PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 9149

, "Front Matter: Volume 9149," Proc. SPIE 9149, Observatory Operations: Strategies, Processes, and Systems V, 914901 (20 August 2014); doi: 10.1117/12.2075349

SPIE.

Event: SPIE Astronomical Telescopes + Instrumentation, 2014, Montréal, Quebec, Canada

PROCEEDINGS OF SPIE

Observatory Operations: Strategies, Processes, and Systems V

**Alison B. Peck
Chris R. Benn
Robert L. Seaman**
Editors

**25–27 June 2014
Montréal, Canada**

Sponsored by
SPIE

Cooperating Organizations
American Astronomical Society (United States) • Australian Astronomical Observatory (Australia) • Association of Universities for Research in Astronomy (AURA) • Canadian Astronomical Society (CASCA) (Canada) • Canadian Space Agency (Canada) • European Astronomical Society (Switzerland) • European Southern Observatory (Germany) • National Radio Astronomy Observatory • Royal Astronomical Society (United Kingdom) • Science & Technology Facilities Council (United Kingdom)

Published by
SPIE

Volume 9149
Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 9149

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

Observatory Operations: Strategies, Processes, and Systems V, edited by Alison B. Peck,
Chris R. Benn, Robert L. Seaman, Proc. of SPIE Vol. 9149, 914901 · © 2014 SPIE
CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2075349

Proc. of SPIE Vol. 9149 914901-1

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 *Observatory Operations: Strategies, Processes, and Systems V*, edited by Alison B. Peck, Chris R. Benn, Robert L. Seaman, Proceedings of SPIE Vol. 9149 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X

ISBN: 9780819496171

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 © 2014, 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. 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/14/\$18.00.

Printed in the United States of America.

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

SPIDigitalLibrary.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

xv Conference Committee

Part One

ARCHIVE OPERATIONS AND DATA FLOW

- 9149 02 **The ALMA archive and its place in the astronomy of the future** [9149-1]
F. Stoehr, European Southern Observatory (Germany); M. Lacy, National Radio Astronomy Observatory (United States); S. Leon, Joint ALMA Observatory (Chile); E. Muller, National Astronomical Observatory of Japan (Japan); A. Manning, C. Moins, European Southern Observatory (Germany); D. Jenkins, Canadian Astronomy Data Ctr. (Canada)
- 9149 03 **Data products in the ESO Science Archive Facility** [9149-2]
J. Retzlaff, M. Arnaboldi, M. Romaniello, P. Ballester, European Southern Observatory (Germany); P. Carson, Terma GmbH (Germany); N. Delmotte, V. Forchi, W. Freudling, A. Gabasch, C. E. Garcia-Dabo, R. Hanuschik, W. Hummel, M. Klein Gebbinck, J. Lockhart, A. Micol, A. Modigliani, I. Percheron, European Southern Observatory (Germany); A. Szostak, Informate International SA/NV (Belgium); I. Vera Sequeiros, European Southern Observatory (Germany)
- 9149 04 **JWST science data products** [9149-3]
D. Swade, H. Bushouse, G. Greene, M. Swam, Space Telescope Science Institute (United States)
- 9149 05 **Telluric-line subtraction in high-accuracy velocimetry: a PCA-based approach** [9149-4]
É. Artigau, Observatoire du Mont-Méganitic, Univ. de Montréal (Canada); N. Astudillo-Defru, X. Delfosse, Institut de Planétologie et d'Astrophysique de Grenoble, CNRS, Univ. Joseph Fourier (France); F. Bouchy, X. Bonfils, Lab. d'Astrophysique de Marseille, CNRS, Aix Marseille Univ. (France); C. Lovis, F. Pepe, Observatoire Astronomique de l'Univ. de Genève (Switzerland); C. Moutou, Canada-France-Hawaii Telescope Corp. (United States); J.-F. Donati, Institut de Recherche en Astrophysique et Planétologie, CNRS, Univ. de Toulouse (France); R. Doyon, Observatoire du Mont-Méganitic, Univ. de Montréal (Canada); L. Malo, Canada-France-Hawaii Telescope Corp. (United States)

TIME DOMAIN FOLLOW-UP I

- 9149 06 **Reengineering observatory operations for the time domain** [9149-5]
R. L. Seaman, National Optical Astronomy Observatory (United States); W. T. Vestrand, Los Alamos National Lab. (United States); F. V. Hessman, Georg-August-Univ. Göttingen (Germany)
- 9149 07 **Prospects and challenges in the electromagnetic follow-up of LIGO-Virgo gravitational wave transients** [9149-6]
S. Vitale, Massachusetts Institute of Technology (United States)

TIME DOMAIN FOLLOW-UP II

- 9149 08 **ANTARES: a prototype transient broker system** [9149-7]
A. Saha, T. Matheson, National Optical Astronomy Observatory (United States);
R. Snodgrass, J. Kececioglu, The Univ. of Arizona (United States); G. Narayan, R. Seaman,
National Optical Astronomy Observatory (United States); T. Jenness, Cornell Univ. (United
States); T. Axelrod, The Univ. of Arizona (United States)

OPERATIONS BENCHMARKING AND METRICS

- 9149 09 **Tracking progress: monitoring observing statistics and telescope usage at the Southern African Large Telescope** [9149-8]
S. M. Crawford, South African Astronomical Observatory (South Africa); A. Koeslag,
E. Romero Colmenero, D. A. H. Buckley, T. Koen, F. Marang, V. Van Wyk, Southern African
Large Telescope (South Africa); S. Bennett, South African Astronomical Observatory
(South Africa)
- 9149 0A **A bibliometric analysis of observatory publications for the period 2008-2012** [9149-10]
D. R. Crabtree, NRC – Herzberg Institute of Astrophysics (Canada)
- 9149 0B **The LSST metrics analysis framework (MAF)** [9149-11]
R. L. Jones, P. Yoachim, Univ. of Washington (United States); S. Chandrasekharan, National
Optical Astronomy Observatory (United States); A. J. Connolly, Univ. of Washington (United
States); K. H. Cook, Eureka Scientific, Inc. (United States); Ž. Ivezić, K. S. Krughoff, Univ. of
Washington (United States); C. Petry, The Univ. of Arizona (United States); S. T. Ridgway,
National Optical Astronomy Observatory (United States)

