

PROCEEDINGS OF SPIE

Optical and Infrared Interferometry and Imaging VIII

**Antoine Mérand
Stephanie Sallum
Joel Sanchez-Bermudez**
Editors

**17–22 July 2022
Montréal, Québec, Canada**

Sponsored and Published by
SPIE

Volume 12183

Proceedings of SPIE 0277-786X, V. 12183

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

Optical and Infrared Interferometry and Imaging VIII, edited by Antoine Mérand, Stephanie Sallum, Joel Sanchez-Bermudez,
Proc. of SPIE Vol. 12183, 1218301 · © 2022 SPIE · 0277-786X · doi: 10.1117/12.2655246

Proc. of SPIE Vol. 12183 1218301-1

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers 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 these proceedings:
Author(s), "Title of Paper," in *Optical and Infrared Interferometry and Imaging VIII*, edited by Antoine Mérand, Stéphanie Sallum, Joel Sanchez-Bermudez, Proc. of SPIE 12183, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510653474
ISBN: 9781510653481 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2022 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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

SPIE. DIGITAL LIBRARY
SPIDigitalLibrary.org

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of 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 and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five 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.

Contents

ix *Conference Committee*

SESSION 1 CURRENT AND PLANNED FACILITIES AND INSTRUMENTS I

- 12183 02 **Imaging nearby, habitable-zone planets with the Large Binocular Telescope Interferometer (Invited Paper)** [12183-1]
- 12183 03 **Recent technical and scientific highlights from the CHARA Array (Invited Paper)** [12183-2]
- 12183 04 **The Navy Precision Optical Interferometer: large-aperture observations and infrastructure improvements (Invited Paper)** [12183-3]
- 12183 05 **The Magdalena Ridge Observatory Interferometer: upcoming important milestones towards first fringes (Invited Paper)** [12183-4]
- 12183 06 **VLTI status update (Invited Paper)** [12183-5]

SESSION 2 CURRENT AND PLANNED FACILITIES AND INSTRUMENTS II

- 12183 08 **CHARA/SPICA: a six-telescope visible instrument for the CHARA Array** [12183-7]
- 12183 09 **SPICA-FT: the new fringe tracker of the CHARA array** [12183-8]
- 12183 0A **MATISSE, the VLTI mid-infrared imaging spectro-interferometer at the time of the first published astrophysical results** [12183-9]
- 12183 0B **MYSTIC: a high angular resolution K-band imager at CHARA** [12183-10]
- 12183 0C **First measurements and upgrade plans of the MAGIC intensity interferometer** [12183-11]
- 12183 0D **Performance of the upgraded VERITAS Stellar Intensity Interferometer (VSII)** [12183-12]
- 12183 0F **A stellar intensity interferometry instrument for the ASTRI Mini-Array telescopes** [12183-14]
- 12183 0G **Intensity interferometry at Calern and beyond: progress report** [12183-15]

SESSION 3 CRITICAL SUBSYSTEMS I

- 12183 OH **L-band nulling interferometry at the VLTI with Asgard/Hi-5: status and plans** [12183-16]
- 12183 OI **Hierarchical Fringe Tracking, sky coverage and AGNs at the VLTI** [12183-17]
- 12183 OK **Achromatic nulling interferometry and fringe tracking with 3D-photonc tricouplers with GLINT** [12183-19]
- 12183 OL **The Nulling Interferometer Cryogenic Experiment: I** [12183-20]

SESSION 4 CRITICAL SUBSYSTEMS II

- 12183 OM **Spectrograph design for the Asgard/BIFROST spectro-interferometric instrument for the VLTI** [12183-22]
- 12183 ON **Design of the new CHARA instrument SILMARIL: pushing for the sensitivity of a 3-beam combiner in the H- and K-bands** [12183-23]
- 12183 OO **Automation upgrades at the navy precision optical interferometer** [12183-24]
- 12183 OP **Factory acceptance of the automated alignment system for the Magdalena Ridge Observatory Interferometer** [12183-25]

