

CV Ariadna Farrés-Basiana

Contact

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Personal Information

Date of Birth: 3 September 1981
Place of Birth: Barcelona
Current Job: Researcher

ResearchID: E-1246-2015
ORCID: 0000-0001-7762-1647

Education

PhD in Mathematics with European Mention by the University of Barcelona (October 2009).
Thesis: *Contributions to the Dynamics of a Solar Sail in the Earth - Sun System*.
Advisor: Àngel Jorba.

Advanced Studies Diploma (D.E.A.) by the University of Barcelona (September 2005).

Degree in Mathematics by the Autonomous University of Barcelona (July 2003).

Profesional Experience

Research Scientist at the *Goddard Planetary Heliophysics Institute*, University of Maryland Baltimore County (December 2018 – Currently).

Visiting Researcher at the *Goddard Planetary Heliophysics Institute*, University of Maryland Baltimore County (May 2017 – November 2018).

Post-Doctoral Researcher at the *Mathematics Institute of the University of Barcelona* (March 2016 – October 2016).

Post-Doctoral Researcher (Beatriu de Pinos Fellow) at the *Department of Applied Mathematics and Analysis*, University of Barcelona (October 2013 – September 2015).

Post-Doctoral Researcher at the *Mathematics Institute of Burgundy*, University of Bourgogne, (September 2012 – August 2013).

Post-Doctoral Researcher (Marie Curie Fellow) at the *Institute of Celestial Mechanics and Calculation of the Ephemerides*, Paris Observatory, (October 2010 – August 2012).

Assistant professor (Ajutant LOU) at the University of Barcelona (September 2006 – September 2010).

Scholar Researcher at the Department of Applied Mathematics and Analysis, University of Barcelona. Supported by the grant *Beca de Formació en la Recerca i Docència* (January 2004 – September 2006).

Personal Grants

Beatriu de Pinós Grant (BP-DGR): postdoctoral fellowship at the University of Barcelona, from the program Beatriu de Pinós BP-2011 by la Generalitat de Catalunya. From October 2013 to October 2015.

Postdoctoral grant by the Conseil Régional de Bourgogne, on “Contrôle optimal en Mécanique Spatiale”. From September 2012 to August 2013.

Postdoctoral grant by a Marie Curie Initial Training Network: GTS-Next towards the next generation Geological Time Scale for the last 100 million years. From October 2010 to August 2012.

BE 2007 2n termini. Grant by la Generalitat de Catalunya for a stage in a research centre outside Catalunya. For a 2 month internship at the University of Strathclyde, Glasgow. Performed between 7 January to 7 February and 16 June to 18 July 2007.

9th Student Participation Programme for the 58th IAC in Hyderabad by ESA, grant to attend and participate in the IAC07 conference in Hyderabad, India.

Beca de Formació en la Recerca i Docència grant by the University of Barcelona to fulfill the doctoral studies in the Department of Applied Mathematics and Analysis. From January 2004 to September 2006.

Student Program at the International Astronautical Congress, grant by the European Space Agency to attend at the 2007 International Astronautical Congress in Hyderabad, India.

Grant for the inscription to the RTNS winter schools: RTNS2004 by la Caixa “Sa Nostra” and RTNS2005 by D.A.N.C.E.

Certifications

Acreditació de Recerca by the Agency for the Quality of the University System in Catalonia (AQU), October 2013.

Acreditació Professor Lector by the Agency for the Quality of the University System in Catalonia (AQU), January 2011.

Awards

Outstanding Paper Awards for a Young Scientist for the manuscript entitled: *On the Station Keeping of a Solar Sail in the elliptic Sun-Earth system*. Prize by the COSPAR Scientific Commission, July 2012.

Evarist Galois Prize by the Catalan Society of Mathematics for the work *Solar Sailing en el Sistema Terra - Lluna*, April 2006.