PROGRAM AND OBSERVATION SCHEDULING

- 9149 0C **Improving the LSST dithering pattern and cadence for dark energy studies** [9149-12]
C. M. Carroll, Dartmouth College (United States) and Rutgers Univ. (United States);
E. Gawiser, P. L. Kurczynski, R. A. Bailey, Rutgers Univ. (United States); R. Biswas, Argonne
National Lab. (United States); D. Cinabro, Wayne State Univ. (United States); S. W. Jha,
Rutgers Univ. (United States); R. L. Jones, K. S. Krughoff, Univ. of Washington (United States);
A. Sonawalla, The Univ. of Chicago (United States); W. M. Wood-Vasey, Univ. of Pittsburgh
(United States)
- 9149 0D **Planning and scheduling at STScI: from Hubble to the James Webb Space Telescope**
[9149-13]
D. S. Adler, W. Kinzel, I. Jordan, Space Telescope Science Institute (United States)
- 9149 0E **Novel scheduling approaches in the era of multi-telescope networks** [9149-14]
E. S. Saunders, Las Cumbres Observatory Global Telescope (United States); S. Lampoudi,
Liquid Robotics, Inc. (United States); T. A. Lister, M. Norbury, Z. Walker, Las Cumbres
Observatory Global Telescope (United States)

- 9149 OF **Seeing and ground meteorology forecast for site quality and observatory operations** [9149-15]
C. Giordano, J. Vernin, Observatoire de la Côte d'Azur, Lab. J.L. Lagrange, CNRS, Univ. de Nice-Sophia Antipolis (France); C. Muñoz-Tuñón, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain); H. Trinquet, Délégation Générale pour l'Armement (France)
- 9149 OG **The LSST OCS scheduler design** [9149-16]
F. Delgado, G. Schumacher, Cerro Tololo Inter-American Observatory (Chile)
- 9149 OH **Artificial intelligence for the CTA Observatory scheduler** [9149-17]
J. Colomé, Institut de Ciències de l'Espai (Spain); P. Colomer, GTD Sistemas de Información (Spain); J. Campreciós, Institut de Ciències de l'Espai (Spain); T. Coiffard, GTD Sistemas de Información (Spain); E. de Oña, G. Pedaletti, D. F. Torres, A. Garcia-Piquer, Institut de Ciències de l'Espai (Spain)

SCIENCE OPERATIONS I

- 9149 OI **Remote access and operation of telescopes by the scientific users** [9149-18]
P. G. Edwards, S. Amy, D. Brodrick, E. Carretti, S. Hoyle, B. Indermuhle, D. McConnell, S. Mader, P. Mirtschin, B. Preisig, M. Smith, J. Stevens, R. Wark, M. Wieringa, X. Wu, CSIRO Astronomy and Space Science (Australia)
- 9149 OJ **ALMA observations during its first early science cycles** [9149-19]
L.-Å. Nyman, P. Cox, Joint ALMA Observatory/European Southern Observatory (Chile); S. Corder, Joint ALMA Observatory/National Radio Astronomy Observatory (Chile); M. Saito, Joint ALMA Observatory/National Astronomical Observatory of Japan (Chile); A. Lundgren, B. Vila-Vilaro, Joint ALMA Observatory/European Southern Observatory (Chile); D. Espada, Joint ALMA Observatory/National Astronomical Observatory of Japan (Chile); E. Villard, Joint ALMA Observatory/European Southern Observatory (Chile); E. Barrios, Joint ALMA Observatory (Chile); P. Andreani, European Southern Observatory (Germany); J. Hibbard, National Radio Astronomy Observatory (United States); K. Tatematsu, National Astronomical Observatory of Japan (Japan)
- 9149 OL **Flux-calibration of medium-resolution spectra from 300 nm to 2500 nm** [9149-21]
S. Moehler, A. Modigliani, W. Freudling, European Southern Observatory (Germany); N. Giammichele, Univ. de Montréal (Canada); A. Gianninas, The Univ. of Oklahoma (United States); A. Gonneau, Observatoire Astronomique de Strasbourg, CNRS, Univ. de Strasbourg (France); W. Kausch, Univ. of Innsbruck (Austria) and Univ. of Vienna (Austria); A. Lançon, Observatoire Astronomique de Strasbourg, CNRS, Univ. de Strasbourg (France); S. Noll, Univ. of Innsbruck (Austria); T. Rauch, Eberhard Karls Univ. Tübingen (Germany); J. Vinther, European Southern Observatory (Germany)
- 9149 OM **Quantifying photometric observing conditions on Paranal using an IR camera** [9149-22]
F. Kerber, European Southern Observatory (Germany); R. R. Querel, National Institute for Water and Atmospheric Research (New Zealand) and Univ. of Chile (Chile); R. Hanuschik, European Southern Observatory (Germany)

