Gaël M. ROUDIER

Jet Propulsion Laboratory Mail Stop 169-327 4800 Oak Grove Drive 91109 PASADENA – CA E-mail: Gael.M.Roudier@jpl.nasa.gov Office phone: (818) 393 7252 Citizenship – French

Research Interests

Exoplanet transit spectroscopy Exoplanet atmosphere parametric modeling Data reduction methods & Bayesian inference

Professional experience

November 2015 – present

Scientist at NASA Jet Propulsion Laboratory/Caltech

- CASE CO-I (NASA contribution to ESA Ariel mission launching in 2029): Science Data System lead, Science Team
- FINESSE CO-I (NASA medium size explorer proposal selected for concept study on August, 9th 2017): Science Data System lead, Science Team
- EXCALIBUR: Science Lead and Main Contributor (Exoplanet data reduction pipeline)
- CERBERUS: Lead and Main Contributor (Exoplanet atmospheres forward modeling radiative transfer code and retrieval package)

November 2012 – 2015

Post-Doctoral researcher at NASA JPL/ Caltech

- PLANCK: PLANCK Scientist, PLANCK beam working group co-leader and main contributor, PLANCK temporal transfer function working group co-leader and main contributor, Fundamental Physics with PLANCK working group: Cosmic Birefringence with HFI data
- CIBER: Theoretical cross power spectrum estimation and errors, data simulations

Education

2008 – 2011

• PhD Astronomy and Astrophysics, AstroParticule & Cosmologie APC laboratory, Université Paris Diderot – Paris7. "Cosmic birefringence constraints from Planck Cosmic Microwave Background polarized data analysis."

2006 - 2008

• Master Science of the Universe and Spatial Technology, L'Observatoire de Paris.

2001 – 2004

- **Master High Energy Physics**, Ecole Nationale Supérieure d'Ingénieurs de Caen, ENSICaen.
- **Concours Commun Polytechnique**, Classe Préparatoire aux Grandes Ecoles, Boarding school for elite french universities.

1998 – 2001

Programming skills

Python, IDL, Matlab, C, Fortran

Awards

- **2021 JPL Voyager award** for creating the Cerberus atmospheric modeling and retrieval code, interpreting transit spectroscopy observations of exoplanet atmosphere.
- **2018 JPL Bonus award** for developing the Excalibur pipeline, enabling comparative exoplanet science.
- 2018 Gruber cosmology prize: Planck Scientist collaboration award.
- **2014 NASA Group achievement award** for successfully developing analysis tools allowing the release of Planck data.

Selected first author referred publication

Disequilibrium chemistry in exoplanet atmospheres observed with the Hubble Space		
(G. Rc)	oudier, M. Swain, M. Gudipati, R. West, et al.)	
·	ApJ 162 37 (2021)	
<u>Select</u>	ted main contributing author referred publications	
Planck 2015 results. VII. HFI TOI and beam processing Planck collaboration		
	A&A 594, A7 (2016)	
Planck 2013 results. VII. HFI time response and beams Planck collaboration		
	A&A 571, A7 (2014)	
Planck 2013 results. VI. High Frequency Instrument data processing		
i ianci	A&A 571, A7 (2014)	
Exhaustive peer reviewed article (135) list Hirsch-index: 56 (Scopus), 66 (Web of Science), 71 (Google Scholar)		
2022		
1. 2	A Temperature Trend for Clouds and Hazes in Exoplanets Atmospheres <i>The Astrophysical Journal Letters, Volume 941, Number 1</i> Identification of earbon dioxide in an exoplanet atmosphere	
Ζ.	Nature Volume 614, pages 649-652 (2023)	
2021		
3.	Characterization of an Instrument Model for Exoplanet Transit Spectrum Estimation through Wide-scale Analysis on HST Data	
1	The Astronomical Journal, Volume 163, Number 1	
4.	Nature Astronomy 5, 1224-1232 (2021)	
5.	Detection of Aerosols at Microbar Pressures in an Exoplanet Atmosphere The Astronomical Journal, Volume 162, Number 3	
6.	Disequilibrium chemistry in exoplanet atmospheres observed with the Hubble Space Telescope	
7	The Astronomical Journal, Volume 162, Number 2 Planek 2018 results, VI, Cosmological percenters (Corrigendum)	
7. 8.	Detection of an Atmosphere on a Rocky Exoplanet	
0.	The Astronomical Journal, Volume 161, Number 5	
9.	Multiband GPI Imaging of the HR 4796A Debris Disk	

- 10. Utilizing Small Telescopes Operated by Citizen Scientists for Transiting Exoplanet Follow-up
- 11. Faster Exo-Earth yield for HabEx and LUVOIR via extreme precision radial velocity prior knowledge

