

# Johan MAZOYER

Research Interests: Optical Instrumentation, Direct Imaging & Coronagraphy, Observation & Characterization of Extrasolar Systems, Debris Disks

## 1 RESEARCH POSITIONS

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CNRS Scientist – <b>LESIA/Paris Observatory</b> (France)	Since 2020
Sagan Fellow – <b>Jet Propulsion Laboratory</b> (Pasadena, CA)	2018 - 2019
Postdoc – <b>Johns Hopkins University</b> (Baltimore, MD)	2016 - 2018
Postdoc – <b>Space Telescope Science Institute</b> (Baltimore, MD)	2014 - 2016
Graduate Student – <b>LESIA/Paris Observatory</b> (France)	2011 - 2014

## 2 EDUCATION

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PhD – Astronomy & Astrophysics – <b>Université Paris Diderot</b> (France) <i>Thesis Advisors:</i> P. Baudoz & G. Rousset <i>Thesis:</i> High-Contrast Direct Imaging Of Exoplanets And Circumstellar Disks	2014
Master – Astrophysics – <b>Université Paul Sabatier</b> (Toulouse, France) <i>Master Thesis Advisors:</i> O. Gasnault & R. Wiens <i>Thesis:</i> Influence of Mars atmosphere on the ChemCam abundance detection limits	2011
Master – Space Engineering – <b>ISAE Supaero</b> (Toulouse, France)	2011
Bachelor – Computer Science – <b>Ecole polytechnique</b> (Paris, France)	2010

## 3 GRANTS & AWARDS

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Carl Sagan Fellowship ( <b>NASA Hubble Fellowship Program</b> ) – 3 yrs	2018
Cover of <b>Astronomy &amp; Astrophysics Journal</b> ( <b>Volume 564</b> )	2014
Outstanding Presentation Award (CNES fellow symposium JC <sup>2</sup> )	2013
CNES Doctoral Research Fellowship ( <b>French space agency</b> ) – 3 yrs	2011
Ecole Polytechnique Scholarship – 4 yrs	2007

## 4 OUTREACH



**Podcast Science:** I am running **PodcastScience.fm**, a general science program, airing every Wednesdays, in french. This podcast is listened by 10'000 to 20'000 listeners. Podcast Science received the Golden blog award for best scientific blog in 2012.

**Kidi'Science:** Contributor for this children science blog.

**Public talks:** CERN & Palais de la découverte (Paris)

## 5 PROFESSIONAL ACTIVITIES & SERVICE

### Conference and Workshop Organizer:

- Organizer and SOC: **National Capital Area Disks** workshop (Baltimore, MD, Oct. 2018) - [website](#)
- Organizer and SOC: **Optimal Optical Coronagraphs** workshop (Leiden, NL, Sep. 2017) - [website](#)
- SOC: **High Contrast Imaging from Space** (Baltimore, MD, Nov. 2016) - [website](#)
- LOC: **La très haute dynamique** workshop (Paris, FR, 2012)

### Other Services:

- **Hubble Telescope Allocation Committee** panel support (2016).



- NASA Exoplanet Exploration Program Analysis Group (ExoPAG) member of the **Study Analysis Groups (SAGs) #19** (Theory and Rigorous Contrast Metrics) since 2016 (see Jensen-Clem et al. 2018).
- Organization of the **“Exoplanet Star and Planet Formation” (ESPF)** seminar at STScI each week (2016-2018) - [website](#)
- Development of the **Paris THD optical testbed website** in August 2014.
- IAU member since 2019
- **Referee** for publications in the *AJ*, *A&A*, *MNRAS*, *PASP* and *JATIS*.

## 6 TEACHING & MENTORING

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### PhD supervising:

- **Lucie Leboulleux**, in co-direction between STScI & ONERA, France (Leboulleux, N'Diaye, Mazoyer et al. 2017 SPIE ; Leboulleux et al. 2018 ; Leboulleux et al. 2018 SPIE).
- **Kevin Fogarty**, PhD at JHU and 1 year postdoc at STScI (Fogarty, Pueyo, Mazoyer et al, 2018 AJ ; Fogarty, Mazoyer et al, 2018 SPIE ; Fogarty, Pueyo, Mazoyer et al, 2017 SPIE). Now Caltech Prize Postdoctoral Fellowship in Experimental Physics or Astrophysics.