SCIENCE OPERATIONS II

- 9149 ON **Translating PI observing proposals into ALMA observing scripts** [9149-23]
H. S. Liszt, North American Alma Science Ctr., National Radio Astronomy Observatory (United States)
- 9149 OO **Solar Wind Electrons Alphas and Protons (SWEAP) Science Operations Center initial design and implementation** [9149-24]
K. E. Korreck, Smithsonian Astrophysical Observatory (United States); J. C. Kasper, Smithsonian Astrophysical Observatory (United States) and Univ. of Michigan (United States); A. W. Case, P. Daigneau, J. A. Bookbinder, Smithsonian Astrophysical Observatory (United States); D. Larson, J. S. Halekas, Univ. of California, Berkeley (United States); M. Stevens, Smithsonian Astrophysical Observatory (United States); M. Ludlam, W. Marchant, Univ. of California, Berkeley (United States)
- 9149 OP **GBOT: ground based optical tracking of the Gaia satellite** [9149-25]
M. Altmann, Univ. Heidelberg (Germany) and SYRTE, Observatoire de Paris (France); S. Bouquillon, F. Tais, SYRTE, Observatoire de Paris (France); I. A. Steele, Liverpool John Moores Univ. (United Kingdom); R. L. Smart, INAF - Osservatorio Astronomico di Torino (Italy); A. H. Andrei, SYRTE, Observatoire de Paris (France) and INAF - Osservatorio Astronomico di Torino (Italy) and Observatório Nacional (Brazil) and Observatorio de Valongo (Brazil); C. Barache, T. Carlucci, SYRTE, Observatoire de Paris (France); S. G. Els, Univ. Heidelberg (Germany) and European Space Astronomy Ctr. (Spain)
- 9149 OQ **The Gaia payload uplink commanding system** [9149-26]
A. Mora, European Space Astronomy Ctr. (Spain) and Aurora Technology BV (Netherlands); A. Abreu, European Space Astronomy Ctr. (Spain) and Elecnor Deimos (Spain); N. Cheek, European Space Astronomy Ctr. (Spain) and Serco Gestión de Negocios (Spain); C. M. Crowley, European Space Astronomy Ctr. (Spain) and HE Space Operations BV (Netherlands); R. Guerra, European Space Astronomy Ctr. (Spain) and GMV (Spain); J. Hernández, European Space Astronomy Ctr. (Spain); E. Joliet, European Space Astronomy Ctr. (Spain) and HE Space Operations BV (Netherlands); R. Kohley, European Space Astronomy Ctr. (Spain); J. Martin-Fleitas, European Space Astronomy Ctr. (Spain) and Aurora Technology (Netherlands); J. Osinde, European Space Astronomy Ctr. (Spain) and Ingeniería de Sistemas para la Defensa de España (Spain); H. Siddiqui, European Space Astronomy Ctr. (Spain) and Telespazio Vega UK Ltd. (United Kingdom)
- 9149 OR **NuSTAR observatory science operations: on-orbit acclimation** [9149-27]
K. Forster, F. A. Harrison, California Institute of Technology (United States); S. R. Dodd, D. K. Stern, Jet Propulsion Lab. (United States); H. Miyasaka, K. K. Madsen, B. W. Grefenstette, California Institute of Technology (United States); C. B. Markwardt, NASA Goddard Space Flight Ctr. (United States); W. W. Craig, Univ. of California, Berkeley (United States); F. E. Marshall, NASA Goddard Space Flight Ctr. (United States)

OPERATIONS AND DATA QUALITY CONTROL

- 9149 OS **Focus and alignment of the Space Surveillance Telescope: procedures and year 2 performance results** [9149-28]
D. Freedman Woods, R. L. Lambour, W. J. Faccenda, J. D. Ruprecht, E. C. Pearce, MIT Lincoln Lab. (United States); R. Y. Shah, Citizen Scientist (United States); M. E. Cornell, MIT Lincoln Lab. (United States)
- 9149 OT **Highly automated on-orbit operations of the NuSTAR telescope** [9149-29]
B. Roberts, M. Bester, R. Dumlao, M. Eckert, S. Johnson, M. Lewis, J. McDonald, D. Pease, G. Picard, J. Thorsness, Univ. of California, Berkeley (United States)
- 9149 OU **An update on the status and performance of the Radiometric All-Sky Infrared Camera (RASICAM)** [9149-30]
Kevin Reil, SLAC National Accelerator Lab. (United States) and Kavli Institute for Particle Astrophysics and Cosmology, Stanford Univ. (United States); Peter Lewis, Univ. of Hawaii [United States]; Rafe Schindler, Zhang Zhang, SLAC National Accelerator Lab. (United States) and Kavli Institute for Particle Astrophysics and Cosmology, Stanford Univ. (United States)
- 9149 OV **The Dark Energy Survey and operations: Year 1** [9149-31]
H. T. Diehl, Fermi National Accelerator Lab. (United States); T. M. C. Abbott, NOAO, Cerro Tololo Inter-American Observatory (Chile); J. Annis, Fermi National Accelerator Lab. (United States); R. Armstrong, Univ. of Pennsylvania (United States); L. Baruah, A. Bermeo, Univ. of Sussex (United Kingdom); G. Bernstein, Univ. of Pennsylvania (United States); E. Beynon, Univ. of Portsmouth (United Kingdom); C. Bruderer, ETH Zürich (Switzerland); E. J. Buckley-Geer, Fermi National Accelerator Lab. (United States); H. Campbell, D. Capozzi, Univ. of Portsmouth (United Kingdom); M. Carter, Univ. of Sussex (United Kingdom); R. Casas, Institut de Ciències de l'Espai (Spain); L. Clerkin, Univ. College London (United Kingdom); R. Covarrubias, Univ. of Illinois at Urbana-Champaign (United States); C. Cuhna, Kavli Institute for Particle Astrophysics and Cosmology, Stanford Univ. (United States); C. D'Andrea, Univ. of Portsmouth (United Kingdom); L. da Costa, Lab. Interinstitucional de e-Astronomia (Brazil); R. Das, Univ. of Michigan (United States); D. L. DePoy, Texas A&M Univ. (United States); J. Dietrich, Univ. Observatory Munich (Germany) and Excellence Cluster Universe (Germany); A. Drlica-Wagner, Fermi National Accelerator Lab. (United States); A. Elliott, The Ohio State Univ. (United States); T. Eifler, Univ. of Pennsylvania (United States); J. Estrada, Fermi National Accelerator Lab. (United States); J. Etherington, Univ. of Portsmouth (United Kingdom); B. L. Flaugher, J. Frieman, Fermi National Accelerator Lab. (United States); A. Fausti Neto, Lab. Interinstitucional de e-Astronomia (Brazil); M. Gelman, Univ. of Illinois at Urbana-Champaign (United States); D. Gerdes, Univ. of Michigan (United States); D. Gruen, Univ. Observatory Munich (Germany) and Max Planck Institute for Extraterrestrial Physics (Germany); R. Gruendl, Univ. of Illinois at Urbana-Champaign (United States); J. Hao, Fermi National Accelerator Lab. (United States); H. Head, Austin Peay State Univ. (United States); J. Helsby, Kavli Institute of Cosmological Physics, The Univ. of Chicago (United States); K. Hoffman, Institut de Ciències de l'Espai, CSIC (Spain); K. Honscheid, The Ohio State Univ. (United States); D. James, NOAO, Cerro Tololo Inter-American Observatory (Chile); M. Johnson, Univ. of Illinois at Urbana-Champaign (United States); T. Kacprzac, Univ. College London (United States); J. Katsaros, R. Kennedy, Univ. of Sussex (United Kingdom); S. Kent, Fermi National Accelerator Lab. (United States); R. Kessler, Kavli Institute of Cosmological Physics, The Univ. of Chicago (United States); A. Kim, Lawrence Berkeley National Lab. (United States); E. Krause, Univ. of Pennsylvania (United States); R. Kron, Fermi National Accelerator Lab.

