

Edith Fayolle's Curriculum Vitae

Current position

Scientist in the Laboratory Studies group, Planetary Science section, Science division (October 2020 -)
Discipline Program Manager for Planetary Science R&A programs (November 2021 -)
Jet Propulsion Laboratory, California Institute of Technology
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Education

Postdoc at the Jet Propulsion Laboratory Pasadena, CA, USA
September 2017 - September 2020

Outer Solar System ice analog spectroscopy. Bacterial spores survivability under icy worlds conditions.
Planetary science section, laboratory studies group. Mentor: Dr. Paul Johnson.

Postdoc at the Harvard-Smithsonian Center for Astrophysics Cambridge, MA, USA
December 2013 - August 2017

Experiments on interstellar ice analogs and observations of organic molecules around protostars.
Astrochemistry group of Prof. Karin Öberg - Rubicon Fellow (2/14 - 1/16).

PhD from Leiden Observatory Leiden, The Netherlands
August 2009 - September 2013

Doctorate in astrochemistry on molecular gas-solid interactions pertaining to interstellar ices.
PhD Advisors: Prof. Harold Linnartz (Leiden Obs.), Prof. Jean-Hugues Fillion (Sorbonne Univ.).

Paris Sud University & Ecole Normale Supérieure de Cachan Orsay & Cachan, FRANCE
September 2006 - July 2009

Combined BSc & MSc in physical chemistry (Magistère de Physico-Chimie Moléculaire).

Technical skills

Laboratory experience

Ice film growth, processing, and monitoring using ultra-high vacuum systems (design and assembly), cryogenic technology, temperature sensors & controllers, quadrupole mass spectrometry, Fourier-transform IR spectroscopy (transmission and reflection), UV spectroscopy, temperature desorption spectroscopy, microgravimetry, matrix isolation studies, and VUV photon and electron sources.

Experience with large instruments (SOLEIL synchrotron).

Microbiology basics, including bacterial spore handling and culturing.

General laboratory equipment maintenance, ordering, and safety guidelines implementation.

Observational experience

Acquisition and analysis of millimeter line data from the JCMT, analysis of IRAM 30m data and interferometric data from the SMA and ALMA.

Computing skills Python, IDL, L^AT_EX, LabVIEW.

Service

Referee for Nature, Nature Astronomy, ACS Earth and Space Chemistry, The Journal of Physical Chemistry, Chemical Physics Letters, The Astrophysical Journal, Astronomy & Astrophysics, and Monthly

Edith Carine Fayolle

Notices of the Royal Astronomical Society

Editor for the Astrochemical Newsletter

Panel chief, panelist, and external reviewer for NASA ROSES programs.

Reviewer for the Deutsche Forschungsgemeinschaft (German Research Foundation)

Elected Dust&Ice member at large on the Laboratory for Astrophysics Division (LAD) executive committee of the American Astronomical Society (AAS).

Member of the AAS and its LAD, the American Chemical Society and its astrochemistry division.

Awards, prizes, and fellowships

JPL Voyager awards March 22, September 22, **JPL team awards** March 21, December 22

Rubicon fellowship for a postdoctoral position awarded by the Netherlands Organisation for Scientific Research (Nederlandse Organisatie voor Wetenschappelijk Onderzoek), February 2014 - January 2016.

Poster prize at the International Astronomical Union symposium "The molecular universe", May 2011.

Scholarship from the Paris region and the higher education ministry for 6-month and 4-month internships abroad. January 2008, 2009.

Prix de la vocation scientifique et technique des filles, prize awarded by the French equality of chances ministry. September 2004.