SESSION 5 OBSERVING TECHNIQUES I

- 12183 OQ **Origins and design of the Aperture Masking Interferometer on JWST (Invited Paper)** [12183-26]
- 12183 OT **GRAVITY+ Wide: towards hundreds of $z \sim 2$ AGN** [12183-29]
- 12183 OU **GRAVITY faint: reducing noise sources in GRAVITY+ with a fast metrology attenuation system** [12183-30]
- 12183 OV **Digging a dark hole in GRAVITY: towards Jupiter-like observations at the astronomical unit scale** [12183-31]

SESSION 6 OBSERVING TECHNIQUES II

- 12183 OX **Evolution of VLTI science operations: supporting imaging, astrometry, and monitoring types of interferometric observations** [12183-33]
- 12183 OZ **A thesis to probe unique exoplanet regimes with micro-arcsecond astrometry and precision closure phases at CHARA and VLTI** [12183-35]

12183 10 **High-angular and high-contrast VLTI observations from Y to M band with the Asgard instrumental suite** [12183-36]

SESSION 7 TECHNOLOGIES

12183 11 **A report on the status of astrophotonics for interferometry and beyond (Invited Paper)** [12183-38]

12183 12 **Heterodyne interferometry: review and prospects (Invited Paper)** [12183-39]

12183 13 **A complete photonics correlation scheme for future mid-infrared heterodyne interferometry instrumentation** [12183-40]

12183 14 **Ultrafast laser inscription of integrated optics two-telescope beam combiners for K-band interferometry at the CHARA array** [12183-41]

12183 15 **Characterization of mid-infrared intersubband detectors for astronomical heterodyne interferometry** [12183-42]

12183 16 **Development of the four-telescope photonic nuller of Hi-5 for the characterization of exoplanets in the mid-IR** [12183-43]

12183 17 **Linear-mode avalanche photodiode arrays in HgCdTe at Leonardo UK** [12183-44]

12183 19 **Four-input photonic kernel-nulling for the VLTI** [12183-46]

12183 1A **A sub-nanometer long-term stable heterodyne laser metrology system for the Nulling Interferometry Cryogenic Experiment** [12183-47]

SESSION 8 SPACE INTERFEROMETRY TECHNOLOGY

12183 1B **The Pyxis Interferometer (I): scientific context, metrology system, and optical design** [12183-48]

12183 1C **The Pyxis Interferometer (II): control system, telescope, and mechanical design** [12183-49]

12183 1D **Sub-milliarsecond astronomical imaging: advancing space-based astronomical optical interferometry observatories with Optimast** [12183-50]

12183 1E **Laser-guided space interferometer** [12183-51]

SESSION 9 DATA PROCESSING ANALYSIS ACCESS AND DISCOVERY

12183 1G **Optical interferometry imaging contest IX (Invited Paper)** [12183-53]

- 12183 1H **IMAGE-OI: an OIFITS extension and its application in OImaging to compare image reconstruction algorithms** [12183-54]
- 12183 1J **Optimal self-calibration and fringe tracking in photonic nulling interferometers using machine learning** [12183-56]
- 12183 1K **CASSINI-AUTOMAP: a novel image reconstruction algorithm for infrared interferometry** [12183-57]
- 12183 1L **Spectral differential imaging using kernel phase with CHARIS/SCEAO: technique performance and current limitations** [12183-59]
- 12183 1M **Statistical tests with multi-wavelength Kernel-phase analysis for the detection and characterization of planetary companions** [12183-60]
- 12183 1N **Flexible spectro-interferometric modelling of OIFITS data with PMOIRE** [12183-61]
- 12183 1O **RHAPSODY: Reconstructing Hankel rAdial Profiles in centro-Symmetric Objects with Discrete rings for astrophysics** [12183-62]

SESSION 10 FUTURE OF INTERFEROMETRY

- 12183 1R **The VLTI Expertise Centres: providing user support and expanding the community (Invited Paper)** [12183-65]
- 12183 1S **High spectral-resolution interferometry down to one micron with Asgard/BIFROST at VLTI: science drivers and project overview** [12183-66]
- 12183 1T **STELLIM: a Stellar Imager at VLTI** [12183-67]
- 12183 1U **Beam combiner for the Asgard/BIFROST instrument** [12183-68]
- 12183 1V **VERMILION: Visitor Extension spectRal sub-Mid-Infrared Light InterferOmeter iNstrument** [12183-69]
- 12183 1W **Achieving diffraction limited imaging with an Imaging Air Cherenkov Telescope** [12183-70]

