, T. Kvamme, T. Cahoon, Lockheed Martin Advanced Technology Ctr. (USA)

Cryo-test results of NIRCam optical elements [6692-17]
L. W. Huff, L. A. Ryder, E. T. Kvamme, Lockheed Martin Advanced Technology Ctr. (USA)

Cryogenic measurements of the dichroic beam splitter for the NIRCam instrument [6692-18]
Y. Mao, L. W. Huff, Lockheed Martin Advanced Technology Ctr. (USA); W. Hendricks, C. Kennemore, JDS Uniphase Corp. (USA)

A second generation low stress cryogenic mount for space-borne lithium fluoride optics [6692-19]
E. T. Kvamme, M. Jacoby, Lockheed Martin Advanced Technology Ctr. (USA)

NIRCam thermal subsystem [6692-20]
L. Osborne, Lockheed Martin Advanced Technology Ctr. (USA)

JWST-MIRI spectrometer main optics qualification and verification [6692-21]
M. Meijers, A. Oudenhuysen, T. Schoenmaker, G. Kroes, ASTRON (Netherlands); R. Jager, NOVA (Netherlands); E. Pauwels, PiE B.V. (Netherlands)

MIRI telescope simulator (MTS) folding mirrors [6692-22]

Overview of the near infrared spectrograph (NIRSpec) instrument on-board the James Webb Space Telescope (JWST) [6692-23]
G. Bagnasco, European Space Agency (Netherlands); M. Kolm, EADS Astrium GmbH (Germany); P. Ferruit, Univ. de Lyon, CNRS (France); K. Honnen, J. Koehler, R. Lemke, M. Maschmann, M. Melf, G. Noyer, EADS Astrium GmbH (Germany); P. Rumler, J.-C. Salvignol, P. Strada, M. Te Plate, European Space Agency (Netherlands)

Physical optics model for simulating the optical performance of the NIRSpec [6692-24]
M. te Plate, J. L. Alvarez, P.-A. Frugier, European Space Agency (Netherlands); P. Marenaci, EADS Astrium GmbH (Germany)
**6692 0P** Photogrammetric metrology for the James Webb Space Telescope integrated science instrument module [6692-26]
M. Nowak, NASA Goddard Space Flight Ctr. (USA); A. Crane, Alliant Techsystems, Inc. (USA); P. Davila, W. Eichhorn, NASA Goddard Space Flight Ctr. (USA); J. Gill, ManTech, Inc. (USA); A. Herrera, Alliant Techsystems, Inc. (USA); M. Hill, J. Hylan, NASA Goddard Space Flight Ctr. (USA); M. Jetten, Northrop Grumman Space Technology (USA); J. Marsh, R. Ohl, NASA Goddard Space Flight Ctr. (USA); R. Quigley, Alliant Techsystems, Inc. (USA); K. Redman, ManTech, Inc. (USA); H. Sampler, G. Wright, NASA Goddard Space Flight Ctr. (USA); P. Young, Young Engineering Services, Inc. (USA)

**6692 0Q** Thermal analysis and seeing improvement of LAMOST enclosure [6692-27]
Z. Chen, H. Shi, Hangzhou Dianzi Univ. (China) and National Astronomical Observatories (China); R. Li, Z. Yao, W. Hao, National Astronomical Observatories (China)

**6692 0R** Optical alignment of the JWST ISIM to the OTE simulator (OSIM): current concept and design studies [6692-29]
B. J. Frey, P. S. Davila, J. G. Hagopian, J. M. Marsh, R. G. Ohl, M. E. Wilson, NASA Goddard Space Flight Ctr. (USA); P. J. Young, Young Engineering Services (USA)

**6692 0S** Calculation of the effect of ice on the transmission of the James Webb Space Telescope [6692-30]
J. Arenberg, Northrop Grumman Space Technology (USA)

Author Index
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1  Cryogenic Optical Properties and Instrument Technology I
   Raymond G. Ohl IV, NASA Goddard Space Flight Center (USA)

2  Cryogenic Optical Properties and Instrument Technology II
   David M. Chaney, Ball Aerospace and Technologies Corporation (USA)

3  Cryogenic Mechanisms and Refrigeration Technology
   Theodore D. Swanson, NASA Goddard Space Flight Center (USA)

4  Space Cryogenic Systems I
   E. Todd Kvamme, Lockheed Martin Advanced Technology Center (USA)

5  Space Cryogenic Systems II
   Mark T. Stier, Goodrich Corporation (USA)

6  Space Cryogenic Systems III
   Leigh A. Ryder, Lockheed Martin Advanced Technology Center (USA)
Introduction

This volume contains the proceedings of our 12th Cryogenic Optical Systems and Instrumentation Conference that was held in San Diego, 26–30 August 2007. Previous books in this series include SPIE volumes 509 (1984), 619 (1986), 973 (1988), 1340 (1990), 1765 (1992), 2227 (1994), 2814 (1996), 3435 (1998), 4131* (2000), 4822 (2002), 5172 (2003), and 5904 (2005). Taken together, these yellow-covered proceedings are a veritable library documenting more than two decades of technological advances related to the design, development, testing and performance of optical components and instruments and the mechanisms and techniques used to cool and maintain them at cryogenic temperatures. The international community is well represented in their contents.

From the beginning, the needs of the aerospace community have had a formative influence on the evolution of this technology. Space satellite missions such as UARS, COBE, SIRTF (Spitzer), Cassini, WMAP, et al. have contained instrumentation that was required to operate at temperatures near absolute zero. Their design, testing, and performance evaluation challenged their cryogenic engineering and forced an advancement of the state-of-the-art. In our most recent conferences in 2005 and 2007, NASA’s JWST mission, with its joint NASA/ESA instrumentation suite, has contributed significantly to the contents of Vol. 5904 and this current volume. A statement of the challenges confronted and the clever engineering remedies applied can be found in the papers contained in these proceedings.

We now know that the average temperature of the universe is closer to absolute zero than the anomalously hot portion of that universe that we inhabit. The exploitation of cryogenic technology enables us to travel from our world into the universe beyond, extracting knowledge of our own origins as we go. If we take a step back from the intricately complex details of the cryogenic technology discussed in these pages and view its workings from a more distant and philosophical perspective, we can understand cryogenic optical systems and instruments as an enabling technology that underpins our ability to explore the universe around us and to find our place within it. It is a worthwhile way to spend one’s time.

Lawrence G. Burriesci
James B. Heaney

*Joint with Infrared Spaceborne Remote Sensing VIII