


Iva Laginja

Curriculum Vitae - December 2022

CURRENT AFFILIATION: LESIA, Observatoire de Paris, Meudon by Paris, France
NATIONALITY: Austria
ORCID iD:  <https://orcid.org/0000-0003-1783-5023>
EMAIL: iva.laginja@obspm.fr

Research interests: Astronomical instrumentation, high contrast imaging, coronagraphy, image formation theory, Fourier optics, wavefront sensing and control, exoplanet detection

EDUCATION

- 2021 **PhD, Astronomy and Astrophysics**, STScI/ONERA/LAM, USA/France
Thesis: “Contrast-based tolerancing of space telescopes for exoEarth imaging”
Supervisors: Rémi Soummer, Laurent Mugnier, Jean-François Sauvage
- 2017 **MSc, Astronomy and Instrumentation**, Leiden University, Netherlands
Major (MSc) Thesis: “Laboratory characterization and end-to-end simulations of the Apodizing Phase Plate Coronagraph”
Minor Thesis: “Exo-ringsystem in the Edge-On Planetary System of β Pictoris”
Supervisors: Matthew Kenworthy, Christoph Keller
- 2015 **BSc, Astronomy and Physics**, University of Vienna, Austria
- 2011 High School Diploma, Theresianische Akademie Wien, Austria

WORK EXPERIENCE

- MAR 2021 - *Current* **CNES postdoctoral fellow**
LESIA/Observatoire de Paris, Meudon, France
Research in high-contrast imaging and coronagraphy
- JUL 2020 - DEC 2021 **Graduate student researcher**
Jul 2020 - Dec 2021: *ONERA*, Marseille, France
Oct 2018 - Jul 2020: *Space Telescope Science Institute*, Baltimore, USA
- NOV 2019 - JUL 2020 **Astronomical Optics Scientist**
Space Telescope Science Institute, Baltimore, USA
Research and operational work at the [Russell B. Makidon Optics Laboratory](#)
- SEP 2017 - NOV 2019 **Research and Instrument Analyst**
Space Telescope Science Institute, Baltimore, USA
Research and operational work at the [Russell B. Makidon Optics Laboratory](#)

TECHNICAL SKILLS

Python, conda, git, GitHub (expert); bash, \LaTeX , IDL, Matlab, Mathematica

LANGUAGES

| | | | |
|----------|-----------------|-----------|-----------------|
| GERMAN: | Mothertongue | CROATIAN: | Mothertongue |
| ENGLISH: | Fluent | FRENCH: | Fluent |
| RUSSIAN: | Basic Knowledge | DUTCH: | Basic Knowledge |

TALKS AND SEMINARS

- 2022 • LESIA seminar talk, Paris, France
- 2021 • MPO seminar talk, Nice, France
 - Journée des doctorants LAM, bilingual presentation of my PhD thesis in 180 seconds
Video: <https://youtu.be/oXEest5A23s?t=16>
- 2020 • NYRIA workshop contributed talk, online
 - LESIA seminar talk, Paris, France
 - GRD/LAM seminar talk, online
- 2019 • Spirit of Lyot contributed talk, Tokyo, Japan
 - *“Laboratory Demonstration of High Contrast Imaging on Segmented Apertures: Results from the STScI HiCAT Testbed”*
 - SPIE Optics&Photonics contributed talk, San Diego, USA
 - *“Wavefront error tolerancing for direct imaging of exo-Earths with a large segmented telescope in space”*
- 2018 • GRD/LAM seminar talk, Marseille, France
 - STScI Instruments Division Science meeting talk, Baltimore, USA
- 2016 • Leiden Observatory Science Day talk, Leiden, Netherlands
 - Contributed talk at the interdisciplinary conference ReTHINK, Maigen, Austria
- 2015 • Contributed talk at the interdisciplinary conference THINK, Küb, Austria

SUMMERSCHOOLS AND WORKSHOPS

- 2020 LAM High Angular Resolution Summer School, online
- 2019 CfAO Adaptive Optics Summer School, University of Santa Cruz, USA
- 2016 ESA Concurrent Engineering Workshop, Redu, Belgium
 - From Rocks to Pebbles Lorentz Center Workshop, Leiden, Netherlands
 - Exoplanets I Conference, Davos, Switzerland
 - 2nd Tautenburg School for Advanced Astronomical Observations, TLS Tautenburg, Germany
- 2014 Dunlap Institute Instrumentation Summer School, University of Toronto, Canada