Short Research Stays

1 week visit at JAXA's Institute of Space and Astronautical Science (Japan). Joint work with Stefania Soldini and Yuchi Tsuda (January 2016). Project: *Harnessing solar radiation pressure perturbations for trajectory design of solar sail mission at Trojan asteroids.*

4 month research stay at NASA's Goddard Space Flight Centre (Greenbelt, USA). Under the supervision of David Folta (May 2016 - September 2016). Project: *Advanced techniques for the control and use of solar sails with respect to advanced modelling of solar radiation pressure.*

2 weeks doctoral visit to Prof. Colin R. McInnes at the Department of Mechanical Engineering, Strathclyde University, Glasgow, United Kingdom (September 2008). Project: *Reduction to the Central Manifold for a Solar sail in the Earth - Sun system.*

2 weeks doctoral visit to Prof. H.W. Broer at the Department of Dynamical Systems and Mathematical Physics at the Institute of Mathematics and Computing Science, University of Groningen, Groningen, The Netherlands (September 2016). Project: *Reduction to the Central Manifold for a Solar sail in the Earth - Sun system.*

2 months doctoral internship at the Department of Mechanical Engineering, Strathclyde University, Glasgow, United Kingdom. Under the supervision by Prof. Colin R. McInnes (February-March 2008). Project: *Station Keeping strategies for a solar sail around an equilibrium point and periodic orbits.*

Participation in Research Contracts for Technology Transfer

Ariadna Study, ESA/ESTEC, Contract Number: 20783/07/NL/CB.

Project: *Efficient Usage of Validated Integrators for Space Applications.*

Duration: 6 months. Starting: February 2008, Ending: July 2008.

Other Merits

Referee since 2010 for the journals: Acta Astronautica; Celestial Mechanics and Dynamical Astronomy; Journal of Guidance, Control and Dynamics; Advances in Space Research.

Referee at the Special Issue *Solar Sailing: Concepts, Technology and Missions.*

Co-organiser of the “Informal Seminar in Dynamical Systems” (session of seminars given by the PhD students at the UB-UPC Dynamical System group with the aim to explain in a more distended environment the research done by the students) during the academic courses 2004-2005, 2005-2006, 2008-2009, 2009-2010. (<http://www.maia.ub.es/dsg/wsem/>)

Organising committee: “Advanced Course on Long Term Integrations” held at the Institut de Matemàtiques de la Universitat de Barcelona (IMUB) 3-9 September 2007. (<http://www.imub.ub.es/lti07>)

Organising committee: “Advanced Course on Numerical Linear Algebra” held at the Institut de Matemàtiques de la Universitat de Barcelona (IMUB) 2-6 July 2007. (<http://www.imub.ub.es/nla07>)

Research Activities

Publications in peer-reviewed Journals

1. **Farrés, A.**; Gao, C.; Masdemont, J.; Gómez, G.; Folta, D.; Webster, C.; *Geometrical Analysis of Station-Keeping Strategies About Libration Point Orbits*, Journal of Guidance Control and Dynamics, Volume 45, Number 6, June 2022.
<https://dx.doi.org/10.2514/1.G006014>
2. Jorba-Cuscó, M.; **Farrés, A.**; Jorba, À.; *On the stabilizing effect of Solar Radiation Pressure in the Earth-Moon system*, Advances in Space Research Volume 67, Issue 9, May 2021.
<https://dx.doi.org/10.1016/j.asr.2020.01.017>
3. **Farrés, A.**; Heiligers, J.; Miguel, N.; *Road map to L_4/L_5 with a solar sail*, Aerospace Science and Technology, Volume 95, December 2019.
<https://dx.doi.org/10.1016/j.ast.2019.105458>
4. Jorba-Cusco, M.; **Farrés, A.** ; Jorba, À.; *Two Periodic Models for the Earth-Moon System*. Frontiers in Applied Mathematics and Statistics, Volume 4, Article 32, July 2018.
<https://dx.doi.org/10.3389/fams.2018.00032>
5. **Farrés, A.**; Jorba, À.; Mondelo, J-M.; *Numerical study of the geometry of the phase space of the AH3BP*, Celestial Mechanics and Dynamical Astronomy, Volume 129, Issues 1-2, pp. 25-55, September 2017.
<https://dx.doi.org/10.1007/s10569-017-9762-z>
6. **Farrés, A.**; *Transfer orbits to L_4 with a solar sail in the Earth-Sun system*, Acta Astronautica, Volume 137, pp. 78-90, August 2017.
<http://dx.doi.org/10.1016/j.actaastro.2017.04.010>
7. **Farrés, A.**; Jorba, À.; *Dynamics, Geometry and Solar Sails*, Indagationes Mathematicae, Volume 27, Issue 5, pp. 1245-1264, December 2016.
<http://dx.doi.org/10.1016/j.indag.2016.06.005>
8. **Farrés, A.**; Jorba. À.; *Station keeping of a solar sail around a Halo orbit*, Acta Astronautica Volume 94, Issue 1, pp. 527-539, January - February 2014.
<http://dx.doi.org/10.1016/j.actaastro.2012.07.002>
9. **Farrés, A.**; Laskar, J.; Blanes, S.; Casas, F.; Makazaga, J.; Murua, M.; *High precision Symplectic Integrators for the Solar System*, Celestial Mechanics and Dynamical Astronomy, Volume 116, Issue 2, pp. 141-174, June 2013.
<http://dx.doi.org/10.1007/s10569>
10. Blanes, S.; Casas, F.; **Farrés, A.**; Laskar, J.; Makazaga, J.; Murua, A.; *New families of symplectic splitting methods for numerical integration in dynamical astronomy*, Applied Numerical Mathematics, Volume 68, pp. 58-72, June 2013.
<http://dx.doi.org/10.1016/j.apnum.2013.01.003>
11. **Farrés, A.**; Jorba. À.; *On the Station Keeping of a Solar Sail in the Elliptic Sun - Earth system*, Advances in Space Research, Volume 48, Issue 11, pp. 1785-1796, December 2011.
<http://dx.doi.org/10.1016/j.asr.2011.02.004>

