GARIMA SINGH

Adaptive Optics Associate Scientist
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Research Interest

- Astronomical instrumentation– Adaptive Optics (AO) and Extreme-AO
- High contrast imaging (HCI) of exoplanets and circumstellar disks
- Active speckle suppression, coronagraphic wavefront sensing, and control techniques
- Exoplanet and circumstellar disk post-processing techniques

University Education

Ph.D., *Très Honorable*, **Astronomy & Astrophysics (Instrumentation)** October 2012 - Sept. 2015
Laboratoire d'études spatiales et d'instrumentation en astrophysique (LESIA),
Observatoire de Paris-Meudon, France and Subaru Telescope, Hawaii, USA
Dissertation: Low-order wavefront control and calibration for phase mask coronagraphs.
Thesis Advisors: Dr. Olivier Guyon, Dr. Pierre Baudoz and Dr. Daniel Rouan

M.Tech., *Mention Bien*, **Astronomy & Astrophysics** July 2008 - September 2010
Université de Paris XI Sud and Ecole Normale Superieure de Cachan, France
Domain: Astronomical & Space-based System Engineering
Thesis Advisors: Dr. Guy Perrin (LESIA), Dr. Yutaka Hayano (Subaru Telescope)

B.Tech., *First Division*, **Information Technology** July 2004 - May 2008
College of Engineering Roorkee, Uttar Pradesh Technical University, India

Employment History

Adaptive Optics Associate Scientist December 2022 - present
Gemini North Observatory, Hilo, Hawaii, USA
– Project Scientist of Gemini Planet Imager 2.0 (GPI 2.0): leading the commissioning and future operations of GPI 2.0 from the Gemini North side. The GPI2 project is a 30M USD investment by the National Science Foundation, the Heising-Simons Foundation, and several US-based universities.
– Support Scientist for Gemini's AO system, Altair.
– Involved in Gemini's vibration mitigation project and upcoming AO system GNAO and GIRMOS projects.

National Research Council (NRC) postdoctoral fellow February 2021- November 2022
Herzberg Astronomy & Astrophysics (HAA) Research Centre, Victoria, BC, Canada
Developed an end-to-end simulation of the Planetary Systems Imager prototype instrument for the Thirty Meter Telescope. Contributed to the development of a specialized calibration sub-system for the GPI 2.0 project and NRC's pathfinder SPIDERS testbed for the Subaru Telescope. I led the implementation of a low-order wavefront sensor and loop merging with a focal-plane wavefront sensor (FPWFS) for these upcoming systems and executed my work on NRC's NEW EARTH lab at HAA.

Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellow June 2018 - September 2020
LESIA, Observatoire de Paris-Meudon, France
Proposed an improvement to the current technological limits and upgrades to the SPHERE instrument installed at the Very Large Telescope. Our published article demonstrated that an FPWFS can minimize the quasi-static speckle intensity (improving the raw contrast by a factor of 10) in long exposure science images down to a limitation set by the AO halo residuals. Apart from strengthening my instrumentation skills, I studied and processed SPHERE data of a gas-rich debris disk HD 141569 in polarimetric imaging. The published results provided constraints on the dust distribution in the inner-most ring of the system known to date.

NASA Postdoctoral Program Fellow November 2015 - November 2017
NASA Jet Propulsion Laboratory, Pasadena, USA
Worked at Palomar Observatory to improve the wave-front capabilities of the stellar double coronagraph system. Contributed to the development of a compact coronagraphic bench, which was a technological demonstrator for NASA's next-generation space telescope for exoplanet science.