(United States); S. Kuhlmann, Argonne National Lab. (United States); A. Kunder, NOAO, Cerro Tololo Inter-American Observatory (Chile); T. Li, Texas A&M Univ. (United States); H. Lin, Fermi National Accelerator Lab. (United States); N. Maccrann, Univ. of Manchester (United Kingdom); M. March, Univ. of Pennsylvania (United States); J. Marshall, Texas A&M Univ. (United States); E. Neilsen, Fermi National Accelerator Lab. (United States); P. Nugent, Lawrence Berkeley National Lab. (United States); P. Martini, The Ohio State Univ. (United States); P. Melchior, Excellence Cluster Universe (Germany) and The Ohio State Univ. (United States); F. Menanteau, Univ. of Illinois at Urbana-Champaign (United States); R. C. Nichol, Univ. of Portsmouth (United Kingdom); B. Nord, Fermi National Accelerator Lab. (United States); R. Ogando, Lab. Interinstitucional de e-Astronomia (Brazil) and Observatório Nacional (Brazil); L. Old, Cripps Ctr. for Astronomy and Particle Theory, The Univ. of Nottingham (United Kingdom); A. Papadopoulos, Univ. of Portsmouth (United Kingdom); K. Patton, The Ohio State Univ. (United States); D. Petravick, Univ. of Illinois at Urbana-Champaign (United States); A. A. Plazas, Brookhaven National Lab. (United States); R. Poulton, Univ. of Sussex (United Kingdom); A. Pujol, Institut de Ciències de l'Espai, CSIC (Spain); K. Reil, Kavli Institute for Particle Astrophysics and Cosmology, Stanford Univ. (United States); T. Rigby, A. Romer, Univ. of Sussex (United Kingdom); A. Roodman, Kavli Institute for Particle Astrophysics and Cosmology, Stanford Univ. (United States); P. Rooney, Univ. of Sussex (United Kingdom); E. Sanchez Alvaro, Fermi National Accelerator Lab. (United States) and NOAO, Cerro Tololo Inter-American Observatory (Chile); S. Serrano, Institut de Ciències de l'Espai (Spain); E. Sheldon, Brookhaven National Lab. (United States); A. Smith, Austin Peay State Univ. (United States); R. C. Smith, NOAO, Cerro Tololo Inter-American Observatory (Chile); M. Soares-Santos, Fermi National Accelerator Lab. (United States); M. Soumagnac, Univ. College London (United Kingdom); H. Spinka, Argonne National Lab. (United States); E. Suchyta, The Ohio State Univ. (United States); D. Tucker, Fermi National Accelerator Lab. (United States); A. R. Walker, NOAO, Cerro Tololo Inter-American Observatory (Chile); W. Wester, M. Wiesner, Fermi National Accelerator Lab. (United States); H. Wilcox, Univ. of Portsmouth (United Kingdom); R. Williams, Univ. of Sussex (United Kingdom); B. Yanny, Fermi National Accelerator Lab. (United States); Y.-Y. Zhang, Univ. of Michigan (United States)

- 9149 OW **SALSA: a tool to estimate the stray light contamination for low-Earth orbit observatories** [9149-77]
T. Kuntzer, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Observatoire de Sauverny (Switzerland); A. Fortier, W. Benz, Univ. Bern (Switzerland)

USER SUPPORT

- 9149 OY **The European ALMA Regional Centre: a model of user support** [9149-34]
P. Andreani, F. Stoehr, M. Zwaan, E. Hatziminaoglou, A. Biggs, M. Diaz-Trigo, E. Humphreys, D. Petry, S. Randall, T. Stanke, E. van Kampen, European Southern Observatory (Germany); M. Bárta, Astronomical Institute of Czech Academy of Science (Czech Republic); J. Brand, INAF - Istituto di Radioastronomia, Bologna (Italy); F. Gueth, Institut de Radioastronomie Millimétrique (France); M. Hogerheijde, Leiden Observatory, Leiden Univ. (Netherlands); F. Bertoldi, Univ. Bonn (Germany); T. Muxlow, A. Richards, The Univ. of Manchester (United Kingdom); W. Vlemmings, Chalmers Univ. of Technology (Sweden)
- 9149 OZ **The human pipeline: distributed data reduction for ALMA** [9149-35]
S. L. Schnee, C. Brogan, National Radio Astronomy Observatory (United States); D. Espada, Joint ALMA Observatory (Chile) and National Astronomical Observatory of Japan (Japan)

and The Graduate Univ. for Advanced Studies (SOKENDAI) (Japan); E. Humphreys, European Southern Observatory (Germany); S. Komugi, National Astronomical Observatory of Japan (Japan); D. Petry, European Southern Observatory (Germany); B. Vila-Villaro, E. Villard, Joint ALMA Observatory (Chile)