COMMUNITY SERVICE AND OUTREACH

Organization and realization of version control courses

- Development of a completely new way to teach software version control for scientists
- Definition of content, scope and objectives of the courses, creation of course material
- Teaching of the course series in the spring of 2021 and 2022, for an audience from interns to senior researchers

EDI (Equity, Diversity and Inclusion) committee member of the [international society of optics and photonics \(SPIE\)](#), 2020-2022

- Discussions about the politics and action points in the context of EDI, for a more inclusive and diverse workforce in optics around the world
- Implementation of action points to promote diversity and inclusion at SPIE conferences

Seminar organizer of the GRD group at LAM, 2020/2021

- Contacting international researchers, invitation and organization of their presentations for the weekly virtual group seminars
- Structuring and management of seminar organization and digital tools

International collaboration platform “CAOTIC” for the instrumentation community

- Co-organization and development of a collaborative and international online platform for all astronomical testbeds dedicated to high-contrast imaging of exoplanets
- Website: <https://sites.google.com/view/highcontrastlabs/>

Coronagraphy outreach with the portable testbed “BabyCAT”

- Developing coronagraphy outreach activities for the general public
- Presentations and demonstrations with a portable coronagraph testbed

Tour guide at the Leiden Old Observatory, 2016-2017

- Giving tours and leading demonstrations of the historical telescopes
- Video: <https://youtu.be/BYc1hTZNFsk?t=34>

Volunteer translator for TED

- Subtitling and translation of TED videos on scientific topics
- Translator profile: <https://www.ted.com/profiles/5884302/translator>

MENTORING OF STUDENTS AND INTERNS

| | | |
|------|-----------------|--|
| 2021 | David Bourgeois | 6-month intern (LAM), masters student, co-supervised with J.-F. Sauvage |
| 2020 | Kelsey Glazer | 6-month intern (STScI), physics undergrad, supervisor: R. Soummer |
| 2019 | Lucas Batista | 2-month SASP intern (STScI), “BabyCAT” outreach, supervisor: T. Rhue |
| 2019 | Maggie Kautz | 3-month intern (STScI), optics undergrad, supervisor: R. Soummer |

PUBLICATIONS

Peer-Reviewed Journal Articles (first author):

3. *Wavefront tolerances of space-based segmented telescopes at very high contrast: Experimental validation*
Laginja, I., Sauvage, J.-F., Mugnier, L.M., Pueyo, L., Perrin, M.D., Noss, J., Will, S.D., Brooks, K.J., Por, E.H., Petrone, P., Soummer, R.
2022, *Astronomy & Astrophysics*, 658, A84
2. *Analytical tolerancing of segmented telescope co-phasing for exo-Earth high-contrast imaging*
Laginja, I., Soummer, R., Mugnier, L.M., Pueyo, L., Sauvage, J.-F., Leboulleux, L., Coyle, L., Knight, J. S.
2021, *Journal of Astronomical Telescopes, Instruments, and Systems* 7(1), 015004
1. *ExoTiC-ISM: A Python package for marginalised exoplanet transit parameters across a grid of systematic instrument models*
Laginja, I. and Wakeford, H. R.
2020, *Journal of Open Source Software*, 5(51), 2281

Peer-Reviewed Journal Articles (contributions):