Subaru Telescope Research Intern October 2012 - September 2015
Subaru Telescope, Hawaii, USA
Executed three years of Ph.D. research on the SCExAO instrument installed on the Nasmyth platform of the Subaru Telescope. I developed the Lyot-stop low-order wavefront sensor (LLOWFS, Singh et al. PASP 2014), which is operational on-sky and is available for the science observers at the telescope. The LLOWFS is a linear wavefront reconstructor, which measures the low-order wavefront aberrations occurring upstream of coronagraphs. This sensor was designed to stabilize pointing errors and other low-order aberrations for the non-reflective phase mask coronagraphs. On-sky results have demonstrated correction of 10 Zernike modes, with a closed-loop pointing residual of 0.15 mas for tip-tilt with a vector vortex coronagraph (Singh et al. PASP 2015). Given the success of the LLOWFS demonstration on SCExAO (Singh et al. PASP 2017), it has been implemented on the THD2 bench (Paris Observatory), NASA's PICTURE-C balloon mission and is under implementation for the upcoming upgrade of the calibration unit (CAL2) of the GPI-2.0 instrument.

Research Associate on a Temporary Contract July-September 2012
LESIA, Observatoire de Paris-Meudon, France

Adaptive Optics System Developer July 2011 - January 2012
Inter-University center for Astronomy & Astrophysics (IUCAA), Pune, India

Research Associate January - June 2011
Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital, India

Subaru Research Intern April - September 2010
Subaru Telescope, Hawaii, USA
Master Thesis: Focus tracking of the laser guide star (LGS) using the guide star acquisition unit of Subaru Telescope's LGS adaptive optics system.

Fellowships & Awards

- NRC Postdoctoral Fellowship, Life Signatures on Exoplanets February 2021 - November 2022
- Marie Skłodowska-Curie Actions Postdoctoral fellowship June 2018 - September 2020
  (Awarded 173,076.00 Euros to cover Research, Travel, and Institutional costs)
- Honorary Professor, Amity Institute of Space Science & Technology, India February 2017
- NASA Postdoctoral Program (NPP) Fellowship November 2015 - October 2017
  (Awarded 136,910.00 USD to cover Research and Travel costs.)
- French Gov. scholarship **"Conseil Région île-de-France"** September 2008-2010
  (Awarded 20,200 Euros for master studies.)

Reviewer

– Panel member of NRC HAA Research Center staff hiring, Victoria BC, Canada, 2024.
– NOIRLab Time Allocation Committee panel member: 2023B and 2024B.
– Journal of Astronomical Telescopes, Instruments, and Systems (JATIS).
– HORIZON-MSCA-PF-2021 Marie-Curie Fellowship proposals and Astronomy & Astrophysics journal, 2022 (invited but could not participate).
– NASA 2019 & 2020 FINESST Astrophysics proposals.

Professional Services

– Habitable World Observatory Living Worlds Steering Committee member.
– American Astronomical Society (AAS) member.
– International Astronomical Union (IAU) member.
– Marie Skłodowska-Curie Alumni Association Member (France & India).
– Volunteer mentor at The Supernova Foundation for providing scientific career guidance to women.
– NYRIA (Network of Young Researchers in Instrumentation for Astronomy) workshop organizing member.

Observing Experience

2023-2024
Engineering nights with Gemini's AO Altair system and Subaru's SCExAO instrument.

July 2021
Observatory: Keck Telescope, 7 nights of remote observing assistance with instruments NIRC2 and OSIRIS.

November 2015 - 2017
Observatory: 5.1-meter Hale Telescope, Palomar Mountain, California
Instrument: Palm-3K Extreme AO (P3K), stellar double coronagraph (SDC) system, and PHARO imager.
Nights: 4 science and 4 engineering nights to test the performance of the SDC downstream P3K, 5 engineering nights with P3K to test the capabilities of the Zernike wavefront sensor.

November 2012 - December 2016
Observatory: 8.2-meter Subaru Telescope, Maunakea, Hawaii
Instrument: Subaru's AO188 system, Extreme-AO system SCExAO, and the high-contrast imager HiCIAO.
Nights: 33 engineering and 17 science nights. During these nights, the performance of different components of the SCExAO instrument was tested including the analysis and feasibility of control loops of the high-order Pyramid wavefront sensor and the LLOWFS (Ph.D. research work).