Research papers

25. M. Choukroun, P. Backes, M. L. Cable, **E. C. Fayolle**, R. Hodyss, A. Murdza, E. M. Schulson, M. Badescu, M. J. Malaska, E. Marteau, "Sampling Plume Deposits on Enceladus' Surface to Explore Ocean Materials and Search for Traces of Life or Biosignatures", *Planet. Sci. J.* 2 100, 2021
24. **E. C. Fayolle**, L. Barge, M. Cable, B. Drouin, J. P. Dworkin, J. Hanley, B. L. Henderson, B. Journaux, A. Noell, F. Salama, E. Sciamma-O'Brien, S. E. Waller, J. Weber, C. J. Bennett, J. Blum, M. Gudipati, S. Milam, M. Melwani-Daswani, M. Nuevo, S. Protopapa, R. L. Smith, "Critical Laboratory Studies to Advance Planetary Science and Support Missions", white paper for the 2023-2032 Planetary Science and Astrobiology Decadal Survey
23. **E. C. Fayolle**, A. C. Noell, P. V. Johnson, R. Hodyss, A. Ponce, "Viability of *Bacillus subtilis* spores exposed to ultraviolet light at ocean world surface temperatures", *Astrobiology*, 20, 889, 2020
22. M. Choukroun, T. H. Vu, **E. C. Fayolle**, "No compelling evidence for clathrate hydrate formation under interstellar medium conditions over laboratory time scales", *PNAS*, 116, 29, 14407, 2019
21. A. Behmard, **E. C. Fayolle**, D. M. Graninger, J. B. Bergner, R. Martín-Doménech, P. Maksyutenko, M. Rajappan, and K. I. Öberg, "Desorption Kinetics and Binding Energies of Small Hydrocarbons", *ApJ*, 875, 73, 2019
20. R. Hodyss, P.V. Johnson, S.M. Meckler, **E. C. Fayolle**, "Ultraviolet Spectroscopy and Photochemistry of SO₂/H₂O Ices", *ACS Earth Space Chem.*, 3, 663, 2019
19. M. T. Carney, M. R. Hogerheijde, V. V. Guzmán, C. Walsh, K. I. Öberg, **E. C. Fayolle**, L. I. Cleaves, J. M. Carpenter and C. Qi, "Upper limits on CH₃OH in the HD 163296 protoplanetary disk", *A&A*, 623, A124, 2019
18. I. R. Cooke, K. I. Öberg, **E. C. Fayolle**, Z. Peeler, J. B. Bergner, "CO Diffusion and Desorption Kinetics in CO₂ Ices", *ApJ*, 852, 75, 2018

17. **E. C. Fayolle**, K. I. Öberg, J. K. Jørgensen, K. Altwegg, H. Calcutt, H. S. P. Müller, M. Rubin, M. H. D. van der Wiel, P. Bjerkeli, T. L. Bourke, A. Coutens, E. F. van Dishoeck, M. N. Drozdovskaya, R. T. Garrod, N. F. W. Ligterink, M. V. Persson, S. F. Wampfler, "Protostellar and cometary detections of organohalogens", *Nat. Astro.*, 1, 703, 2017
16. J. M. Lykke, A. Coutens, J. K. Jørgensen, M. H. D. van der Wiel, R. T. Garrod, H. S. P. Müller, P. Bjerkeli, T. L. Bourke, H. Calcutt, M. N. Drozdovskaya, C. Favre, **E. C. Fayolle**, S. K. Jacobsen, K. I. Öberg, M. V. Persson, E. F. van Dishoeck, S. F. Wampfler, "The ALMA-PILS survey: First detections of ethylene oxide, acetone and propanal toward the low-mass protostar IRAS 16293-2422", *A&A*, 597, A53, 2017
15. I. R. Cooke, **E. C. Fayolle**, K. I. Öberg "CO₂ Infrared Phonon Modes in Interstellar Ice Mixtures", *ApJ*, 832, 5, 2016
14. J. K. Jørgensen, M. H. D. van der Wiel, A. Coutens, J. M. Lykke, H. S. P. Müller, E. F. van Dishoeck, H. Calcutt, P. Bjerkeli, T. L. Bourke, M. N. Drozdovskaya, C. Favre, **E. C. Fayolle**, R. T. Garrod, S. K. Jacobsen, K. I. Öberg, M. V. Persson, S. F. Wampfler, "The ALMA Protostellar Interferometric Line Survey (PILS)-First results from an unbiased submillimeter wavelength line survey of the Class 0 protostellar binary IRAS 16293-2422 with ALMA", *A&A*, 595, A117, 2016
13. J. B. Bergner, K. I. Öberg, M. Rajappan, **E. C. Fayolle** "Kinetics and mechanisms of the acid-base reaction between NH₃ and HCOOH in interstellar ice analogs", *ApJ*, 829, 85, 2016
12. A. Coutens, J. K. Jørgensen, M. H. D. van der Wiel, H. S. P. Müller, J. M. Lykke, P. Bjerkeli, T. L. Bourke, H. Calcutt, M. N. Drozdovskaya, C. Favre, **E. C. Fayolle**, R. T. Garrod, S. K. Jacobsen, N. F. W. Ligterink, K. I. Öberg, M. V. Persson, E. F. van Dishoeck, S. F. Wampfler, "The ALMA-PILS survey: First detections of deuterated formamide and deuterated isocyanic acid in the interstellar medium", *A&A*, 590, L6, 2016
11. **E. C. Fayolle**, J. Balfe, R. Loomis, J. Bergner, D. Graninger, M. Rajappan, K. I. Öberg, "CO and N₂ desorption energies from water ice", *ApJL*, 816, L28, 2016
10. **E. C. Fayolle**, K. I. Öberg, R. T. Garrod, E. F. van Dishoeck, S. E. Bisschop, "Complex organic molecules in organic-poor massive young stellar objects", *A&A*, 576, A45, 2015
9. K. I. Öberg, **E. C. Fayolle**, J.B. Reiter, R. T. Garrod, C. Cyganowski, "Complex molecule formation around massive young stellar objects", *Faraday Discuss.*, 168, 81-101, 2014
8. J.-H. Fillion, **E. C. Fayolle**, X. Michaut, M. Doronin, L. Philippe, J. Rakovsky, C. Romanzin, N. Champion, K.I. Öberg, H. Linnartz, M. Bertin, "Wavelength resolved UV photodesorption and photochemistry of CO₂ ice", *Faraday Discuss.*, 168, 533-552, 2014
7. M. Bertin, **E. C. Fayolle**, C. Romanzin, H. A. M. Poderoso, X. Michaut, L. Philippe, P. Jeseck, K. I. Öberg, H. Linnartz, J.-H. Fillion, "Indirect UV photodesorption from CO:N₂ binary ices - an efficient grain-gas process", *ApJ*, 779,120, 2013
6. **E. C. Fayolle**, M. Bertin, C. Romanzin, H. A. M. Poderoso, L. Philippe, X. Michaut, P. Jeseck, H. Linnartz, K. I. Öberg, J.-H. Fillion, "Wavelength-dependent UV photodesorption of pure N₂ and O₂ ices", *A&A*, 556, A122, 2013
5. K. I. Öberg, M. Dufie Boamah, **E. C. Fayolle**, R. T. Garrod, C. Cyganowski, F. van der Tak, "The Spatial Distribution of Organics toward the High-Mass YSO NGC 7538 IRS9", *ApJ*, 771, 95, 2013

