

# Prashant PATHAK

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## RESEARCH EXPERIENCE

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- PostDoc Fellow at Space sciences, Technologies & Astrophysics Research (STAR) Institute, [University of Liège](#), Liège, Belgium. Oct. 2021 - Present
- Engineering and Technology Research Fellow at [European Southern Observatory \(ESO\)](#), Garching, Germany. Feb. 2018 - May 2021

## EDUCATION

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PhD, Astronomy (Instrumentation) 2014-2017  
[The Graduate University for Advance Studies \[SOKENDAI\]](#), Japan

Integrated Bachelor & Master of Science (BS-MS) 2008-2013  
[Indian Institute of Science Education and Research -Thiruvananthapuram, India](#)

## RESEARCH INTEREST

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- Direct imaging and characterization of Exoplanets.
- Adaptive optics and wavefront control techniques.
- Ground and space-based infrared instrumentation.

## MAJOR INSTRUMENTATION PROJECTS

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- **METIS**: is a mid-infrared imager and spectrograph for the [Extremely Large Telescope \(ELT\)](#), Europe's next-generation ground-based telescope for optical and infrared (IR) wavelengths.  
I have been involved in a realistic estimation of the METIS high-contrast imaging (HCI) performance, participation in various consortia meetings and contribution to its final design and performance.
- **NEAR**: The experiment was a collaboration between ESO and the [Breakthrough Initiatives](#) to search for potentially habitable planets around  $\alpha$  Centauri by developing HCI capabilities in the mid-IR.  
I was involved in developing a pipeline (pre - and post-processing) to reduce science observation data and publication of science results.
- **SCEXAO**: is one of the near-IR HCI instrument at the [Subaru Telescope](#).  
I was involved with developing new capabilities and commissioning of the instrument.

## PUBLICATIONS

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I have **19 publications** with a total **citations of 254** and h-index of 9 (as of 3<sup>rd</sup> June 2022), these include: 11 refereed publications in international journals, 6 publications in international conference proceedings and 2 non-peer reviewed articles.

## MANUSCRIPT UNDER PREPARATION

1. **Pathak P.**, Kasper M. et al. "New Earths in Alpha-Cen Region Campaign: technical analysis and lessons learned for the future mid-IR HCI instruments.", 2022, in prep.