Computing Experience and Data reduction
Python, IDL, and Julia (basics).
Laboratory and on-sky coronagraphic performance evaluation and spectral analysis of SCExAO instrument, SDC system, and THD2 bench. End-to-end PROPER simulation (Python) and implementation of control algorithms (Julia) for wavefront sensing for NRC's NEW-EARTH testbed, pathfinder SPIDERS/Subaru and CAL2/GPI-2.0 projects. Angular differential imaging of debris disks imaged with the SPHERE instrument.

Professional Development

Invited Lecture

"Wavefront sensing and reconstruction", **August 20, 2019 and August 17, 2021**.
Center for Adaptive Optics summer school (CfAO), University of California, Santa Cruz

Workshop Retreat

"Maunakea Observatories tipping point strategy workshop", **October 2024**.
Gemini North Observatory, Hilo, Hawaii

Presentations & Seminars (Selected Talks)

- GPI2 and SCExAO: the two powerful ground-based high-contrast imagers on Maunakea.
  Commissioning of Gemini Planet Imager 2.0 at the Gemini North Observatory (Invited talks)
  Pathways to Characterizing Non-Transiting Planets, NASA Goddard, Maryland April 2024
  Canada France Hawaii Telescope Colloquium, Hawaii September 2024

- Getting ready to commission Gemini Planet Imager 2.0 at the Gemini Observatory. (Invited talk)
  Colloquium at Tata Institute of Fundamental Research, Mumbai, India August 2023
- Overview of Ground-based High-Contrast Imaging Technique and related-Instruments. (Invited talk)
  Exoplanet conference, IISER Pune, India August 2023
- LLOWFS and FAST simulations for future pathfinder direct imaging instruments. (Invited talk)
  In the Spirit of Lyot 2022, Leiden, Netherlands July 2022
- Wavefront sensing and control for Gemini Planet Imager's Calibration Unit 2.0.
  Gemini Science User Meeting: Link to the talk (starts at 2:35:18), Seoul, Korea July 2022
- How to image Exoplanets? (Invited talks)
  San Francisco State University A&A Colloquium series (online) October 2021
  University of British Columbia, BC, Canada October 2022
- SPHERE observation of the complex structure of HD 141569 inside 50 AU.
  Canadian Astronomical Society (CASCA) 2021 online conference, Canada May 2021
  Subaru 20th anniversary conference, Big Island of Hawaii November 2019
- The complex structure of HD 141569 inside 50 AU. October 2019
  SPHERE General Science Meeting, Laboratoire d'Astrophysique de Marseille, France
- Falling Walls Lab - Marie Skłodowska-Curie Actions 25 September 2018
  Museum of Natural Sciences in Brussels, Belgium
- Reconstruction of high-contrast images with the low-order wavefront sensor telemetry. May 2017
  NYRIA workshop, Paris, France
- Direct imaging of Exoplanets at a small inner working angle: Techniques. (Invited talk)
  Indian Institute of Astrophysics, Bangalore, India February 2017
- Optimizing coronagraphic observations at a small inner working angle. November 2016
  High-Contrast Imaging in Space workshop, Space Telescope Science Institute, Baltimore
- PSF calibration using the Lyot-based low-order wavefront sensor telemetry. (Invited talk)
  Keck Institute for Space Studies workshop, CalTech, Pasadena, California August 2016
- Low-order wavefront control and calibration for phase mask coronagraphs. (Invited talks)
  Large Binocular Telescope Observatory (LBTO), Arizona May 2015
  STScl Star and Planet Formation Seminar Series, Baltimore September 2015
- Low-order aberrations control and PSF calibration on SCExAO. (Invited talk)
  LOWFS & PSF for Exoplanets meeting, Jet Propulsion Laboratory, California February 2014