POSTERS: CRITICAL SUBSYSTEMS

- 12183 1X **Building a GRAVITY+ adaptive optics test bench** [12183-71]
- 12183 1Y **Technical requirements and optical design of the Hi-5 spectrometer** [12183-72]
- 12183 1Z **Measuring and compensating vibrations at the VLTI: MANHATTAN-II self-intrinsic noise and hardware extension** [12183-73]

- 12183 20 **Design of the VLTI/Hi-5 light injection system** [12183-74]
- 12183 21 **The expected performance of nulling at the VLTI down to five mas** [12183-76]
- 12183 22 **Focal plane detector and front-end electronics of the stellar intensity interferometry instrument for the ASTRI Mini-Array telescopes** [12183-77]
- 12183 23 **Cryogenic performance of FOURIER, the initial science combiner at the MROI** [12183-78]

POSTERS: OBSERVING TECHNIQUES

- 12183 26 **Field of View and contrast limitations of stellar interferometers: a quick review** [12183-82]
- 12183 27 **VLTI/Hi-5: detection yield predictions for young giant exoplanets** [12183-83]
- 12183 28 **Towards a better understanding of OPD limitations for higher sensitivity and contrast at the VLTI** [12183-84]
- 12183 2B **How much is enough? Using the NPOI archive to characterize stellar diameter measurements** [12183-87]
- 12183 2C **Differential speckle polarimetry with SCEAO VAMPIRES** [12183-88]
- 12183 2D **Simulating the performance of aperture mask designs for SCALES** [12183-89]

POSTERS: TECHNOLOGIES

- 12183 2E **Last performances improvement of the C-RED One camera using the 320x256 e-APD infrared Saphira detector** [12183-90]
- 12183 2F **Increasing baselines and precision of optical interferometers using two-photon interference** [12183-91]
- 12183 2H **On-sky experiment of the discrete beam combiner: lessons learned and strategies for improved calibration of the transfer function** [12183-93]

POSTERS: DATA PROCESSING ANALYSIS ACCESS AND DISCOVERY

- 12183 2M **SAMpy: a Fourier-plane pipeline for JWST/NIRISS aperture masking interferometry (and more!)** [12183-99]

POSTERS: FUTURE OF INTERFEROMETRY

12183 2N **The CHARA Michelson Array Pathfinder** [12183-100]

Conference Committee

Symposium Chairs

René Doyon, Université de Montréal (Canada)
Shouleh Nikzad, Jet Propulsion Laboratory (United States)

Symposium Co-chairs

Sarah Kendrew, European Space Agency (United States)
Satoshi Miyazaki, National Astronomical Observatory of Japan
(Japan)

Conference Chairs

Antoine Mérand, European Southern Observatory (Chile)
Stephanie Sallum, University of California, Irvine (United States)
Joel Sanchez-Bermudez, Universidad Nacional Autónoma de México
(Mexico)

Conference Programme Committee

Fabien Baron, Georgia State University (United States)
Myriam Benisty, Institut de Planétologie et d'Astrophysique de
Grenoble (France)
Michelle J. Creech-Eakman, New Mexico Institute of Mining and
Technology (United States)
Takayuki Kotani, National Astronomical Observatory of Japan
(Japan)
Xavier Haubois, European Southern Observatory (Chile)
Keiichi Ohnaka, Universidad Católica del Norte (Chile)
Lucas Labadie, Universität zu Köln (Germany)
Sebastian F. Hönig, University of Southampton (United Kingdom)
Sylvie Robbe-Dubois, Observatoire de la Côte d'Azur (France)
Rachael Marie Roettenbacher, Yale University (United States)
Stephen A. Rinehart, NASA Goddard Space Flight Center
(United States)
Gail H. Schaefer, CHARA (United States)
Peter G. Tuthill, The University of Sydney (Australia)

