

# PROCEEDINGS OF SPIE

## ***Target Diagnostics Physics and Engineering for Inertial Confinement Fusion***

**Perry Bell**  
**Gary P. Grim**  
*Editors*

**14 August 2012**  
**San Diego, California, United States**

Sponsored and Published by  
SPIE

**Volume 8505**

Proceedings of SPIE 0277-786X, V. 8505

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Target Diagnostics Physics and Engineering for Inertial Confinement Fusion,  
edited by Perry Bell, Gary P. Grim, Proc. of SPIE Vol. 8505, 850501 · © 2012 SPIE  
CCC code: 0277-786X/12/\$18 · doi: 10.1117/12.2012091

Proc. of SPIE Vol. 8505 850501-1

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Target Diagnostics Physics and Engineering for Inertial Confinement Fusion*, edited by Perry Bell, Gary P. Grim, Proceedings of SPIE Vol. 8505 (SPIE, Bellingham, WA, 2012) Article CID Number.

ISSN: 0277-786X

ISBN: 9780819492227

Published by

**SPIE**

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2012, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at [copyright.com](http://copyright.com). Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/12/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.



[SPIEDigitalLibrary.org](http://SPIEDigitalLibrary.org)

---

**Paper Numbering:** Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID Number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID Number.

# Contents

vii Conference Committee

---

## SESSION 1 DIAGNOSTIC SYSTEMS

---

- 8505 02 **Picosecond optical MCPI-based imagers** [8505-1]  
R. A. Buckles, R. L. Guyton, P. W. Ross, National Security Technologies, LLC (United States)
- 8505 04 **A compact UV timing fiducial system for use with x-ray streak cameras at NIF** [8505-3]  
D. Homolle, M. Bowers, D. Browning, S. Burns, G. Erbert, B. Golick, J. Haley, T. McCarville, Y. Opachich, E. Padilla, N. Palmer, B. Perfect, L. Pelz, T. Spinka, A. Throop, J. N. Wong, Lawrence Livermore National Lab. (United States)
- 8505 05 **Measuring x-ray burn history with the Streaked Polar Instrumentation for Diagnosing Energetic Radiation (SPIDER) at the National Ignition Facility (NIF)** [8505-4]  
S. F. Khan, P. M. Bell, D. K. Bradley, S. R. Burns, J. R. Celeste, L. S. Dauffy, M. J. Eckart, M. A. Gerhard, C. Hagmann, Lawrence Livermore National Lab. (United States); D. I. Headley, Sandia National Labs. (United States); J. P. Holder, N. Izumi, Lawrence Livermore National Lab. (United States); M. C. Jones, J. W. Kellogg, Sandia National Labs. (United States); H. Y. Khater, J. R. Kimbrough, A. G. Macphee, Y. P. Opachich, N. E. Palmer, R. B. Petre, Lawrence Livermore National Lab. (United States); J. L. Porter, Sandia National Labs. (United States); R. T. Shelton, T. L. Thomas, J. B. Worden, Lawrence Livermore National Lab. (United States)
- 8505 06 **Performance improvements of PCDs for measuring x-ray bang time** [8505-5]  
J. R. Kimbrough, A. G. MacPhee, P. M. Bell, S. R. Burns, J. M. Parker, Lawrence Livermore National Lab. (United States)
- 8505 07 **Mach-Zehnder modulator performance using the Comet laser facility and implications for use on NIF** [8505-6]  
B. Beeman, A. G. MacPhee, J. R. Kimbrough, G. A. Lacaille, M. A. Barrios, J. Emig, J. R. Hunter, Lawrence Livermore National Lab. (United States); E. K. Miller, National Security Technology (United States); W. R. Donaldson, Univ. of Rochester (United States)
- 8505 08 **Calibrating of x-ray detectors in the 8 to 111 keV energy range and their application to diagnostics on the National Ignition Facility** [8505-7]  
J. J. Lee, M. J. Haugh, National Security Technologies, LLC (United States); G. LaCaille, Lawrence Livermore National Lab. (United States); P. Torres, National Security Technologies, LLC (United States)

---

**SESSION 2    DIAGNOSTIC ALIGNMENT SYSTEMS**

---

- 8505 09 **An overview of target and diagnostic alignment at the National Ignition Facility (Invited Paper) [8505-8]**  
D. H. Kalantar, P. Di Nicola, N. Shingleton, S. Burkhart, J. Dzenitis, J. Klingmann, J. Lawson, J. Lutz, D. Manha, A. M. Manuel, T. McCarville, E. Palma, D. Pigg, K. Widmann, R. Wood, Lawrence Livermore National Lab. (United States)
- 8505 0A **Alignment of an x-ray imager line of sight in the National Ignition Facility (NIF) target chamber using a Diagnostic Instrument Manipulator (DIM) and Opposed Port Alignment System (OPAS) [8505-9]**  
N. Shingleton, D. Kalantar, R. Wood, T. McCarville, J. Klingmann, A. Manuel, Lawrence Livermore National Lab. (United States)
- 8505 0B **Beam and target alignment at the National Ignition Facility using the Target Alignment Sensor (TAS) [8505-10]**  
P. Di Nicola, D. Kalantar, T. McCarville, J. Klingmann, S. Alvarez, R. Lowe-Webb, J. Lawson, P. Datte, P. Danforth, M. Schneider, J.-M. Di Nicola, J. Jackson, C. Orth, S. Azevedo, R. Tommasini, A. Manuel, R. Wallace, Lawrence Livermore National Lab. (United States)