Conference Posters

- Pupil-plane LLOWFS simulation and laboratory results from NEW-EARTH's HCI testbed.
  SPIE, Montreal, Canada July 2022
- Active minimization of non-common path aberrations using a self-coherent camera for imaging exoplanetary systems.
  In the Spirit of Lyot, Tokyo, Japan October 2019
  Adaptive Optics for Extremely Large Telescopes (AO4ELT6), Québec city, Canada June 2019
- Discovery of an azimuthal density gradient in a gas-rich debris disk possibly related to massive collision.
  In the Spirit of Lyot, Tokyo, Japan October 2019
  New Horizons in Planetary Systems, Victoria, Canada May 2019

- Wavefront sensing for high contrast imaging. May 2016
  UCLA Lake Arrowhead Conference Center, California
- PSF calibration using the LLOWFS telemetry: First simulations. June 2016
  SPIE Astronomical Telescopes & Instrumentation, Edinburgh, UK
- Lyot-based low-order wavefront sensor: Implementation on the Subaru Coronagraphic Extreme Adaptive Optics System and its Laboratory Performance.
  Sagan Workshop, California Institute of Technology, Pasadena July 2014
  SPIE Astronomical Telescopes & Instrumentation, Montreal, Canada June 2014
- Lyot-based low-order wavefront sensor for phase mask coronagraphs.
  Search for life beyond the solar system, Arizona March 2014
  5th Subaru International Conference: Exoplanet & disks, Kona, Hawaii December 2013
  AO4ELT3 conference, Florence, Italy May 2013

Summer Schools and Workshops attended

- Network of Young Researchers in Instrumentation for Astronomy (NYRIA)
  Leiden Observatory, Netherlands 8-12 October 2018
  Observatoire de Paris-Meudon, Paris, France 16-19 May 2017
- Preparing Thirty Meters Telescope Future Science and Technology Leaders
  Science Advisory Committee (SAC) member for the workshop activity.
  Santa Cruz, California, USA 22-29 August 2017
  Hilo, Hawai'i, USA 3-7 December 2016
- Exoplanet Imaging and Characterization:
  Coherent Differential Imaging and Signal Detection Statistics
  California Institute of Technology, Pasadena, California 22-26 August 2016
- Sagan Workshop 21-25 July 2014
  California Institute of Technology, Pasadena, California
- Search for Life beyond the Solar System (Exoplanets, Biosignatures & Instruments) 14-16 March 2014
  Biosphere2, University of Arizona, Tucson, USA
- Astronomy & Astrophysics summer school 11-16 August 2013
  Dunlap Institute for Astronomy, University of Toronto, Canada
- Adaptive Optics summer school 4-9 August 2013
  Center for Adaptive Optics, University of Santa Cruz, California

Outreach Activities

- Featured in the GEMMA planetarium full-dome video. February 2024
- Journey through the Universe 2024, Hilo, Big Island of Hawaii: Represented two career panels (Waiākea High and Hilo High schools) and delivered a presentation to high-school students of Hilo High School. February 2024
- Shadow the Scientists (STS): Participated in three STS events from the Gemini North Observatory. Youtube link 1, 2, and 3. 2024
- Actively engaged in local activities supporting astronomy culture on the Big Island of Hawaii and promoting scientific discoveries from the MaunaKea Observatories: Activities included planting native Hawaiian species (700 Koa and 1600 Mamane trees) on the slopes of ManuaKea in collaboration with the *Maunakea Forest Restoration Project*, volunteering in the Mālama Maunakea weed pull event with

the *Center for Maunakea Stewardship*, and ʻOhana Kilo Hōkū stargazing event at *Moʻokini Heiau* strengthening connections between Native Hawaiians and astronomy. 2023 - 2024