12. Laskar, J.; Gastineau, M.; Delisle, J.-B.; **Farrés, A.**; Fienga, A.; *Strong chaos induced by close encounters with Ceres and Vesta*, Astronomy & Astrophysics, Vol. 532 L4, August 2011.
<http://dx.doi.org/10.1051/0004-6361/201117504>
13. **Farrés, A.**; Jorba, À.; *Dynamics of a Solar Sail Near a Halo Orbit*, Acta Astronautica , Volume 67, pp. 979-990, October - November 2010.
<http://dx.doi.org/10.1016/j.actaastro.2010.05.022>
14. **Farrés, A.**; Jorba, À.; *On the High Order Approximation of the Centre Manifold for ODEs*, Discrete and Continuous Dynamical Systems - Serie B, Vol.14:3, pp. 977-1000, October 2010.
<http://dx.doi.org/10.3934/dcdsb.2010.14.977>
15. **Farrés, A.**; Jorba, À.; *Periodic and Quasi - Periodic Motion of a Solar Sail close to SL1 in the Earth-Sun System*, Celestial Mechanics and Dynamical Astronomy, Volume 107, num. 1-2, pp. 233-253, June 2010.
<http://dx.doi.org/10.1007/s10569-010-9268-4>
16. **Farrés, A.**; Jorba, À.; *Solar Sail Surfing Along Families of Equilibrium Points*, Acta Astronautica, Volume 63, Issues 1-4, pp. 249-257, July-August 2008.
<http://dx.doi.org/10.1016/j.actaastro.2007.12.021>
17. **Farrés, A.**; Jorba, À.; *A Dynamical System Approach for the Station Keeping of a Solar Sail*, The Journal of the Astronautical Science, Volume 56, Number 2, pp. 199-230, April-June 2008.
<http://dx.doi.org/10.1007/BF03256549>

Books and Chapters

1. **Farrés, A.**; *Propellant-less systems*, In book: Next Generation CubeSats and SmallSats, Enabling Technologies, Missions, and Markets, Chapter: 21, Publisher: Elsevier, Editors: F.Branz, C. Cappelletti, A.J. Ricco, J.W. Hines. pp. 519-541, 2023.
<http://dx.doi.org/10.1016/B978-0-12-824541-5.00019-4>
2. **Farrés, A.**; Jorba, À.; *Artificial Equilibria in the RTBP for a Solar Sail and Applications*, Astrodynamics Network AstroNet-II, Volume 44 of the series Astrophysics and Space Science Proceedings. Publisher: Springer, Editors: G. Gómez and J. Masdemont, pp 73-89, 2016.
http://dx.doi.org/10.1007/978-3-319-23986-6_6
3. **Farrés, A.**; Jorba, À.; *Station Keeping Strategies for a Solar Sail in the Solar System*, In book: Recent Advances in Celestial and Space Mechanics, Chapter: 3, Publisher: Springer, Editors: B. Bonnard and M. Chyba, pp. 83-115, April 2016.
http://dx.doi.org/10.1007/978-3-319-27464-5_3
4. Caillau, J.-B.; **Farrés, A.**; *On local optima in minimum time control of the restricted three-body problem*, In book: Recent Advances in Celestial and Space Mechanics, Chapter: 7, Publisher: Springer, Editors: B. Bonnard and M. Chyba, pp. 209-302, April 2016.
http://dx.doi.org/10.1007/978-3-319-27464-5_7
5. **Farrés, A.**; Jorba, À.; Mondelo, J-M.; Villac, B.; *Periodic Motion for an Imperfect Solar Sail near an Asteroid*, Advances in Solar Sailing, Part of the Springer Praxis Books series, Publisher: Springer Berlin Heidelberg, Editor: M. Macdonald, pp. 885-898, February 2014.
https://doi.org/10.1007/978-3-642-34907-2_53