6. *Low-order wavefront control using a Zernike sensor through Lyot coronagraphs for exoplanet imaging: II. Concurrent operation with stroke minimization*
Pourcelot, R., Por, E.H., N'Diaye, M., Brady, G., Carbillet, M., Dohlen, K., **Laginja, I.**, Lugten, J., Noss, J., Perrin, M.D., Petrone, P., Pueyo, L., Redmond, S.F., Sahoo, A., Vigan, A., Will, S.D., Soummer, R.
Submitted to *Astronomy & Astrophysics*
5. *Coronagraphic detection of Earth-like planets with large, actively controlled space telescopes*
Pueyo, L., Juanola-Parramon, R., Tumlinson, J., Soummer, R., **Laginja, I.**, Hammel, H.B., Moun-tain, C.M.
2022, *Journal of Astronomical Telescopes, Instruments, and Systems* 8(4), 049002
4. *Implementation of a dark zone maintenance algorithm for speckle drift correction in a high contrast space coronagraph*
Redmond, S.F., Pogorelyuk, L., Pueyo, L., Por, E.H., Noss, J., Will, S.D., **Laginja, I.**, Brooks, K.J., Maclay, M., Fowler, J., Kasdin, N.J., Perrin, M.D., Soummer, R.
2022, *Journal of Astronomical Telescopes, Instruments, and Systems* 8(3), 035001
3. *Low-order wavefront control using a Zernike sensor through Lyot coronagraphs for exoplanet imaging: Blind stabilization of an image dark hole*
Pourcelot, R., N'Diaye, M., Por, E.H., **Laginja, I.**, Carbillet, M., Benard, H., Brady, G., Canas, L., Dohlen, K., Fowler, J., Lai, O., Maclay, M., McChesney, E., Noss, J., Perrin, M.D., Petrone, P.,

- Pueyo, L., Redmond, S.F., Sahoo, A., Vigan, A., Will, S.D., Soummer, R.
2021, *Astronomy & Astrophysics*, 663, A49
2. *The β Pictoris b Hill sphere transit campaign. Paper I: Photometric limits to dust and rings*
Kenworthy, M.A., Mellon, S.N., Bailey, J.I. III, Stuik, R., Dorval, P., Talens, G.J.J., Crawford, S.M., Mamajek, E.E., **Laginja, I.**, Ireland, M., Lomberg, B.B.D., Kuhn, R.B.
2021, *Astronomy & Astrophysics*, 648, A15
 1. *bRing: An observatory dedicated to monitoring the β Pictoris b Hill sphere transit*
Stuik, R., Bailey, J.E., Lomberg, B.B.D., Dorval, P., Talens, G.J.J., Mellon, S.N., **Laginja, I.**, Rieder, S., Crawford, S.M., Mamajek, E.E., Kenworthy M.A.
2017, *Astronomy & Astrophysics*, 607, A45

SPIE Papers, Conference Proceedings (first author):

4. *Connecting the astronomical testbed community - the CAOTIC project: optimized teaching methods for software version control concepts*
Laginja, I., Robles, P., Barjot, K., Leboulleux, L., Jensen-Clem, R., Brooks, K.J., Moriarty, C.
2022, *Proc. SPIE 12185, Adaptive Optics Systems VIII*, 121853A
3. *Predicting contrast sensitivity to segmented aperture misalignment modes for the HiCAT testbed*
Laginja, I., Soummer, R., Mugnier, L.M., Pueyo, L., Sauvage, J.-F., Leboulleux, L., Coyle, L., Knight, J.S., Perrin, M.D., Will, S.D., Noss, J., Brooks, K.J., Fowler, J.
2020, *Proc. SPIE 11443, Space Telescopes and Instrumentation 2020: Optical, Infrared, and Millimeter Wave*; 11443J
2. *Wavefront error tolerancing for direct imaging of exo-Earths with a large segmented telescope in space*
Laginja, I., Leboulleux, L., Pueyo, L., Soummer, R., Sauvage, J.-F., Mugnier, L., Coyle, L., Knight, J.S., St-Laurent, K., Por, E., Noss, J.
2019, *Proc. SPIE 11117, Techniques and Instrumentation for Detection of Exoplanets IX*, 1111717
1. *James Webb Space Telescope Optical Simulation Testbed V: Wide-field phase retrieval assessment*
Laginja, I., Brady, G., Soummer, R., Egron, S., Lajoie, C.-P., Bonnefois, A., Michau, V., Choquet, É., Ferrari, M., Leboulleux, L., Levecq, O., N'Diaye, M., Perrin, M.D., Petrone, P., Pueyo, L., Sivaramakrishnan, A.
2018, *Proc. SPIE 10698, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave*, 106983N

SPIE Papers, Conference Proceedings (contributions):