- Invited to give an outreach talk by an online astronomy school, Galileo Multiverse. November 2023
- Invited at the Hilo High School to give a talk on the meteorites and lunar samples received as a loan from NASA as a part of their educational program. May 2023
- Invited for a Story Telling event at 500 Women Scientists: Link (talk begins at 1hour) November 2022
- Public talk for the Nanaimo Astronomy Club (Media coverage).
  Astronomy colloquia at the University of British Columbia. October 2022
- Public talk for the Friends of Dominion Astrophysical Observatory, Victoria BC.
  Link to the talk: Youtube. March 2022
- Four outreach talks at schools under the Greater Victoria School District, BC. April-May 2022
- Three invited outreach lectures (delivered online) on exoplanet detection techniques. January 2021
  Women in STEM Series (WoAA) India, NSS USA-Mumbai and Hilwood College Kandy, Sri Lanka.
  Link to one of the talks on: Youtube.
- Four invited outreach lectures on the adaptive optics and direct imaging of exoplanets. August 2019
  Nehru Planetarium in Delhi, Miranda House in University of Delhi and College of Engineering Roorkee in Uttarakhand, India
- Regular volunteer stay at the campus of Sri Ram Ashram. This organization provides shelter and schooling to abandoned children. My motivation has been to execute one-to-one discussions with the kids/adults about science, astronomy, and cultural and ethical issues faced in Indian society. This experience is always a two-way transfer of knowledge both on a scientific and personal level.
  Haridwar, Uttarakhand, India *January 2018*
- How to directly image exoplanets with adaptive optics and coronagraphy February 2018
  University of Petroleum and Energy Studies, Dehradun, India (Invited Talk)
- Volunteer stay for one month at SECMOL school (altitude: 3500 meters) to teach high-school students the basics of astronomy and recognizing constellations and other astronomical objects in our galaxy visible in the Himalayan skies. December 2017
  Leh Ladakh, Kashmir, India
- Discussion on science, astronomy and women empowerment February 2017
  Pardada Pardadi Educational Society, India (Volunteer Talk)
- Techniques to find extrasolar planets February 2017
  Nehru Planetarium & SPACE India in collaboration with AMITY University, Delhi (Invited Talks)
- *"Journey through the Universe"* and *Astroday* educator with the Mauna Kea Astronomy Outreach Committee in Hilo, Hawaii. 2014 - 2015, 2023, 2024

Languages

Hindi, Punjabi, English (fluent), French ("Diplôme d'etudes en langue Française" B1 level), Basic Italian

Personal Website

https://equanimouscorner.com/

Professional references

Dr. Olivier Guyon
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Herzberg Astronomy & Astrophysics
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Astronomer and Director of Research and Science Services at NOIRLab
Tucson, Arizona
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PUBLICATIONS

Peer-reviewed first author articles

- *"Revealing asymmetrical dust distribution in the inner regions of HD 141569"*. **G. Singh**, T. Bhowmik, A. Boccaletti, P. Thébault, Q. Kral, J. Milli, J. Mazoyer, E. Pantin, R. G. van Holstein, J. Olofsson et al. (36 more), Astronomy & Astrophysics, 653, A79, 2021
- *"Active minimization of non-common path aberrations in long-exposure imaging of exoplanetary systems"*. **Singh, G.**, Galicher, R., Baudoz, P., Dupuis, O., Ortiz, M., Potier, A., Thijs, S., Huby, E., Astronomy & Astrophysics, 631, A106, 2019.
- *"A demonstration of a versatile low-order wavefront sensor tested on multiple coronagraphs"*. **Singh, G.**, Lozi, J., Jovanovic, N., Guyon, O., Baudoz, P., Kudo, T., Publications of the Astronomical Society of the Pacific, Vol. 129, Number 979, 2017
- *"On-sky demonstration of low-order wavefront sensing and control with focal plane phase mask coronagraphs"*. **Singh, G.**, Lozi, J., Guyon, O., Baudoz, P., Jovanovic N., Martinache, F., Kudo, T., Serabyn, E., & Kuhn, J., Publications of the Astronomical Society of the Pacific, Volume 127, issue 955, pp.857-869, 2015
- *"Lyot-based low-order wavefront sensor for phase mask coronagraphs: Principle, Simulations and Laboratory Experiments"*. **Singh, G.**, Martinache, F., Baudoz, P., Guyon, O., Matsuo, T., Jovanovic N., Clergeon, C., Publications of the Astronomical Society of the Pacific, vol. 126, pp. 586-594, June 2014