### Teaching assistant:

Université Paris Diderot – Paris 7	Electronics	2013 - 2014
Université Paris Descartes – Paris 5	Fluid dynamics	2011 - 2012

**La Main à la Pâte:** **2007 - 2008**

- I taught science during 8 months (30h/week) in primary schools in underprivileged neighborhoods (Perpignan, France). **La Main à la pâte** was founded by Nobel Prize winner G. Charpak, astronomer P. Léna and physicist Y. Quéré, of the French Academy of Sciences, to improve the quality of science and technology teaching in primary and middle school.

# PUBLICATION LIST

## 1 MAJOR REFEREED PUBLICATIONS

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8. **Mazoyer, J.** ; Pueyo, L. ; N'Diaye, M. et al. (2018), *Active Correction of Aperture Discontinuities-Optimized Stroke Minimization. II. Optimization for Future Missions*, The Astronomical Journal, 155, 8, [DOI Link](#), 8 citations
7. **Mazoyer, J.** ; Pueyo, L. ; N'Diaye, M. et al. (2018), *Active Correction of Aperture Discontinuities-Optimized Stroke Minimization. I. A New Adaptive Interaction Matrix Algorithm*, The Astronomical Journal, 155, 7, [DOI Link](#), 6 citations
6. Fogarty, K. ; Pueyo, L. ; **Mazoyer, J.** et al. (2017), *Polynomial Apodizers for Centrally Obscured Vortex Coronagraphs*, The Astronomical Journal, 154, 240, [DOI Link](#), 6 citations
5. **Mazoyer, J.** ; Pueyo, L. ; Norman, C. et al. (2016), *Active compensation of aperture discontinuities for WFIRST-AFTA: analytical and numerical comparison of propagation methods and preliminary results with a WFIRST-AFTA-like pupil*, Journal of Astronomical Telescopes, Instruments, and Systems, 2, 011008, [DOI Link](#), 7 citations
4. **Mazoyer, J.** ; Boccaletti, A. ; Choquet, É. et al. (2016), *A Symmetric Inner Cavity in the HD 141569A Circumstellar Disk*, The Astrophysical Journal, 818, 150, [DOI Link](#), 10 citations
3. **Mazoyer, J.** ; Boccaletti, A. ; Augereau, J. -C. et al. (2014), *Is the HD 15115 inner disk really asymmetrical?*, Astronomy and Astrophysics, 569, A29, [DOI Link](#), 28 citations
2. **Mazoyer, J.** ; Baudoz, P. ; Galicher, R. et al. (2014), *High-contrast imaging in polychromatic light with the self-coherent camera*, Astronomy and Astrophysics, 564, L1, [DOI Link](#), 26 citations
1. **Mazoyer, J.** ; Baudoz, P. ; Galicher, R. et al. (2013), *Estimation and correction of wavefront aberrations using the self-coherent camera: laboratory results*, Astronomy and Astrophysics, 557, A9, [DOI Link](#), 27 citations

## 2 OTHER REFEREED PUBLICATIONS

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17. Ertel, S. ; Defrère, D. ; Hinz, P. et al. (2020), *The HOSTS Survey for Exozodiacal Dust: Observational Results from the Complete Survey*, The Astronomical Journal, 159, 177, [DOI Link](#)
16. Bruzzone, J. S. ; Metchev, S. ; Duchêne, G. et al. (2020), *Imaging the 44 au Kuiper Belt Analog Debris Ring around HD 141569A with GPI Polarimetry*, The Astronomical Journal, 159, 53, [DOI Link](#)
15. Hom, J. ; Patience, J. ; Esposito, T. M. et al. (2020), *First Resolved Scattered-light Images of Four Debris Disks in Scorpius-Centaurus with the Gemini Planet Imager*, The Astronomical Journal, 159, 31, [DOI Link](#)
14. Bhowmik, T. ; Boccaletti, A. ; Thébault, P. et al. (2019), *Spatially resolved spectroscopy of the debris disk HD 32297. Further evidence of small dust grains*, Astronomy and Astrophysics, 630, A85, [DOI Link](#), 7 citations