2020

- 12. Planck intermediate results. LV. Reliability and thermal properties of high-frequency sources in the Second Planck Catalogue of Compact Sources
- 13. Planck intermediate results: LVII. Joint Planck LFI and HFI data processing
- 14. Planck 2018 results: V. CMB power spectra and likelihoods

2019

- 15. Constraining Exoplanet Metallicities and Aerosols with ARIEL: An Independent Study by the Contribution to ARIEL Spectroscopy of Exoplanets (CASE) Team *Publications of the Astronomical Society of the Pacific, Volume 131, Issue 1003*
- 16. Engaging Citizen Scientists to Keep Transit Times Fresh and Ensure the Efficient Use of Transiting Exoplanet Characterization Missions
- 17. On the use of On the Use of Planetary Science Data for Studying Extrasolar Planets
- 18. Two Terrestrial Planet Families With Different Origins
- 19. Ground-based Spectroscopy of the Exoplanet XO-2b using a Systematic Wavelength Calibration

2018

- 20. Planck 2018 results. XII. Galactic astrophysics using polarized dust emission
- 21. Planck 2018 results. X. Constraints on inflation
- 22. Planck 2018 results. VIII. Gravitational lensing
- 23. Planck 2018 results. VI. Cosmological parameters
- 24. Planck 2018 results. IV. Diffuse component separation
- 25. Planck 2018 results. III. High Frequency Instrument data processing and frequency maps
- 26. Planck 2018 results. II. Low Frequency Instrument data processing
- 27. Planck 2018 results. I. Overview and the cosmological legacy of Planck
- 28. Additional Exoplanet Science Enabled by FINESSE
- 29. The Transiting Exoplanet Community Early Release Science Program for JWST Publications of the Astronomical Society of the Pacific, Volume 130, Number 993
- 30. Planck intermediate results. LV. The Planck Multi-frequency Catalogue of Non-thermal Sources
- 31. Planck 2018 results. XI. Polarized dust foregrounds

2017

- 32. Planck intermediate results. LIII. Detection of velocity dispersion from the kinetic Sunyaev-Zeldovich effect
- 33. Forecasting the Impact of Stellar Activity on Transiting Exoplanet Spectra

2016

- 34. Planck intermediate results. LII. Planet flux densities
- 35. Planck intermediate results. L. Evidence for spatial variation of the polarized thermal dust spectral energy distribution and implications for CMB B-mode analysis
- 36. Planck intermediate results. XLV. Radio spectra of northern extragalactic radio sources
- 37. Planck intermediate results. XLVIII. Disentangling Galactic dust emission and cosmic infrared background anisotropies
- 38. Planck intermediate results. XLIX. Parity-violation constraints from polarization data A&A Volume 596, December 2016
- 39. Planck intermediate results. XLVII. Planck constraints on reionization history

- 40. Planck intermediate results. XLIV. The structure of the Galactic magnetic field from dust polarization maps of the southern Galactic cap
- 41. Planck intermediate results. XLIII. The spectral energy distribution of dust in clusters of galaxies
- 42. Planck intermediate results. XLII. Large-scale Galactic magnetic fields
- 43. Planck intermediate results. XLI. A map of lensing-induced B-modes
- 44. A Characteristic Transmission Spectrum dominated by H2O applies to the majority of HST/WFC3 exoplanet observations
- 45. Planck intermediate results. XL. The Sunyaev-Zeldovich signal from the Virgo cluster