## PEER-REVIEWED PAPERS

1. Bowens R., Meyer M., Delacroix C., Absil O., Boekel van R., Quanz S. P., Shinde M., Kenworthy M., Carlomagno B., Orban de Xivry G., Cantalloube F., **Pathak P.**, "Exoplanets with ELT-METIS I: Estimating the direct imaging exoplanet yield around stars within 6.5 parsecs", 2021, [A&A, 653, A8](#).
2. Viswanath G., Janson M., Dahlgqvist C. H., Petit dit de la Roche D. J. M., Samland M., Girard J., **Pathak P.**, Kasper M., Feng F., Meyer M., Boehle A., Quanz S. P., Jones H.R.A., Absil O., Brandner W., Maire A. L., Siebenmorgen R., Sterzik M., Pantin E., "Constraints on the nearby exoplanet  $\epsilon$  Indi Ab from deep near- and mid-infrared imaging limits", 2021, [A&A 651 A89](#).
3. **Pathak P.**, Petit dit de la Roche D. J. M., Kasper M., Sterzik M., Absil O., Boehle A., Feng F., Ivanov V. D., Janson M., Jones H.R.A., Kaufer A., Käufel H.-U., Maire A.-L., Meyer M., Pantin E., Siebenmorgen R., Ancker M. E. van den, Viswanath G., "High contrast imaging at 10 microns, a search for exoplanets around: Eps Indi A, Eps Eri, Tau Ceti, Sirius A and Sirius B", 2021, [A&A, 652, A121](#).
4. Wagner K., Boehle A., **Pathak P.**, Kasper M., Arsenault R., Jakob U., Käufel H.-U., Leveratto S., Maire A.-L., Pantin E., Siebenmorgen R., Zins G., Absil O., Ageorges N., Apai D., Carlotti A., Choquet E., Delacroix C., Dohlen P., Duhoux P., Forsberg P., Fuenteseca E., Gutruf S., Guyon O., Huby E., Kampf D., Karlsson M., Kervella P., Kirchbauer J.-P., Klupar P., Kolb J., Mawet D., N'Diaye M., Orban de Xivry G., Quanz S.P., Reutlinger A., Ruane G., Riquelme M., Soenke C., Sterzik M., Vigan A., de Zeeuw T., "Imaging Low-Mass Planets Within  $\alpha$  Centauri's Habitable Zone", 2020, [Nature Communications, 12, 922](#).
5. Turchi A., Masciadri E., **Pathak P.**, Kasper M., "High-accuracy short-term precipitable water-vapour operational forecast at the Very Large Telescope and perspectives for sky background forecast ", 2020, [MNRAS, 497, 4910](#).
6. Carlomagno B., Delacroix C., Absil O., Cantalloube F., Orban de Xivry G., **Pathak P.**, Agocs T., Bertram T., Brandl B., Burtscher L., Feldt M., Glauser A., Hippler S., Kenworthy M., Stuik R., van Boekel R., "METIS high contrast imaging: design and expected performance", 2020, [JATIS, 6\(3\), 035005](#).
7. Maire A., Huby E., Absil O., Zins G., Kasper M., Delacroix C., Leveratto S., Karlsson M., Ruane G., Käufel H., Orban de Xivry G., **Pathak P.**, Pettazzi L., Duhoux P., Kolb J., Pantin E., Riggs A., Siebenmorgen R., Mawet D., "Design, pointing control, and on-sky performance of the mid-infrared vortex coronagraph for the VLT/NEAR experiment", 2020, [JATIS, 6, 035003](#).
8. **Pathak P.**, Guyon O., Jovanovic N., Lozi J., Martinache F., Minowa Y., Kudo T., Kotani T., Takami H., "On-sky closed loop correction of atmospheric dispersion for high-contrast coronagraphy and astrometry", 2018, [PASP 130, 025004](#).
9. Currie T., Kasdin N.J., Groff T.D., Lozi J., Jovanovic N., Guyon O., Brandt T., Martinache F., Chilcote J., Skaf N., Kuhn J., **Pathak P.**, Kudo T., "Laboratory and On-sky Validation of the Shaped Pupil Coronagraph's Sensitivity to Low-order Aberrations With Active Wavefront Control", 2018, [PASP 130, 044505](#).
10. **Pathak P.**, Guyon O., Jovanovic N., Lozi J., Martinache F., Minowa Y., Kudo T., Takami H., Hayano Y., Narita N., "A high precision technique to correct for residual atmospheric dispersion in high-contrast imaging systems", 2016, [PASP 128, 124404](#).
11. Jovanovic N., Guyon O., Martinache F., **Pathak P.**, Hagelberg J., Kudo T., "Artificial Incoherent Speckles Enable Precision Astrometry and Photometry in High-contrast Imaging", 2015, [ApJ, 813, 24J](#).

## CONFERENCE PROCEEDINGS / NON PEER-REVIEWED

1. Kasper M., Cerpa Urrea N., **Pathak P.**, Bonse M., Nousiainen J., Engler B., Heritier C. T., Kammerer J., Leveratto S., Rajani C., Bristow P., Le Louarn M., Madec P. -Y., Ströbele S., Verinaud C., Glauser A., Quanz S. P., Helin T., Keller C., Snik F., Boccaletti A., Chauvin G., Mouillet D., Kulcsár C., Raynaud H. -F., "PCS — A Roadmap for Exoearth Imaging with the ELT", 2021, [The Messenger, 182: 38-43](#).
2. Cantalloube F., Absil O., Bertram T., Brandner W., Delacroix C., Feldt M., Kenworthy M., Kulas M., Milli J., Neureuther P., Orban de X. G., **Pathak P.**, Por E., Scheithauer S., Steuer H., van Boekel R., "High contrast imaging with ELT/METIS: The wind driven halo, from SPHERE to METIS", 2019, [AO4ELT6 Conference Proceedings](#).