4. M. Bertin, **E. C. Fayolle**, C. Romanzin, K. I. Öberg, X. Michaut, A. Moudens, L. Philippe, P. Jeseck, H. Linnartz, J.-H. Fillion, "UV photodesorption of interstellar CO ice analogues: from subsurface excitation to surface desorption", *PCCP*, 14, 9929, 2012
3. **E. C. Fayolle**, M. Bertin, C. Romanzin, X. Michaut, K. I. Öberg, H. Linnartz, J.-H. Fillion, "CO Ice Photodesorption: A Wavelength-dependent Study", *ApJL*, 739, L36, 2011
2. **E. C. Fayolle**, K. I. Öberg, H. M. Cuppen, R. Visser, H. Linnartz, "Laboratory H₂O:CO₂ ice desorption data: entrapment dependencies and its parameterization with an extended three-phase model", *A&A*, 529, A74, 2011
1. K. I. Öberg, **E. C. Fayolle**, H. M. Cuppen, E. F. van Dishoeck, H. Linnartz, "Quantification of segregation dynamics in ice mixtures", *A&A*, 505, 183-194, 2009

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2. **E. C. Fayolle**, K.I. Öberg, H.M. Cuppen, R. Visser, H. Linnartz, "Laboratory H₂O:CO₂ ice desorption data: entrapment dependencies and its parameterization with an extended three-phase model", in *Proceedings EAS Publications Series*, 58, 327-331 2012
1. H. Linnartz, J.-B. Bossa, J. Bouwman, H. M. Cuppen, S. H. Cuyllle, E. F. van Dishoeck, **E. C. Fayolle**, G. Fedoseev, G. W. Fuchs, S. Ioppolo, K. Isokoski, T. Lamberts, K.I. Öberg, C. Romanzin, E. Tenenbaum, J. Zhen, "Solid State Pathways towards Molecular Complexity in Space", in *Proceedings of IAU Symposium*, vol. 280 of IAU Symposium, pp. 390-404, Dec. 2011.