Technical Reports

1. Alessi, E.M., **Farrés, A.**, Vieiro, A., Jorba, Á., Simó, C., *Efficient Usage of Self Validated Integrators for Space Applications*, Ariadna Final Report, Contract Number: 20783/07/NL/CB, June 2008. <http://www.esa.int/gsp/ACT/publications/pub-inf.htm>

Conference Proceedings

1. **Farrés, A.**; Michaels, A.; Prichet, R.; Folta, D.; *Lissajous Orbit Selection Strategies as a Secondary Payload; the Space Weather Follow On-1 Mission* 2023 AAS/AIAA Astrodynamics Specialist Conference, 13-17 August 2023.
2. Zardaín, L.; **Farrés, A.**, Puig, A.; *Validation of the SRP tool: HiFi-SoRaP* 2023 AAS/AIAA Astrodynamics Specialist Conference, 13-17 August 2023.
3. Cui Doming, L.; **Farrés**; *Orbital control strategy for a CubeSat satellite equipped with a solar sail for Earth-Mars communications during solar conjunctions* 2023 AAS/AIAA Astrodynamics Specialist Conference, 13-17 August 2023.
4. **Farrés, A.**; Folta, D.; Webster, C.; Michaels, A.; *Mitigating the Impact of Momentum Unloads on Station-Keeping around Libration Point Orbits* 2022 AAS/AIAA Astrodynamics Specialist Conference, 7-11 August 2022.
5. Zardaín, L., **Farrés, A.**, Puig, A.; *High-fidelity Modeling and Visualizing of Solar Radiation Pressure: A Framework for High-fidelity Analysis*, 2020 AAS/AIAA Astrodynamics Specialist Conference, 9-12 August 2020.
6. Schlenker, L., **Farrés, A.**, Webster, C., Donaldson, J., Pritchett, R.; *A Unique Approach to Achieving Size-Constrained Quasi-Halo Orbits for the Roman Space Telescope*, 2020 AAS/AIAA Astrodynamics Specialist Conference, 9-12 August 2020.
7. **Farres, A.**, Gómez, G.; Masdemont, J.; Webster, C.; Folta, D.; *The Geometry of Stationkeeping Strategies Around Libration Point Orbits* Proceedings of the 70th International Astronautical Congress, 21-25 October 2019.
8. **Farres, A.**, Petersen, J.; *Solar Radiation Pressure effects on the orbital motion at SEL2 for the James Webb Space Telescope*, 2019 AAS/AIAA Astrodynamics Specialist Conference, 11-15 August 2019.
9. Heiligers, J.; Fernandez, A.; **Farres, A.**; Miguel, N.; Keats Wilkiem W.; *Solar-Sail Pathways to the Sun-Earth L5 Point* Proceedings of the 5th International Symposium on Solar Sailing, Aachen, Germany, 30 July – 2 August 2019.
10. Jorba-Cusco, M; **Farres, A.**; Jorba, À.; *On the stabilizing effect of Solar Radiation Pressure in the Earth-Moon system*. Proceedings of the 5th International Symposium on Solar Sailing, Aachen, Germany, 30 July – 2 August 2019.
11. **Farrés, A.**; Webster, C.; *Wide-Field Infrared Survey Telescope and Starshade Formation Flying Dynamics at Sun-Earth L2*. Proceedings of the 69th International Astronautical Congress, Bremen, Germany, 3-5 October 2018.