13. Ren, B. ; Choquet, É. ; Perrin, M. D. et al. (2019), *An Exo-Kuiper Belt with an Extended Halo around HD 191089 in Scattered Light*, The Astrophysical Journal, 882, 64, [DOI Link](#), 3 citations
12. Stark, C. C. ; Belikov, R. ; Bolcar, M. R. et al. (2019), *ExoEarth yield landscape for future direct imaging space telescopes*, Journal of Astronomical Telescopes, Instruments, and Systems, 5, 024009, [DOI Link](#), 2 citations
11. Engler, N. ; Boccaletti, A. ; Schmid, H. M. et al. (2019), *Investigating the presence of two belts in the HD 15115 system*, Astronomy and Astrophysics, 622, A192, [DOI Link](#), 6 citations
10. Esposito, T. M. ; Duchêne, G. ; Kalas, P. et al. (2018), *Direct Imaging of the HD 35841 Debris Disk: A Polarized Dust Ring from Gemini Planet Imager and an Outer Halo from HST/STIS*, The Astronomical Journal, 156, 47, [DOI Link](#), 5 citations
9. Leboulleux, L. ; Sauvage, J. -F. ; Pueyo, L. A. et al. (2018), *Pair-based Analytical model for Segmented Telescopes Imaging from Space for sensitivity analysis*, Journal of Astronomical Telescopes, Instruments, and Systems, 4, 035002, [DOI Link](#), 2 citations
8. Poteet, C. A. ; Chen, C. H. ; Hines, D. C. et al. (2018), *Space-based Coronagraphic Imaging Polarimetry of the TW Hydrae Disk: Shedding New Light on Self-shadowing Effects*, The Astrophysical Journal, 860, 115, [DOI Link](#), 4 citations
7. Jensen-Clem, R. ; Mawet, D. ; Gomez Gonzalez, C. A. et al. (2018), *A New Standard for Assessing the Performance of High Contrast Imaging Systems*, The Astronomical Journal, 155, 19, [DOI Link](#), 13 citations
6. Perrot, C. ; Boccaletti, A. ; Pantin, E. et al. (2016), *Discovery of concentric broken rings at sub-arcsec separations in the HD 141569A gas-rich, debris disk with VLT/SPHERE*, Astronomy and Astrophysics, 590, L7, [DOI Link](#), 25 citations
5. Delorme, J. R. ; Galicher, R. ; Baudoz, P. et al. (2016), *Focal plane wavefront sensor achromatization: The multireference self-coherent camera*, Astronomy and Astrophysics, 588, A136, [DOI Link](#), 10 citations
4. Choquet, É. ; Perrin, M. D. ; Chen, C. H. et al. (2016), *First Images of Debris Disks around TWA 7, TWA 25, HD 35650, and HD 377*, The Astrophysical Journal, 817, L2, [DOI Link](#), 44 citations
3. Debes, J. H. ; Ygouf, M. ; Choquet, E. et al. (2016), *Wide-Field Infrared Survey Telescope-Astrophysics Focused Telescope Assets coronagraphic operations: lessons learned from the Hubble Space Telescope and the James Webb Space Telescope*, Journal of Astronomical Telescopes, Instruments, and Systems, 2, 011010, [DOI Link](#), 9 citations
2. Wiens, R. C. ; Maurice, S. ; Lasue, J. et al. (2013), *Pre-flight calibration and initial data processing for the ChemCam laser-induced breakdown spectroscopy instrument on the Mars Science Laboratory rover*, Spectrochimica Acta, 82, 1, [DOI Link](#), 125 citations
1. Cousin, A. ; Forni, O. ; Maurice, S. et al. (2011), *Laser induced breakdown spectroscopy library for the Martian environment*, Spectrochimica Acta, 66, 805, [DOI Link](#), 44 citations

### 3 PHD THESIS

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- **Mazoyer, J. (2014)**, *High-Contrast Direct Imaging of Exoplanets and Circumstellar Disks: From the Self-Coherent Camera to NICI Data Analysis*, Ph.D. Thesis, [DOI Link](#), 2 citations