- 9149 10 **The Gemini Observatory fast turnaround program** [9149-36]
R. E. Mason, Gemini Observatory (United States); S. Côté, NRC - Herzberg Institute of Astrophysics (Canada); M. Kissler-Patig, N. A. Levenson, A. Adamson, Gemini Observatory (United States); C. Emmanuel, NRC - Herzberg Institute of Astrophysics (Canada) and Univ. of Victoria (Canada); D. Crabtree, NRC - Herzberg Institute of Astrophysics (Canada)

SITE AND FACILITY OPERATIONS I

- 9149 12 **LCOGT network observatory operations** [9149-38]
A. Pickles, A. Hjelstrom, T. Boroson, B. Burleson, P. Conway, J. De Vera, M. Elphick, B. Haworth, W. Rosing, E. Saunders, D. Thomas, G. White, M. Willis, Z. Walker, Las Cumbres Observatory Global Telescope (United States)
- 9149 14 **A comparison of operation models and management strategies for the Spitzer Space Telescope and the Nuclear Spectroscopic Telescope Array** [9149-40]
S. R. Dodd, Jet Propulsion Lab. (United States)
- 9149 15 **Maintaining a suite of binocular facility instruments at the Large Binocular Telescope** [9149-41]
R. O. Reynolds, J. Morris, J. Power, J. Howard, J. Riedl, E. Solheid, R. M. Wagner, C. Veillet, Large Binocular Telescope Observatory (United States)
- 9149 16 **LBTO's long march to full operation - step 1** [9149-42]
C. Veillet, J. Brynnel, J. Hill, R. Wagner, D. Ashby, J. Christou, J. Little, D. Summers, Large Binocular Telescope Observatory (United States)

SITE AND FACILITY OPERATIONS II

- 9149 17 **Commissioning and operation of the new Karl G. Jansky Very Large Array** [9149-43]
C. J. Chandler, B. J. Butler, National Radio Astronomy Observatory (United States)
- 9149 18 **Auxiliary instruments for the absolute calibration of the ASTRI SST-2M prototype for the Cherenkov Telescope Array** [9149-44]
M. C. MacCarone, A. Segreto, O. Catalano, G. La Rosa, F. Russo, G. Sottile, C. Gargano, B. Biondo, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); M. Fiorini, S. Incorvaia, G. Toso, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Milano (Italy)
- 9149 19 **Calibration strategies for the Cherenkov Telescope Array** [9149-45]
M. Gaig, Univ. Autònoma de Barcelona (Spain) and Institut de Ciències de l'Espai (Spain); Univ. and Institut Nazional di Fisica Nucleare; D. Berge, Univ. van Amsterdam (Netherlands); M. Daniel, Univ. of Liverpool (United Kingdom); M. Doro, Univ. Autònoma de Barcelona, Institut de Ciències de l'Espai (Spain) and Univ. degli Studi di Padova (Italy); A. Förster, W. Hofmann, Max-Planck-Institut für Kernphysik (Germany); M. C. MacCarone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); D. Parsons, R. de los

Reyes Lopez, Max-Planck-Institut für Kernphysik (Germany); C. van Eldik, Univ. Erlangen–Nürnberg (Germany)

9149 1A **Operating observatories: the need for a new paradigm** [9149-46]
I. Payne, Magdalena Ridge Observatory (United States); C. Veillet, Large Binocular Telescope Observatory (United States)

9149 1B **The Isaac Newton Group of Telescopes on La Palma** [9149-47]
C. R. Benn, Isaac Newton Group of Telescopes (Spain)

Part Two

SITE AND FACILITY OPERATIONS III

9149 1C **Tiers of the maintenance concept at ALMA in operations** [9149-48]
D. Rabanus, European Southern Observatory (Chile) and ALMA (Chile)

9149 1D **Creation of an instrument maintenance program at W. M. Keck Observatory** [9149-49]
G. M. Hill, S. H. Kwok, J. A. Mader, G. D. Wirth, S. E. Dahm, R. W. Goodrich, W. M. Keck Observatory (United States)

9149 1E **Science operations for LCOGT: a global telescope network** [9149-50]
T. Boroson, T. Brown, A. Hjellstrom, D. A. Howell, T. Lister, A. Pickles, W. Rosing, E. Saunders, R. Street, Z. Walker, Las Cumbres Observatory Global Telescope (United States)

9149 1F **Setting the standard: 25 years of operating the JCMT** [9149-51]
J. T. Dempsey, G. S. Bell, Joint Astronomy Ctr. (United States); A. Chrysostomou, Univ. of Hertfordshire (United Kingdom); I. M. Coulson, G. R. Davis, Joint Astronomy Ctr. (United States); F. Economou, National Optical Astronomy Observatory (United States); P. Friberg, Joint Astronomy Ctr (United States); T. Jenness, Cornell Univ. (United States); D. Johnstone, Joint Astronomy Ctr. (United States); R. P. J. Tilanus, Netherlands Organisation for Scientific Research (Netherlands); H. S. Thomas, C. A. Walther, Joint Astronomy Ctr. (United States)

9149 1G **SciOps2.0: an evolution of ESO/VLT's science operations model** [9149-52]
C. Dumas, H. Boffin, S. Brilliant, G. Hau, C. Ledoux, A. Mérand, S. Mieske, A. Pino, T. Rivinius, A. Smette, A. Wright, European Southern Observatory (Chile)