---

**SESSION 3    SENSOR DEVELOPMENT**

---

- 8505 0C **Testing of CMOS devices in NIF's harsh neutron environment [8505-11]**  
A. T. Teruya, P. M. Bell, S. Burns, C. Hagmann, J. D. Moody, M. Richardson, Lawrence Livermore National Lab. (United States)
- 8505 0D **Design and testing of a mega pixel CMOS charge dump and read camera [8505-12]**  
J. R. Kimbrough, J. D. Moody, P. M. Bell, Lawrence Livermore National Lab. (United States)
- 8505 0F **Performance of a 512 x 512 gated CMOS imager with a 250 ps exposure time [8505-14]**  
A. T. Teruya, S. P. Vernon, J. D. Moody, W. W. Hsing, Lawrence Livermore National Lab. (United States); C. G. Brown, M. Griffin, A. S. Mead, V. Tran, National Security Technologies, LLC (United States)

---

**SESSION 4    DIAGNOSTIC IMAGING SYSTEMS**

---

- 8505 0G **High resolution imaging systems for inertial confinement fusion experiments [8505-15]**  
D. Dennetiere, CEA, DAM (France); P. Audebert, Ecole Polytechnique, CNRS (France); R. Bahr, Univ. of Rochester (United States); S. Bole, J. L. Bourgade, CEA, DAM (France); B. Brannon, Univ. of Rochester (United States); F. Girard, CEA, DAM (France); G. Pien, Univ. of Rochester (United States); P. Troussel, CEA, DAM (France)
- 8505 0H **Performance measurements of the DIXI (dilation x-ray imager) photocathode using a laser produced x-ray source [8505-16]**  
S. R. Nagel, M. J. Ayers, B. Felker, Lawrence Livermore National Lab. (United States); T. J. Hilsabeck, T. Chung, General Atomics (United States); R. F. Smith, P. M. Bell, D. K. Bradley, G. W. Collins, Lawrence Livermore National Lab. (United States); J. D. Kilkenny, B. Sammuli, General Atomics (United States); J. D. Hares, A. K. L. Dymoke-Bradshaw, Kentech Instruments Ltd. (United Kingdom)

- 8505 0I **Measurement of cathode luminescence efficiency of phosphors for micro-channel plate based x-ray framing cameras** [8505-17]  
N. Izumi, J. Emig, J. Moody, C. Middleton, J. Holder, S. Glenn, Lawrence Livermore National Lab. (United States); T. Pond, R. Shellman, M. Cardenas, National Security Technologies, LLC (United States); P. J. Walsh, Los Alamos National Lab. (United States); S. J. Chelli, Deposition Research Lab., Inc. (United States); D. K. Bradley, P. M. Bell, Lawrence Livermore National Lab. (United States)
- 8505 0J **Design and implementation of high magnification framing camera for NIF “ARIANE Light”** [8505-18]  
J. Ayers, B. Felker, V. Smalyuk, N. Izumi, K. Piston, J. Holder, G. Power, F. Allen, N. Simanovska , P. Bell, D. Bradley, Z. Lamb, Lawrence Livermore National Lab. (United States)
- 8505 0K **A new gated x-ray detector for the Orion laser facility** [8505-19]  
D. D. Clark, R. Aragonez, T. Archuleta, V. Fatherley, A. Hsu, J. Jorgenson, D. Mares, J. Oertel, Los Alamos National Lab. (United States); K. Oades, P. Kemshall, P. Thomas, T. Young, Atomic Weapons Establishment (United Kingdom); N. Pederson, VI Control Systems (United States)
- 8505 0L **Crystal imager development at the Laboratory for Laser Energetics** [8505-20]  
C. Mileham, C. Stoeckl, W. Theobald, G. Fiksel, D. Guy, R. K. Junquist, P. M. Nilson, T. C. Sangster, M. J. Shoup III, Univ. of Rochester (United States)

*Author Index*



# Conference Committee

## Program Track Chair

**Carolyn A. MacDonald**, University at Albany (United States)

## Conference Chairs

**Perry Bell**, Lawrence Livermore National Laboratory (United States)  
**Gary P. Grim**, Los Alamos National Laboratory (United States)

## Conference Program Committee

**W. Jack Armstrong**, University of Rochester (United States)  
**David K. Bradley**, Lawrence Livermore National Laboratory  
(United States)  
**John Dzenitis**, Lawrence Livermore National Laboratory  
(United States)  
**Frank Merrill**, Los Alamos National Laboratory (United States)  
**John A. Oertel**, Los Alamos National Laboratory (United States)  
**T. Craig Sangster**, University of Rochester (United States)

## Session Chairs

- 1 Diagnostic Systems  
**Perry Bell**, Lawrence Livermore National Laboratory (United States)
- 2 Diagnostic Alignment Systems  
**Gary P. Grim**, Los Alamos National Laboratory (United States)
- 3 Sensor Development  
**David D. Clark**, Los Alamos National Laboratory (United States)
- 4 Diagnostic Imaging Systems  
**Gary P. Grim**, Los Alamos National Laboratory (United States)