## 4 MAJOR CONFERENCE PROCEEDINGS & WHITE PAPERS

20. **Mazoyer, J.** ; Baudoz, P. ; Belikov, R. et al. (2019), *High-Contrast Testbeds for Future Space-Based Direct Imaging Exoplanet Missions*, Bulletin of the American Astronomical Society, 51, 101
19. Fogarty, K. ; **Mazoyer, J.** ; St. Laurent, K. et al. (2018), *Optimal deformable mirror and pupil apodization combinations for apodized pupil Lyot coronagraphs with obstructed pupils*, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 10698, 106981J, [DOI Link](#), 1 citation
18. Ruane, G. ; Riggs, A. ; **Mazoyer, J.** et al. (2018), *Review of high-contrast imaging systems for current and future ground- and space-based telescopes I: coronagraph design methods and optical performance metrics*, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 10698, 106982S, [DOI Link](#), 2 citations
17. **Mazoyer, J.** ; Pueyo, L. ; N'Diaye, M. et al. (2017), *Capabilities of ACAD-OSM, an active method for the correction of aperture discontinuities*, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 10400, 104000G, [DOI Link](#), 2 citations
16. **Mazoyer, J.** ; Pueyo, L. (2017), *Fundamental limits to high-contrast wavefront control*, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 10400, 1040014, [DOI Link](#), 1 citation
15. Lebouilleux, L. ; N'Diaye, M. ; **Mazoyer, J.** et al. (2017), *Comparison of wavefront control algorithms and first results on the high-contrast imager for complex aperture telescopes (hicat) testbed*, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 10562, 105622Z, [DOI Link](#)
14. Fogarty, K. ; Pueyo, L. ; **Mazoyer, J.** et al. (2017), *Tip/tilt optimizations for polynomial apodized vortex coronagraphs on obscured telescope pupils*, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 10400, 104000T, [DOI Link](#), 2 citations
13. **Mazoyer, J.** ; Pueyo, L. ; N'Diaye, M. et al. (2016), *Correcting for the effects of pupil discontinuities with the ACAD method*, Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave, 9904, 99044T, [DOI Link](#), 1 citation
12. **Mazoyer, J.** ; Pueyo, L. ; Norman, C. et al. (2015), *Active correction of aperture discontinuities (ACAD) for space telescope pupils: a parametric analysis*, Techniques and Instrumentation for Detection of Exoplanets VII, 9605, 96050M, [DOI Link](#), 9 citations
11. N'Diaye, M. ; **Mazoyer, J.** ; Choquet, É. et al. (2015), *High-contrast imager for complex aperture telescopes (HiCAT): 3. first lab results with wavefront control*, Techniques and Instrumentation for Detection of Exoplanets VII, 9605, 96050I, [DOI Link](#), 7 citations
10. **Mazoyer, J.** ; Boccaletti, A. ; Augereau, J. -C. et al. (2014), *Is the HD 15115 circumstellar disk really asymmetrical?*, Thirty years of Beta Pic and Debris Disks Studies, 47
9. **Mazoyer, J.** ; Galicher, R. ; Baudoz, P. et al. (2014), *Deformable mirror interferometric analysis for the direct imagery of exoplanets*, Adaptive Optics Systems IV, 9148, 914846, [DOI Link](#), 1 citation
8. **Mazoyer, J.** ; Baudoz, P. ; Galicher, R. et al. (2013), *Direct detection of exoplanets in polychromatic light with a Self-coherent camera*, Proceedings of the Third AO4ELT Conference, 97, [DOI Link](#)



7. Baudoz, P. ; **Mazoyer, J.** ; Galicher, R. (2013), *Laboratory tests of planet signal extraction in high contrast images*, Proceedings of the Third AO4ELT Conference, 109, [DOI Link](#), 1 citation
6. **Mazoyer, J.** ; Galicher, R. ; Baudoz, P. et al. (2013), *Speckle correction in polychromatic light with the self-coherent camera for the direct detection of exoplanets*, Techniques and Instrumentation for Detection of Exoplanets VI, 8864, 88640N, [DOI Link](#), 1 citation
5. Galicher, R. ; **Mazoyer, J.** ; Baudoz, P. et al. (2013), *High-contrast imaging with a self-coherent camera*, Techniques and Instrumentation for Detection of Exoplanets VI, 8864, 88640M, [DOI Link](#)
4. Baudoz, P. ; **Mazoyer, J.** ; Mas, M. et al. (2012), *Dark hole and planet detection: laboratory results using the self-coherent camera*, Ground-based and Airborne Instrumentation for Astronomy IV, 8446, 84468C, [DOI Link](#), 10 citations
3. Mas, M. ; Baudoz, P. ; **Mazoyer, J.** et al. (2012), *Experimental results on wavefront correction using the self-coherent camera*, Ground-based and Airborne Instrumentation for Astronomy IV, 8446, 844689, [DOI Link](#), 4 citations
2. **Mazoyer, J.** ; Baudoz, P. ; Mas, M. et al. (2012), *Experimental parametric study of the self-coherent camera*, Space Telescopes and Instrumentation 2012: Optical, Infrared, and Millimeter Wave, 8442, 844250, [DOI Link](#), 2 citations
1. Gasnault, O. ; **Mazoyer, J.** ; Cousin, A. et al. (2012), *Deciphering Sample and Atmospheric Oxygen Contents with ChemCam on Mars*, Lunar and Planetary Science Conference, 2888, 1 citation