Other peer-reviewed articles

- *"Socio-demographic study of the exoplanet direct imaging community"*. L. Leboulleux, E. Choquet, E. Huby, **G. Singh**, F. Cantalloube, Bulletin of the American Astronomical Society, Vol. 52, Issue 2, id. 0209, 2020.
- *"Comparing focal plane wavefront control techniques: Numerical simulations and laboratory experiments"*. A. Potier, P. Baudoz, R. Galicher, **G. Singh**, A. Boccaletti, Astronomy & Astrophysics, 635, A192, 2020.
- *"Characterizing vibrations at the Subaru Telescope for the Subaru coronagraphic extreme adaptive optics instrument"*. J. Lozi, O. Guyon, N. Jovanovic, N. Takato, **G. Singh**, et al., Journal of Astronomical Telescopes, Instruments, and Systems, Vol 4, id. 049001, 2018.
- *"An H-band Vector Vortex Coronagraph for the Subaru Coronagraphic Extreme-adaptive Optics System"*. J. Kuhn, E. Serabyn, J. Lozi, N. Jovanovic, T. Currie, O. Guyon, T. Kudo, F. Martinache, **G. Singh**, et al., Publications of the Astronomical Society of the Pacific, Vol. 130, Issue 985, 2018.
- *"Subaru/SCExAO First-light Direct Imaging of a Young Debris Disk around HD 36546"*. T. Currie, O. Guyon, M. Tamura, T. Kudo, N. Jovanovic, J. Lozi, J. E. Schlieder, T. D. Brandt, J. Kuhn, E. Serabyn, M. Janson, J. Carson, T. Groff, J. N. Kasdin, M. W. McElwain, **G. Singh**, et al., The Astrophysical Journal Letters, Vol. 836, Issue 1, 2017.
- *"The Subaru Coronagraphic Extreme Adaptive Optics System: Enabling High-Contrast Imaging on Solar-System Scales"*. N. Jovanovic, F. Martinache, O. Guyon, C. Clergeon, **G. Singh**, et al., Publications of the Astronomical Society of the Pacific Vol 127, Issue 955, pp. 890, 2015.
- *"On-Sky Speckle Nulling Demonstration at Small Angular Separation with SCExAO"*. F. Martinache, O. Guyon, N. Jovanovic, C. Clergeon, **G. Singh**, et al., Publications of the Astronomical Society of the Pacific Vol 126, Issue 940, pp. 565, 2014.

Submitted, under preparation, public, and workshop articles

- A public article written for a journal associated with Marie Skłodowska-Curie Alumni Association (MCAA): Worlds beyond ours.
- An article "Improving data interpretation of exoplanet images" written for the 21st MCAA Newsletter. This article is an easy read explaining the motives and significance of my published work as an MSCA fellow at the Observatoire de Paris.
- A public article, "Paving the way for improving exoplanet imaging with ground-based telescopes", published in Volume 5 of the UK-based European Dissemination Media Agency (page number 30).