16. *High-contrast imager for complex aperture telescopes (HiCAT): 8. Dark zone demonstration with simultaneous closed-loop low-order wavefront sensing and control*
Soummer, R., Por, E.H., Pourcelot, R., Redmond, S.F., **Laginja, I.**, Will, S.D., Perrin, M., Pueyo, L., Sahoo, A., Petrone, P., Brooks, K.J., Fox, R., Klein, A., Nickson, B., Comeau, T., Ferrari, M., Gontrum, R., Hagopian, J., Leboulleux, L., Leongomez, D., Lugten, J., Mugnier, L.M., N'Diaye, M., Nguyen, M., Noss, J., Sauvage, J.-F., Scott, N., Sivaramakrishnan, A., Subedi, H.B., Weinstock, S.
2022, *Proc. SPIE 12180, Space Telescopes and Instrumentation 2022: Optical, Infrared, and Millimeter Wave*, 1218026
15. *Architecture trades to optimize wavefront stability requirements for exoplanet imaging in space.*
Pueyo, L., Pogorelyuk, L., **Laginja, I.**, Soummer, R., Sahoo, A., Por, E.H., Cahoy, K., Coyle, L., Knight, S.
2022, *Proc. SPIE 12180, Space Telescopes and Instrumentation 2022: Optical, Infrared, and Millimeter Wave*, 121802J
14. *Dark zone maintenance for future coronagraphic space missions*
Redmond, S.F., Pueyo, L., Pogorelyuk, L., Por, E.H., Noss, J., Brooks, K.J., **Laginja, I.**, Perrin, M.D., Soummer, R., Kasdin, N.J.
2022, *Proc. SPIE 12180, Space Telescopes and Instrumentation 2022: Optical, Infrared, and Millimeter Wave*, 121802B

13. *APLC-optimization: an apodized pupil Lyot coronagraph design survey toolkit*
Nickson, B., Por, E.H., Nguyen, M., Soummer, R., **Laginja, I.**, Sahoo, A., Pueyo, L., St.Laurent, K., N'Diaye, M., Zimmerman, N., Noss, J., Perrin, M.D.
2022, Proc. SPIE 12180, Space Telescopes and Instrumentation 2022: Optical, Infrared, and Millimeter Wave, 121805K
12. *Segment-level thermal sensitivity analysis for exo-Earth imaging*
Sahoo, A., **Laginja, I.**, Pueyo, L., Soummer, R., Coyle, L., Knight, J.S., East, M.
2022, Proc. SPIE 12180, Space Telescopes and Instrumentation 2022: Optical, Infrared, and Millimeter Wave, 121805V
11. *Experimental validation of active control of low-order aberrations with a Zernike sensor through a Lyot coronagraph*
Pourcelot, R., N'Diaye, M., Por, E.H., Perrin, M., Soummer, R., **Laginja, I.**, Sahoo, A., Carbillet, M., Brady, G.R., Dohlen, K., Maclay, M., McChesney, E., Noss, J., Petrone, P., Pueyo, L., Vigan, A., Will, S.D.
2021, Proc. SPIE 11823, Techniques and Instrumentation for Detection of Exoplanets X, 118231M
10. *Dark zone maintenance results for segmented aperture wavefront error drift in a high contrast space coronagraph*
Redmond, S.F., Pueyo, L., Pogorelyuk, L., Por, E., Noss, J., **Laginja, I.**, Brooks, K., Perrin, M.D., Soummer, R., Kasdin, N.J.
2021, Proc. SPIE 11823, Techniques and Instrumentation for Detection of Exoplanets X, 118231K
9. *Implementation of a broadband focal plane estimator for high-contrast dark zones*
Redmond, S.F., Pueyo, L., Pogorelyuk, L., Noss, J., Will, S.D., **Laginja, I.**, Kasdin, N.J., Perrin, M.D., Soummer, R.
2021, Proc. SPIE 11823, Techniques and Instrumentation for Detection of Exoplanets X, 118231Q
8. *Wavefront control with algorithmic differentiation on the HiCAT testbed*
Will, S.D., Perrin, M.D., Por, E.H., Noss, J., Sahoo, A., Petrone, P., **Laginja, I.**, Pourcelot, R., Redmond, S.M., Pueyo, L., Groff, T.D., Fienup, J.R., Soummer, R.
2021, Proc. SPIE 11823, Techniques and Instrumentation for Detection of Exoplanets X, 118230V
7. *Implementation of a dark hole maintenance algorithm for speckle drift in a high contrast space coronagraph*
Redmond, S.M., Kasdin, N. J., Pogorelyuk, L., Soummer, R., Pueyo, L., Perrin, M.D., Maclay, M., Noss, J., **Laginja, I.**, Will, S.D., Fowler, J.
2020, Proc. SPIE 11443, Space Telescopes and Instrumentation 2020: Optical, Infrared, and Millimeter Wave; 114432K
6. *Estimating low-order aberrations through a Lyot coronagraph with a Zernike wavefront sensor for exoplanet imaging*
Pourcelot, R., N'Diaye, M., Brady, G., Carbillet, M., Dohlen, K., Fowler, J., **Laginja, I.**, Maclay, M., Noss, J., Perrin, M., Petrone, P., Por, E., Sauvage, J.-F., Soummer, R., Vigan, A., Will, S.
2020, Proc. SPIE 11443, Space Telescopes and Instrumentation 2020: Optical, Infrared, and Millimeter Wave; 1144346
5. *First error budget of a deployable CubeSat telescope*
Sauvage, J.-F., Schwartz, N., Vievard, S., Bonnefois, A., Velluet, M.-T., Correia, C., Cassaing, F., Fusco, T., Michau, V., Krapez, J.-C., Ferrari, M., **Laginja, I.**
2020, Proc. SPIE 11443, Space Telescopes and Instrumentation 2020: Optical, Infrared, and Millimeter Wave; 1144330
4. *Phase-retrieval-based wavefront metrology for high-contrast coronagraphy: 2. Reconstructions through a shaped pupil apodizer*
Brady, G.R., Petrone, P., **Laginja, I.**, Brooks, K., Zhang, M., N'Diaye, M., Moriarty, C., Hagopian, J., Soummer, R.
2019, Proc. SPIE 11117, Techniques and Instrumentation for Detection of Exoplanets IX, 1111712
3. *The LUVOIR Extreme Coronagraph for Living Planetary Systems (ECLIPS) I: searching and characterizing exoplanetary gems*
Pueyo, L., Stark, C., Juanola-Parramon, R., Zimmerman, N., Bolcar, M., Roberge, A., Arney, G.,