2015

- 46. Planck 2015 results. XXIII. The thermal Sunyaev-Zeldovich effect--cosmic infrared background correlation
- 47. Planck 2015 results. XII. Full Focal Plane simulations
- 48. Planck intermediate results. XXXIX. The Planck list of high-redshift source candidates
- 49. Planck 2013 results. XXXI. Consistency of the Planck data
- 50. Planck 2015 results. III. LFI systematic uncertainties
- 51. Planck 2015 results. XI. CMB power spectra, likelihoods, and robustness of parameters
- 52. Planck 2015 results. XXVI. The Second Planck Catalogue of Compact Sources
- 53. Planck 2015 results. XVI. Isotropy and statistics of the CMB
- 54. Planck 2015 results. XXV. Diffuse low-frequency Galactic foregrounds
- 55. Planck 2015 results. V. LFI calibration
- 56. Planck intermediate results. XXXVIII. E- and B-modes of dust polarization from the magnetized filamentary structure of the interstellar medium
- 57. Planck Intermediate Results. XXXVI. Optical identification and redshifts of Planck SZ sources with telescopes in the Canary Islands Observatories
- 58. Planck intermediate results. XXXVII. Evidence of unbound gas from the kinetic Sunyaev-Zeldovich effect
- 59. Planck intermediate results. XXVII. High-redshift infrared galaxy over density candidates and lensed sources discovered by Planck and confirmed by Herschel-SPIRE
- 60. Planck 2015 results. IX. Diffuse component separation: CMB maps
- 61. Planck intermediate results. XXXV. Probing the role of the magnetic field in the formation of structure in molecular clouds
- 62. Planck 2015 results. XX. Constraints on inflation
- 63. Planck 2015 results. XXVIII. The Planck Catalogue of Galactic Cold Clumps
- 64. Planck 2015 results. XXVII. The Second Planck Catalogue of Sunyaev-Zeldovich Sources
- 65. Planck 2015 results. XXVII. The Second Planck Catalogue of Sunyaev-Zeldovich Sources
- 66. Planck 2015 results. XXIV. Cosmology from Sunyaev-Zeldovich cluster counts
- 67. Planck 2015 results. XXII. A map of the thermal Sunyaev-Zeldovich effect
- 68. Planck 2015 results. XXI. The integrated Sachs-Wolfe effect
- 69. Planck 2015 results. XIX. Constraints on primordial magnetic fields
- 70. Planck 2015 results. XVIII. Background geometry & topology
- 71. Planck 2015 results. XVII. Constraints on primordial non-Gaussianity
- 72. Planck 2015 results. XV. Gravitational lensing
- 73. Planck 2015 results. XIV. Dark energy and modified gravity
- 74. Planck 2015 results. XIII. Cosmological parameters
- 75. Planck 2015 results. X. Diffuse component separation: Foreground maps

- 76. Planck 2015 results. VIII. High Frequency Instrument data processing: Calibration and maps
- 77. Planck 2015 results. VII. HFI TOI and beam processing

A&A Volume 594, October 2016

- 78. Planck 2015 results. VI. LFI mapmaking
- 79. Planck 2015 results. IV. Low Frequency Instrument beams and window functions
- 80. Planck 2015 results. II. Low Frequency Instrument data processing
- 81. Planck 2015 results. I. Overview of products and scientific results
- 82. A Joint Analysis of BICEP2/Keck Array and Planck Data
- 83. Planck 2013 results. XXIX. The Planck catalogue of Sunyaev-Zeldovich sources: Addendum
- 84. Planck intermediate results. XXXIV. The magnetic field structure in the Rosette Nebula
- 85. The Magnetic Fields at the Surface of Active Single G-K Giants
- 86. Planck intermediate results. XXXIII. Signature of the magnetic field geometry of interstellar filaments in dust polarization maps
- 87. On the Origin of Near-Infrared Extragalactic Background Light Anisotropy

Science Vol. 346 no. 6210 pp. 732-735

- 88. Planck intermediate results. XXXII. The relative orientation between the magnetic field and structures traced by interstellar dust
- 89. Planck intermediate results. XXXI. Microwave survey of Galactic supernova remnants
- 90. Planck intermediate results. XXX. The angular power spectrum of polarized dust emission at intermediate and high Galactic latitudes

2014

- 91. Planck intermediate results. XXVIII. Interstellar gas and dust in the Chamaeleon clouds as seen by Fermi LAT and Planck
- 92. Planck intermediate results. XXIX. All-sky dust modeling with Planck, IRAS, and WISE observations
- 93. Planck intermediate results. XXVI. Optical identification and redshifts of Planck clusters with the RTT150 telescope
- 94. Planck intermediate results. XXV. The Andromeda Galaxy as seen by Planck
- 95. Planck intermediate results. XXIV. Constraints on variation of fundamental constants
- 96. Planck intermediate results. XXIII. Galactic plane emission components derived from Planck with ancillary data
- 97. Planck intermediate results. XXII. Frequency dependence of thermal emission from Galactic dust in intensity and polarization
- 98. Planck intermediate results. XXI. Comparison of polarized thermal emission from Galactic dust at 353 GHz with optical interstellar polarization
- 99. Planck intermediate results. XX. Comparison of polarized thermal emission from Galactic dust with simulations of MHD turbulence
- 100. Planck intermediate results. XIX. An overview of the polarized thermal emission from Galactic dust
- 101. Planck intermediate results. XVIII The millimeter and sub-millimeter emission from planetary nebulae

2013

- 102. Planck intermediate results. XVII. Emission of dust in the diffuse interstellar medium from the far-infrared to microwave frequencies
- 103. Planck 2013 results. XI. All-sky model of thermal dust emission
- 104. Planck intermediate results. XVI. Profile likelihoods for cosmological parameters
- 105. Planck intermediate results. XV. A study of anomalous microwave emission in Galactic clouds