Conference Proceedings

- "Adaptive optics at Gemini Observatories: past, present, and future", C. Blain et al., Proc. SPIE 13097, Adaptive Optics Systems IX, 130970M, 2024.
- "CAL2: project update of the NRC Canada facility-class focal plane wavefront sensor for the Gemini Planet Imager 2 upgrade", C. Marois et al., Proc. SPIE 13097, Adaptive Optics Systems IX, 1309708, 2024.
- "GPI 2.0: pre-integrated pyramid wavefront sensor results", S. Perera et al., Proc. SPIE 13097, Adaptive Optics Systems IX, 130971S, 2024.
- "Spectral interferometric wavefront sensing: a solution for petalometry at Subaru/SCExAO", V. Deo et al., Proc. of SPIE, 2024
- "SPIDERS: A pathfinder 4th generation planet imager", W. Thompson et al., Proceedings Volume 13097, Adaptive Optics Systems IX; 130974K, 2024
- "GPI 2.0: end-to-end simulations of the AO-coronagraph system", J. Nguyen et al., Proc. SPIE 13097, Adaptive Optics Systems IX, 130976D, 2024
- "The future of polarimetry at the NOIRLab Gemini North Observatory facility, M. G. Rawlings et al., Proceedings Volume 13096, Ground-based and Airborne Instrumentation for Astronomy X; 1309636, 2024
- "ALTAIR, Gemini North SCAO: challenges and performance review", C. Clergeon et al., Proceedings Volume 13096, Ground-based and Airborne Instrumentation for Astronomy X; 130969I, 2024
- "US Adaptive Optics Roadmap to Achieve Astro2020": arXiv Link
- *"The Planetary Systems Imager for TMT: overview and status"*. Fitzgerald, Michael P., Sallum, Steph, Millar-Blanchaer, Maxwell A., Jensen-Clem, Rebecca, Hinz, Philip M., Guyon, Olivier, Wang, Jason, Mazin, Benjamin A., Skemer, Andrew, Chun, Mark, Males, Jared, Marois, Christian, **Singh Garima**, et al., Proc. of SPIE, Volume 12184, id. 1218426 8 pp., 2022.
- *"Pupil-plane LLOWFS simulation and laboratory results from NEW-EARTH's high-contrast imaging testbed"*. **G. Singh**, W. Thompson, et al., Proc. of SPIE, Volume 12185, id. 1218553 12 pp., 2022
- *"Performance of the Fast Atmospheric Self Coherent camera at the NEW-EARTH lab and a simplified measurement algorithm"*. W. Thompson, C., Marois, **G. Singh**, et al., Proc. of SPIE, Volume 12185, id. 121852C 12 pp., 2022.
- *"Optical design of SPIDERS, a Subaru Pathfinder Instrument for Detecting Exoplanets and Retrieving Spectra"*. O. Lardière, C. Marois, W. Thompson, **G. Singh**, et al., Proc. of SPIE, Volume 12185, id. 1218547 11 pp., 2022.