9149 1H **SUMO: operation and maintenance management web tool for astronomical observatories** [9149-53]
E. Mujica-Alvarez, A. Pérez-Calpena, M. L. García-Vargas, FRACTAL S.L.N.E (Spain)

9149 1I **The Observatorio Astrofísico de Javalambre: current status, developments, operations, and strategies** [9149-54]
A. J. Cenarro, Ctr. de Estudios de Física del Cosmos de Aragón (Spain); M. Moles, Ctr. de Estudios de Física del Cosmos de Aragón (Spain) and Instituto de Astrofísica de Andalucía, CSIC (Spain); A. Marín-Franch, D. Cristóbal-Hornillos, A. Yanes-Díaz, A. Ederoclite, J. Varela, H. Vázquez-Ramió, L. Valdivielso, Ctr. de Estudios de Física del Cosmos de Aragón (Spain); N. Benítez, Instituto de Astrofísica de Andalucía (CSIC) (Spain); J. Cepa, Instituto de Astrofísica de Canarias (Spain); R. Dupke, Observatorio Nacional (Brazil); A. Fernández-Soto, Instituto de Física de Cantabria (CSIC-UC) (Spain); C. Mendes de Oliveira, L. Sodré, K. Taylor, Univ. de São Paulo (Brazil); S. Rueda-Teruel,

F. Rueda-Teruel, R. Luis-Simoes, S. Chueca, J. L. Anton, R. Bello, M. C. Díaz-Martín, L. Guillen-Civera, J. Hernández-Fuertes, Ctr. de Estudios de Física del Cosmos de Aragón (Spain); R. Iglesias-Marzoa, Ctr. de Estudios de Física del Cosmos de Aragón (Spain) and Univ. de La Laguna (Spain); D. Jiménez-Mejías, N. M. Lasso-Cabrera, G. López-Alegre, A. López-Sainz, M. A. C. Rodríguez-Hernández, O. Suárez, J. L. Lamadrid, N. Maicas, J. Abril-Ibañez, V. Tilve, S. Rodríguez-Llano, Ctr. de Estudios de Física del Cosmos de Aragón (Spain)

POSTER SESSION

- 9149 1J **Upgrading, monitoring and operation of a dome drive system** [9149-55]
S. E. Bauman, B. Cruise, I. Look, G. Matsushige, L. Roberts, D. Salmon, R. Taroma, T. Vermeulen, Canada-France-Hawaii Telescope Corp. (United States); K. Richards, Baldor-Reliance (United States)
- 9149 1K **Dome venting: the path to thermal balance and superior image quality** [9149-56]
S. E. Bauman, T. Benedict, M. Baril, Canada-France-Hawaii Telescope Corp. (United States); J. C. Culiandre, Canada-France-Hawaii Telescope Corp.(United States) and CEA-Institut de recherché sur les lois fondamentales de l'Univers (France); I. Look, G. Matsushige, L. Roberts, Canada-France-Hawaii Telescope Corp.(United States); R. Racine, Univ. de Montréal (Canada); D. Salmon, T. Vermeulen, Canada-France-Hawaii Telescope Corp.(United States)
- 9149 1L **Strategies for personnel sustainable lifecycle at astronomical observatories and local industry development** [9149-57]
E. A. Bendek, NASA Ames Research Ctr. (United States); M. Leatherbee, Stanford Univ. (United States); H. Smith, NASA Ames Research Ctr. (United States); V. Strappa, Chilean Ministry of Economy (Chile); H. Zinnecker, SOFIA Observatory, NASA Ames Research Ctr. (United States); M. Perez, NASA Headquarters (United States)
- 9149 1N **Measure fiber position errors from spectra data for LAMOST** [9149-59]
J.-J. Chen, National Astronomical Observatories (China); Z.-R. Bai, National Astronomical Observatories (China) and Univ. of Chinese Academy of Sciences (China); A.-L. Luo, Y.-H Zhao, National Astronomical Observatories (China)
- 9149 1O **Acquiring multiple stars with the LINC-NIRVANA Pathfinder** [9149-60]
A. R. Conrad, Max-Planck-Institut für Astronomie (Germany); C. Arcidiacono, INAF - Osservatorio Astrofisico di Bologna (Italy); H. Baumeister, Max-Planck-Institut für Astronomie (Germany); M. Bergomi, INAF - Osservatorio Astronomico di Padova (Italy); T. Bertram, J. Berwein, F. Briegel, Max-Planck-Institut für Astronomie (Germany); J. Farinato, INAF - Osservatorio Astronomico di Padova (Italy); T. Herbst, R. Hofferbert, F. Kittmann, M. Kürster, D. Kopon, Max-Planck-Institut für Astronomie (Germany); L. Marafatto, INAF - Osservatorio Astronomico di Padova (Italy); M. Norris, Max-Planck-Institut für Astronomie (Germany); R. Ragazzoni, V. Viotto, INAF - Osservatorio Astronomico di Padova (Italy)
- 9149 1Q **ESPRESSO data flow: from design to development** [9149-62]
P. Di Marcantonio, V. D'Odorico, G. Cupani, INAF - Osservatorio Astronomico di Trieste (Italy); D. Sosnowska, C. Lovis, Observatoire Astronomique, Univ. de Genève (Switzerland); S. Sousa, P. Figueira, Univ. do Porto (Portugal); J. I. González Hernández, Instituto de Astrofísica de Canarias (Spain); G. Lo Curto, A. Modigliani, European Southern Observatory (Germany); R. Cirami, INAF - Osservatorio Astronomico di Trieste (Italy); D. Mégevand,

Observatoire Astronomique, Univ. de Genève (Switzerland); S. Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy)