- Ruane, G., Riggs, A.J., Belikov, R., Sirbu, D., Redding, D., Soummer, R., **Laginja, I.**, Will, S. 2019, Proc. SPIE 11117, Techniques and Instrumentation for Detection of Exoplanets IX, 1111703
2. *High-contrast imager for complex aperture telescopes (HiCAT): 5. first results with segmented-aperture coronagraph and wavefront control*
 Soummer, R., Brady, G.R., Brooks, K., Comeau, T., Choquet, É., Dillon, T., Egron, S., Gontrum, R., Hagopian, J., **Laginja, I.**, Leboulleux, L., Perrin, M.D., Petrone, P., Pueyo, L., Mazoyer, J., N'Diaye, M., Riggs, A.J.E., Shiri, R., Sivaramakrishnan, A., St.Laurent, K., Valenzuela, A.-M., Zimmerman, N.T.
 2018, Proc. SPIE 10698, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 106981O
1. *Phase-retrieval-based wavefront metrology for high contrast coronagraphy*
 Brady, G.R. , Moriarty, C., Petrone, P., **Laginja, I.**, Brooks, K., Comeau, T., Leboulleux, L., Soummer, R.
 2018, Proc. SPIE 10698, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 106986I

Software:

In the context of my research, I write a significant amount of code and I have contributed to various projects over time, many of which are open-source. The below table lists GitHub repositories I have made contributions to, roughly ordered by amount of contributed code. The PASTIS package contains the bulk of my PhD work.

| Name | GitHub | |
|---------------|------------------------------|---|
| PASTIS | spacetelescope/PASTIS | Analytical tolerancing of coronagraphs |
| hicat-package | spacetelescope/hicat-package | Control code and simulator for HiCAT (private) |
| jost-package | spacetelescope/jost-package | Control code for JOST (private) |
| ExoTiC-ISM | hrwakeford/ExoTiC-ISM | Marginalized exoplanet transit parameters |
| FouFourier | ivalaginja/FouFourier | Learning notebooks for Fourier optics |
| catkit | spacetelescope/catkit | Hardware control interfaces for lab instrumentation |
| hcupy | ehpor/hcupy | Optical propagations for HCI |
| poppy | spacetelescope/poppy | Physical optical propagation |