- *"Deployment of focal plane WFS technologies on 8-m telescopes: from the Subaru SPIDERS pathfinder, to the facility-class GPI 2.0 CAL2 system"*. C., Marois, O. Lardière, W. Thompson, **G. Singh**, et al., Proc. of SPIE, Volume 12185, id. 121851Y 10 pp., 2022.
- "Blinking the fringes: initial development and results of the Ultra-Low Speed Optical Chopper for the Self-Coherent Camera". Adam B. Johnson, C. Marois, D. Gamroth, J. Fitzsimmons, O. Lardière, W. Thompson, **G. Singh**, et al., Proc. of SPIE, Volume 12185, id. 1218575 8 pp., 2022.
- *"Fast focal plane wavefront sensing as a second stage adaptive optics wavefront sensor"*. B. L. Gerard, J. P. Veran, **G. Singh**, et al., Proc. SPIE 11448, Adaptive Optics Systems VII, 1144826, 2021.
- *"The SCExAO High Contrast Imaging Platform: Current and Upcoming Capabilities"*. O. Guyon, J. Lozi, S. Vievard, A. Sahoo, N. Jovanovic, T. Currie, P. Pathak, F. Martinache, T. Kudo, M. Tamura, **G. Singh**, et al., American Astronomical Society Meeting #233, id.104.03, 2019.
- *"PSF calibration using the Lyot-based low order wavefront sensor telemetry: first simulations"*. **G. Singh**, J. Lozi, E. Choquet, E. Serabyn, O. Guyon, Proc. SPIE Vol. 9909, id. 99097K 10 pp., 2016.
- *"Efficiently feeding single-mode fiber photonic spectrographs with an extreme adaptive optics system: on-sky characterization and preliminary spectroscopy"*. N. Jovanovic, N. Cvetojeviic, C. Schwab, B. Norris, J. Lozi, S. Gross, C. Betters, **G. Singh**, et al., Proc. SPIE Vol. 9908, id. 99080R 10 pp., 2016.
- *"The SCExAO high contrast imager: transitioning from commissioning to science"*. N. Jovanovic, O. Guyon, J. Lozi, T. Currie, J. Hagelberg, B. Norris, **G. Singh**, et al., Proc. SPIE Volume 9909, id. 99090W 10 pp., 2016.
- *"Characterizing and mitigating vibrations for SCExAO"*. J. Lozi, O. Guyon, N. Jovanovic, **G. Singh**, et al., Proc. SPIE Volume 9909, id. 99090J 13 pp., 2016.
- *"SCExAO: the most complete instrument to characterize exoplanets and stellar environments"*. J. Lozi, O. Guyon, N. Jovanovic, **G. Singh**, et al., American Astronomical Society, ESS meeting #3, id.104.03. BAAS volume 47 #6, 2015.
- *"SCExAO: the first high contrast exoplanet imager on an ELT?"*. J. Lozi, N. Jovanovic, O. Guyon, J. Males, **G. Singh**, et al., Proc. Adaptive Optics for Extremely Large Telescopes IV, id.E79 2015.
- *"The low-order wavefront sensor for the PICTURE-C mission"*. C. B. Mendillo, J. Brown, J. Martel, G. A. Howe, K. Hewasawam, S. C. Finn, T. A. Cook, S. Chakrabarti, E. S. Douglas, D. Mawet, O. Guyon, **G. Singh**, et al., Proc. SPIE Volume 9605, id. 960519 12 pp., 2015.
- *"Lyot-based low order wavefront sensor: implementation on the Subaru Coronagraphic Extreme Adaptive Optics System and its laboratory performance"*. **G. Singh**, O. Guyon, P. Baudoz, N. Jovanovic, et. al., Proc. SPIE Volume 9148, id. 914848 9 pp., 2014.
- *"On-sky speckle nulling with the Subaru Coronagraphic Extreme AO (SCExAO) instrument"*. F. Martinache, O. Guyon, N. Jovanovic, C. Clergeon, **G. Singh**, et. al., Proc. SPIE Volume 9148, id. 914821 10 pp., 2014.
- *"Recent progress on phase-mask coronagraphy based on photonic-crystal technology"*. N. Murakami, J. Nishikawa, M. Tamura, E. Serabyn, W. A. Traud, K. M. Liewer, D. C. Moody, J. T. Trauger, O. Guyon, F. Martinache, N. Jovanovic, **G. Singh**, et. al., Proc. SPIE Volume 9143, id. 914334 8 pp., 2014.
- *"Development and recent results from the Subaru coronagraphic extreme adaptive optics system"*. N. Jovanovic, O. Guyon, F. Martinache, C. Clergeon, **G. Singh**, et al., Proc SPIE Volume 9147, id. 91471Q 11 pp., 2014.

- *"SCExAO: First Results and On-Sky Performance"*. T. Currie, O. Guyon, F. Martinache, C. Clergeon, M. McElwain, C. Thalmann, N. Jovanovic, **G. Singh**, et. al., Proceedings of the International Astronomical Union, IAU Symposium, Volume 299, pp. 34-35, 2014.
- *"SCExAO as a precursor to an ELT exoplanet direct imaging instrument"*. N. Jovanovic, O. Guyon, F. Martinache, C. Clergeon, **G. Singh**, et al., Proceedings of the Third AO4ELT Conference. id.94, 2013.
- *"Lyot-based ultra-fine pointing control system for phase mask coronagraphs"*. **G. Singh**, F. Martinache, P. Baudoz, O. Guyon, C. Clergeon, T. Matsuo, Proceedings of the Third AO4ELT Conference. id.7, 2013.
- *"The Subaru Coronagraphic Extreme Adaptive Optics Imager: First Results and On-Sky Performance"*. T. Currie, O. Guyon, F. Martinache, C. Clergeon, M. McElwain, C. Thalmann, N. Jovanovic, **G. Singh**, et. al., IAU 299/Victoria conference proceedings, 2013.