- 9149 1R **Operational support and service concepts for observatories** [9149-63]
P. Emde, MT Mechatronics GmbH (Germany); P. Chapus, MT Mecatrónica SpA (Chile)
- 9149 1S **Status of ALMA offline software in the transition from construction to full operations** [9149-64]
D. Espada, M. Saito, L.-A. Nyman, J. Cortes, Joint ALMA Observatory (Chile); A. Biggs, F. Stoehr, European Southern Observatory (Germany); I. de Gregorio, S. Leon, R. Kneissl, Joint ALMA Observatory (Chile); L. Humphreys, European Southern Observatory (Germany); E. Barrios, G. Mathys, T. Wiklind, Joint ALMA Observatory (Chile); C. Brogan, C. Lonsdale, A. Remijan, National Radio Astronomy Observatory (United States); B. Vila-Vilaro, E. Villard, A. Lundgren, Joint ALMA Observatory (Chile); P. M. Andreani, European Southern Observatory (Germany); K. Tatematsu, National Astronomical Observatory of Japan (Japan); J. E. Hibbard, National Radio Astronomy Observatory (United States)
- 9149 1T **The NOAO Data Laboratory: a conceptual overview** [9149-65]
M. J. Fitzpatrick, K. Olsen, F. Economou, E. B. Stobie, T. C. Beers, M. Dickinson, P. Norris, A. Saha, R. Seaman, D. R. Silva, R. A. Swaters, B. Thomas, F. Valdes, National Optical Astronomy Observatory (United States)
- 9149 1U **Artificial intelligence for the EChO long-term mission planning tool** [9149-66]
Á. García-Piquer, I. Ribas, J. Colomé, Institut de Ciències de l'Espai (Spain)
- 9149 1V **Phoenix: automatic science processing of ESO-VLT data** [9149-67]
R. Hanuschik, European Southern Observatory (Germany)
- 9149 1W **The ALMA CONOPS project: the impact of funding decisions on observatory performance** [9149-69]
J. Ibsen, Joint ALMA Observatory (Chile); J. Hibbard, National Radio Astronomy Observatory (Chile); G. Filippi, Joint ALMA Observatory (Chile)
- 9149 1X **Characterisation of atmospheric Cherenkov transparency with all-sky camera measurements** [9149-70]
F. Jankowsky, S. Wagner, Landessternwarte Heidelberg (Germany)
- 9149 1Y **Full automation of the Automatic Telescope for Optical Monitoring** [9149-71]
F. Jankowsky, S. Wagner, Landessternwarte Heidelberg (Germany)
- 9149 1Z **The NIRSpec MSA Planning Tool for multi-object spectroscopy with JWST** [9149-72]
D. Karakla, A. Shyrov, K. Pontoppidan, T. Beck, K. Gilbert, J. Valenti, S. Kassin, D. Soderblom, Space Telescope Science Institute (United States)
- 9149 20 **Web-based data providing system for Hyper Suprime-Cam** [9149-74]
M. Koike, H. Furusawa, T. Takata, National Astronomical Observatory of Japan (Japan); Y. Okura, RIKEN (Japan); Y. Yamada, H. Yamanoi, S. Mineo, National Astronomical Observatory of Japan (Japan); N. Yasuda, S. Bickerton, N. Katayama, Kavli Institute for the Physics and Mathematics of the Universe, Univ. of Tokyo (Japan); R. Lupton, P. Price, J. Bosch, C. Loomis, Princeton Univ. (United States)

- 9149 21 **Turning a remotely controllable observatory into a fully autonomous system** [9149-75]
S. Swindell, C. Johnson, Steward Observatory, The Univ. of Arizona (United States);
P. Gabor, Steward Observatory, The Univ. of Arizona (United States) and Vatican
Observatory (United States); G. Zareba, Steward Observatory, The Univ. of Arizona (United
States); P. Kubánek, M. Prouza, Institute of Physics of the ASCR, v.v.i. (Czech Republic)
- 9149 23 **Study on fault diagnose expert system for large astronomy telescope** [9149-78]
J. Liu, M.-C. Luo, P. Tang, W. Wu, G. Zhang, H. Zhang, J. Wang, Univ. of Science and
Technology of China (China)
- 9149 24 **AO operations at Gemini South** [9149-79]
E. Marin, A. Cardwell, P. Pessev, Gemini Observatory (Chile)
- 9149 25 **Scheduling and calibration strategy for continuous radio monitoring of 1700 sources every
three days** [9149-80]
W. Max-Moerbeck, National Radio Astronomy Observatory (United States) and California
Institute of Technology (United States)
- 9149 26 **Two years of ALMA bibliography: lessons learned** [9149-81]
S. Meankins, U. Grothkopf, European Southern Observatory (Germany); M. J. Bishop,
National Radio Astronomy Observatory (United States); F. Stoehr, European Southern
Observatory (Germany); K. Tatematsu, National Astronomical Observatory of Japan
(Japan)
- 9149 27 **LaNotte, the TNG metric system after two years of data** [9149-82]
E. Molinari, FGG-INAF, Telescopio Nazionale Galileo (Spain) and INAF - Istituto di Astrofisica
Spaziale e Fisica Cosmica (Italy); N. Hernandez, FGG-INAF, Telescopio Nazionale Galileo
(Spain)
- 9149 28 **Safety management of an underground-based gravitational wave telescope: KAGRA**
[9149-84]
N. Ohishi, Institute for Cosmic Ray Research (Japan) and National Astronomical
Observatory of Japan (Japan); S. Miyoki, T. Uchiyama, O. Miyakawa, M. Ohashi, Institute
for Cosmic Ray Research (Japan)
- 9149 29 **Automating engineering verification in ALMA subsystems** [9149-85]
J. Ortiz, J. Castillo, Atacama Large Millimeter/submillimeter Array (Chile)
- 9149 2A **Early laser operations at the Large Binocular Telescope Observatory** [9149-86]
G. Rahmer, M. Lefebvre, J. Christou, Large Binocular Telescope Observatory (United
States); W. Raab, S. Rabien, J. Ziegler, Max-Planck-Institut für extraterrestrische Physik
(Germany); J. L. Borelli, W. Gässler, Max-Planck-Institut für Astronomie (Germany)
- 9149 2B **Gemini planet imager integration to the Gemini South telescope software environment**
[9149-87]
F. T. Rantakyro, A. Cardwell, Gemini Observatory (Chile); J. Chilcote, Univ. of California, Los
Angeles (United States); J. Dunn, NRC - Herzburg Institute of Astrophysics (Canada);
S. Goodsell, P. Hibon, Gemini Observatory (Chile); B. Macintosh, Stanford Univ. (United
States); C. Quiroz, Gemini Observatory (Chile); M. D. Perrin, Space Telescope Science
Institute (United States); N. Sadakuni, Gemini Observatory (Chile); L. Saddlemyer, NRC -
Herzberg Institute of Astrophysics (Canada); D. Savransky, Cornell Univ. (United States);
A. Serio, C. Winge, R. Galvez, G. Gausachs, K. Hardie, M. Hartung, J. Luhrs, Gemini