- 106. Planck 2013 results. XXX. Cosmic infrared background measurements and implications for star formation
- 107. Planck 2013 results. XXIX. Planck catalogue of Sunyaev-Zeldovich sources
- 108. Planck 2013 results. XXVIII. The Planck Catalogue of Compact Sources
- 109. Planck 2013 results. XXVI. Background geometry and topology of the Universe
- 110. Planck 2013 results. XXV. Searches for cosmic strings and other topological defects
- 111. Planck 2013 Results. XXIV. Constraints on primordial non-Gaussianity
- 112. Planck 2013 results. XXIII. Isotropy and Statistics of the CMB
- 113. Planck 2013 results. XXII. Constraints on inflation
- 114. Planck 2013 results. XXI. Cosmology with the all-sky Planck Compton parameter y-map
- 115. Planck 2013 results. XX. Cosmology from Sunyaev-Zeldovich cluster counts
- 116. Planck 2013 results. XIX. The integrated Sachs-Wolfe effect
- 117. Planck 2013 results. XVIII. Gravitational lensing-infrared background correlation
- 118. Planck 2013 results. XVII. Gravitational lensing by large-scale structure
- 119. Planck 2013 results. XVI. Cosmological parameters
- 120. Planck 2013 results. XV. CMB power spectra and likelihood
- 121. Planck 2013 results. XIV. Zodiacal emission
- 122. Planck 2013 results. XIII. Galactic CO emission
- 123. Planck 2013 results. XII. Component separation
- 124. Planck 2013 results X. Energetic particle effects: characterization, removal, and simulation
- 125. Planck 2013 results. IX. HFI spectral response
- 126. Planck 2013 results. VIII. HFI photometric calibration and mapmaking
- 127. Planck 2013 results. VII. HFI time response and beams

A&A Volume 571, November 2014

128. Planck 2013 results. VI. High Frequency Instrument data processing

A&A Volume 571, November 2014

- 129. Planck 2013 results. V. LFI calibration
- 130. Planck 2013 results. IV. Low Frequency Instrument beams and window functions
- 131. Planck 2013 results. III. LFI systematic uncertainties
- 132. Planck 2013 results. II. The Low Frequency Instrument data processing
- 133. Planck 2013 results. I. Overview of products and scientific results

2011

134. Planck early results. VI. The High Frequency Instrument data processing

A&A Volume 536, December 2011

135. Planck early results: first assessment of the High Frequency Instrument in-flight performance

A&A Volume 536, December 2011

Conferences and meetings

Invited Speaker for the Excalibur workshop at NEXSCI Pasadena,

Overview of the Atmospheric Retrieval and its application to the Excalibur datasets.

2022

2017

2023

Invited Speaker for the Exoplanets in the 21st century workshop at Max Planck Institute for Astronomy,

Post processing techniques, combining low and high resolution.

Invited Speaker at California State University Northridge,

Exoplanet spectroscopy and FINESSE.

	2015
Planck HFI Restricted Coreteam meeting, Results on the temporal transfer function and sourious dipole harmonics power	
Results on the temporal transfer function and spundus dipole narmonics power	2014
Planck HFI/LFI Joint Coreteam meeting,	
2014 temporal parameters for 353 GHz channels.	
Methodology for future temporal transfer functions	
Planck HFI Coreteam meeting, R&D on temporal transfer functions.	
	2013
Planck HFI Coreteam meeting, Beam products.	
Planck HFI Coreteam meeting, Major updates on the beam pipeline.	
UC Davis Cosmic Frontiers Conferences, HFI transfer functions.	
47 th ESLAB Symposium . The Universe as seen by Planck.	
	2012
ESTEC Planck Science Team meeting, Reconstructed beams versus optical simulat Planck HFI Coreteam meeting, Beam Monte Carlo simulation pipeline results. Planck HFI Coreteam meeting, New method for bolometer's time response recovery	ions.
3 , 3 ,	2011
Planck HFI Coreteam meeting, Birefringence angle constraints with Planck. Planck HFI Coreteam meeting, New representation for HFI beams.	
	2010
Planck HFI Coreteam meeting,	
Focal plane reconstruction and reverse engineering for telescope alignment retrieval results.	
	2009
ISAPP2009, International School of Antiparticle Physics CMB and Fundamental Interaction	
Physics.	
Mars seen by Planck as a beam calibrator	
	2008
Planck Joint Coreteam meeting,	
Original hears reconstruction method heard on stacked data from planets and	

Original beam reconstruction method based on stacked data from planets and HII ultra compact regions (final year undergraduate project).