## 5 OTHER CONFERENCE PROCEEDINGS & WHITE PAPERS

17. Pueyo, L. ; Bailey, V. ; Bolcar, M. et al. (2019), *Wavefront Sensing and Control technologies for Exo-Earth imaging*, Bulletin of the American Astronomical Society, 51, 215
16. Shaklan, S. ; Crill, B. ; Belikov, R. et al. (2019), *Status of Space-based Segmented-Aperture Coronagraphs for Characterizing Exo-Earths Around Sun-Like Stars*, Bulletin of the American Astronomical Society, 51, 211
15. Chen, C. ; Ballering, N. ; Duchene, G. et al. (2019), *Debris Disk Composition: A Diagnostic Tool for Planet Formation and Migration*, Bulletin of the American Astronomical Society, 51, 342
14. Debes, J. ; Choquet, E. ; Faramaz, V. C. et al. (2019), *Cold Debris Disks as Strategic Targets for the 2020s*, Bulletin of the American Astronomical Society, 51, 566
13. Stark, C. ; Arney, G. N. ; Belikov, R. et al. (2019), *Optimal Architectures and Survey Designs for Maximizing the Yields of Direct-Imaging Exoplanet Missions*, Bulletin of the American Astronomical Society, 51, 511
12. N'Diaye, M. ; Fogarty, K. ; Soummer, R. et al. (2018), *Apodized Pupil Lyot coronagraphs with arbitrary aperture telescopes: novel designs using hybrid focal plane masks*, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 10698, 106986A, [DOI Link](#)

11. Soummer, R. ; Brady, G. R. ; Brooks, K. et al. (2018), *High-contrast imager for complex aperture telescopes (HiCAT): 5. first results with segmented-aperture coronagraph and wavefront control*, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 10698, 106981O, [DOI Link](#)
10. Snik, F. ; Absil, O. ; Baudoz, P. et al. (2018), *Review of high-contrast imaging systems for current and future ground-based and space-based telescopes III: technology opportunities and pathways*, Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation III, 10706, 107062L, [DOI Link](#), 2 citations
9. St. Laurent, K. ; Fogarty, K. ; Zimmerman, N. T. et al. (2018), *Apodized pupil Lyot coronagraphs designs for future segmented space telescopes*, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 10698, 106982W, [DOI Link](#)
8. Jovanovic, N. ; Absil, O. ; Baudoz, P. et al. (2018), *Review of high-contrast imaging systems for current and future ground-based and space-based telescopes: Part II. Common path wavefront sensing/control and coherent differential imaging*, Adaptive Optics Systems VI, 10703, 107031U, [DOI Link](#), 4 citations
7. Leboulleux, L. ; Pueyo, L. ; Sauvage, J. -F. et al. (2018), *Sensitivity analysis for high-contrast imaging with segmented space telescopes*, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, 10698, 106986H, [DOI Link](#)
6. Egron, S. ; Soummer, R. ; Lajoie, C. -P. et al. (2017), *James Webb Space Telescope optical simulation testbed IV: linear control alignment of the primary segmented mirror*, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 10398, 1039811, [DOI Link](#)
5. Pueyo, L. ; Zimmerman, N. ; Bolcar, M. et al. (2017), *The LUVOIR architecture "A" coronagraph instrument*, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 10398, 103980F, [DOI Link](#), 6 citations
4. Leboulleux, L. ; N'Diaye, M. ; Riggs, A. J. E. et al. (2016), *High-contrast imager for Complex Aperture Telescopes (HiCAT). 4. Status and wavefront control development*, Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave, 9904, 99043C, [DOI Link](#)
3. Galicher, R. ; Baudoz, P. ; Delorme, J. R. et al. (2014), *High contrast imaging on the THD bench: progress and upgrades*, Space Telescopes and Instrumentation 2014: Optical, Infrared, and Millimeter Wave, 9143, 91435A, [DOI Link](#), 1 citation
2. Delorme, J. R. ; Galicher, R. ; Baudoz, P. et al. (2014), *High-contrast imaging in wide spectral band with a self-coherent camera and achromatic coronagraphs*, Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation, 9151, 91515Q, [DOI Link](#), 1 citation
1. Galicher, R. ; Delorme, J. R. ; Baudoz, P. et al. (2013), *Focal Plane Wavefront Sensing with a self-coherent camera*, Proceedings of the Third AO4ELT Conference, 123, [DOI Link](#)