Observatory (Chile); L. Poyneer, Lawrence Livermore National Lab. (United States);
S. Thomas, NASA Ames Research Ctr. (United States)

- 9149 2D **Exploring remote operation for ALMA Observatory** [9149-90]
T.-C. Shen, R. Soto, N. Ovando, G. Velez, S. Fuica, A. Schemml, A. Robles, Atacama Large
Millimeter/submillimeter Array (Chile); J. Ibsen, G. Filippi, European Southern Observatory
(Chile); E. Pietriga, INRIA Chile (Chile)
- 9149 2E **Gaia downlink data processing** [9149-91]
H. Siddiqui, European Space Astronomy Ctr. (Spain); S. G. Els, European Space Astronomy
Ctr. (Spain) and Gaia DPAC Project Office (Spain); R. Guerra, European Space Astronomy
Ctr. (Spain); N. Cheek, European Space Astronomy Ctr. (Spain) and Gaia DPAC Project
Office (Spain); A. Mora, W. O'Mullane, European Space Astronomy Ctr. (Spain)
- 9149 2F **Future-oriented maintenance strategy based on automated processes is finding its way
into large astronomical facilities at remote observing sites** [9149-92]
A. Silber, European Southern Observatory (Germany); C. Gonzalez, F. Pino, P. Escarate,
S. Gairing, Joint ALMA Observatory (Chile)
- 9149 2G **Implementing extended observing at the JCMT** [9149-93]
C. Walther, J. Dempsey, I. Campbell, Joint Astronomy Ctr. (United States)
- 9149 2H **Problems with twilight/supersky flat-field for wide-field robotic telescopes and the solution**
[9149-94]
P. Wei, National Astronomical Observatories (China); Z. Shang, Tianjin Normal Univ. (China);
B. Ma, National Astronomical Observatories (China); C. Zhao, Tsinghua Univ. (China); Y. Hu,
Q. Liu, National Astronomical Observatories (China)
- 9149 2J **Multi-object spectroscopy data reduction: the AF2+WYFFOS pipeline** [9149-96]
L. Domínguez Palmero, R. Jackson, A. Molaeinezhad, C. Fariña, M. Balcells, C. R. Benn,
Isaac Newton Group of Telescopes (Spain)

Author Index

Conference Committee

Symposium Chairs

Gillian S. Wright, UK Astronomy Technology Centre (United Kingdom)
Luc Simard, National Research Council Canada (Canada)

Symposium Co-chairs

Colin Cunningham, UK Astronomy Technology Centre
(United Kingdom)
Masanori Iye, National Astronomical Observatory of Japan (Japan)

Conference Chairs

Alison B. Peck, National Radio Astronomy Observatory (United States)
Chris R. Benn, Isaac Newton Group of Telescopes (Spain)
Robert L. Seaman, National Optical Astronomy Observatory
(United States)

Conference Program Committee

David S. Adler, Space Telescope Science Institute (United States)
Lori E. Allen, National Optical Astronomy Observatory (United States)
Todd A. Boroson, Las Cumbres Observatory Global Telescope
Network (United States)
Dennis R. Crabtree, National Research Council Canada (Canada)
Suzanne R. Dodd, Jet Propulsion Laboratory (United States)
Andreas Kaufer, European Southern Observatory (Chile)
Nicole M. Radziwill, James Madison University (United States)
Arnold H. Rots, Smithsonian Astrophysical Observatory (United States)
Christian Veillet, Large Binocular Telescope Observatory
(United States)

Session Chairs

- 1 Archive Operations and Data Flow
Alison B. Peck, National Radio Astronomy Observatory (United States)
- 2 Time Domain Follow-up I
David S. Adler, Space Telescope Science Institute (United States)
- 3 Time Domain Follow-up II
David S. Adler, Space Telescope Science Institute (United States)

- 4 Operations Benchmarking and Metrics
David S. Adler, Space Telescope Science Institute (United States)
- 5 Program and Observation Scheduling
Dennis R. Crabtree, National Research Council (Canada)
- 6 Science Operations I
Robert L. Seaman, National Optical Astronomy Observatory
(United States)
- 7 Science Operations II
Alison B. Peck, National Radio Astronomy Observatory (United States)
- 8 Operations and Data Quality Control
Suzanne R. Dodd, Jet Propulsion Laboratory (United States)
- 9 Virtual Observatory
Suzanne R. Dodd, Jet Propulsion Laboratory (United States)
- 10 User Support
Chris R. Benn, Isaac Newton Group of Telescopes (Spain)
- 11 Site and Facility Operations I
Christophe Dumas, European Southern Observatory (Chile)
- 12 Site and Facility Operations II
Todd Boroson, Las Cumbres Observatory Global Telescope Network
(United States)
- 13 Site and Facility Operations III
Christian Veillet, Large Binocular Telescope Observatory
(United States)