3. Kasper M., Arsenault R., Käufl U., Jakob G., Leveratto S., Zins G., Pantin E., Duhoux P., Riquelme M., Kirchbauer J. P., Kolb J., **Pathak P.**, Siebenmorgen R., Soenke C., Fuenteseca E., Sterzik M., Ageorges N., Gutruf S., Kampf D., Reutlinger A., Absil O., Delacroix C., Maire A. L., Huby E., Guyon O., Klupar P., Mawet D., Ruane G., Karlsson M., Dohlen K., Vigan A., N'Diaye M., Quanz S., Carlotti A., “NEAR: First Results from the Search for Low-Mass Planets in  $\alpha$  Cen”, 2019, [The Messenger 178: 5-9](#).
4. Lozi J., Guyon O., Jovanovic N., Goebel S., **Pathak P.**, Skaf N., Sahoo A., “SCEXAO, an instrument with a dual purpose: perform cutting-edge science and develop new technologies”, 2018, [SPIE, 10703, 1070359](#).
5. Jovanovic N., Guyon O., Lozi J., Currie T., Hagelberg J., Norris B., Singh G., **Pathak P.**, Doughty D., Goebel S., Males J., Kuhn J., Serabyn E., Tuthill P., Schworer G., Martinache F., Kudo T., Kawahara H., Kotani T., Ireland M., Feger T., Rains A., Bento J., Schwab C., Coutts D., Cvetojevic N., Gross S., Arriola A., Lagadec T., Kasdin J., Groff T., Mazin B., Minowa Y., Takato N., Tamura M., Takami H., Hayashi M., “The SCEXAO high contrast imager: transitioning from commissioning to science”, 2016, [Proc. of SPIE, 9909-9W](#).
6. **Pathak P.**, Guyon O., Jovanovic N., Lozi J., Martinache F., Minowa Y., Kudo T., Takami H., Hayano Y., Narita N., “First on-sky closed loop measurement and correction of atmospheric dispersion”, 2016, [Proc. of SPIE, 9909-56](#).
7. Lozi J., Guyon O., Jovanovic N., Singh G., Doughty D., **Pathak P.**, Goebel S., Kudo T., “SCEXAO: the most complete instrument to characterize exoplanets and stellar environments”, 2015, [AAS/Division for Extreme Solar Systems Abstracts, 3, 104.03](#).
8. Lozi J., Jovanovic N., Guyon O., Males J., Singh G., Doughty D., **Pathak P.**, Goebel S., Kudo T., Martinache F., “SCEXAO: the first high contrast exoplanet imager on an ELT?”, 2015, [Proc. of AO4ELT4,31711](#)

## PROFESSIONAL TALKS

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- NEAR campaign data reduction and summary.  
*HCI post-processing workshop, Berlin, Germany.* Jan-2020
- A Shack-Hartmann based setup to study deformable mirrors dynamics at very high framerates.  
*Wavefront sensing and control in the VLT/ELT era, Paris, France.* Oct-2018
- HEEPS: High-contrast End-to-end ELT Performance Simulator package.  
*VORTEX yearly meeting, Liège, Belgium.* Aug-2018
- Closed-loop correction of atmospheric dispersion to achieve high-Strehl ratio with TMT.  
*Thirty Meter Telescope Science Forum 2017, Mysore, India.* Nov-2017
- Closed-loop correction of residual atmospheric dispersion in high-contrast imaging systems.  
*Institute for Astronomy (IfA), Hilo, Hawaii, USA.* Oct-2016

## PROFESSIONAL VISITS

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- Max Planck Institute for Astronomy, Heidelberg, Germany. Oct. 2019
- Leiden University, Leiden, Netherlands. Jul. 2019
- The UK Astronomy Technology Centre, Edinburgh, United Kingdom. May 2018
- Space sciences, Technologies & Astrophysics Research (STAR) Institute, University of Liège, Liege, Belgium. Apr. 2018

## AWARDS AND FELLOWSHIP

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INSPIRE (Innovation in Science Pursuit for Inspired Research) fellow from DST (Department of Science and Technology) India.

## ASTRONOMY OUTREACH

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*Journey through the Universe* educator, a public education program held annually by GEMINI Observatory in Hilo, Hawaii.

## REFERENCES

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