12. Sarli, B.; **Farrés, A.**; Folta, D.; *MAVEN Optimal Aerobrake Maneuver Estimation*. Proceedings of the 69th International Astronautical Congress, Bremen, Germany, 3-5 October 2018.
13. Jorba-Cusco, M.; **Farrés, A.**; Jorba, À.; *Solar Sail resonant periodic orbits in the augmented Earth-Moon Quasi-Bicircular Problem*. Proceedings of the 69th International Astronautical Congress, Bremen, Germany, 3-5 October 2018.
14. **Farrés, A.**; Webster, C; Donaldson, J; Folta, D.; *Orbital Maintenance for the Wide Field Infrared Survey Telescope: The Effects of Solar Radiation Pressure and Navigation Accuracies on Station Keeping (AAS 18-434)*. 2018 AAS/AIAA Astrodynamics Specialist Conference, Snowbird, UT, United States, 19-23 August 2018.
15. **Farrés, A.** ; Folta, D.; Webster, C; *High fidelity modeling of SRP and its effect on the relative motion of Starshade and WFIRST (AIAA 2018-2227)*. AIAA SciTech Forum, 2018 Space Flight Mechanics Meeting, Kissimmee, FL, United States, 8-12 January 2018.
16. **Farrés, A.** ; Heiligers, J.; Miguel, N.; *Road Map to L4/L5 with a solar sail (AIAA 2018-0211)*. AIAA SciTech Forum, 2018 Space Flight Mechanics Meeting, Kissimmee, FL, United States, 8-12 January 2018.
17. **Farrés, A.**; Folta, D.; Webster, C; *Using Spherical Harmonics to model Solar Radiation Pressure accelerations*, 2017 AAS/AIAA Astrodynamics Specialist Conference Columbia River Gorge, Stevenson, WA, United States, 20-24 August 2017.
18. **Farrés, A.**; Miguel, N.; *Solar Sailing at the L4/L5 Libration Points*, 2017 AAS/AIAA Astrodynamics Specialist Conference Columbia River Gorge, Stevenson, WA, United States, 20-24 August 2017.
19. **Farrés, A.**; Soldini, S.; Tsuda, Y.; *JAXA's Trojan Asteroids Mission: Trajectory Design of the Solar Power Sail and its Lander*, Proceedings of the 4th International Symposium on Solar Sailing, Kyoto, Japan, 17-20 January 2017.
20. **Farrés, A.**; *Catalogue on the Dynamics of a Solar Sail around L1 and L2*, Proceedings of the 4th International Symposium on Solar Sailing, Kyoto, Japan, 17-20 January 2017.
21. Jorba-Cusco, M.; **Farrés, A.**; Jorba, À.; *Periodic and Quasi-Periodic motion for a Solar Sail in the Earth-Moon system*, Proceedings of the 67th International Astronautical Congress, Guadalajara, Mexico, 26-30 September 2016.
22. **Farrés, A.**; Jorba, À.; *Solar Sailing with invariant manifolds in the Earth-Sun system*, Proceedings of the 66th International Astronautical Congress, Jerusalem, Israel, 12-16 October 2015.
23. Jorba-Cusco, M.; **Farrés, A.**; Jorba, À.; *A study on the effect of solar radiation pressure on the stability region near the Earth-Moon triangular points*, Proceedings of the 66th International Astronautical Congress, Jerusalem, Israel, 12-16 October 2015.
24. **Farrés, A.**; Jorba, À.; *Dynamical System Tools to Navigate in the Earth-Sun System*, Proceedings of the XXIV congress on differential equations and applications, Cadiz, Spain, 8-12 June 2015.
25. Jorba-Cusco, M.; **Farrés, A.**; Jorba, À.; *On the Solar Sail periodic orbits near the Earth-Moon libration points*, Proceedings of the XXIV congress on differential equations and applications, Cadiz, Spain, 8-12 June 2015.

26. **Farrés, A.**; Jorba, À.; Mondelo, J-M.; *Orbital dynamics for a non-perfectly reflecting Solar sail close to an asteroid*, Proceedings of the 2nd IAA Conference on Dynamics and Control of Space System, Rome, Italy, 24-26 March 2014.
27. **Farrés, A.**; Jorba, À.; *Periodic Motion for an Imperfect Solar Sail Near an Asteroid*, Proceedings of the 3rd International Symposium on Solar Sailing, Glasgow, United Kindom, 11-13 July 2013. (*selected for publication in Advances in Solar Sailing*)
28. **Farrés, A.**; Jorba, À.; *Orbital Dynamics of a Solar Sail near L1 and L2 in the Elliptic Hill problem*, Proceedings of the 63rd International Astronautical Congress, Naples, Campania, Italy, 1-5 October 2012.
29. **Farrés, A.**; Ceriotti, M.; *Solar sail station keeping of high-amplitude vertical Lyapunov orbits in Sun-Earth system*, Proceedings of the 63rd International Astronautical Congress, Naples, Campania, Italy, 1-5 October 2012.
30. Villac, B.; Ribalta, G.; **Farrés, A.**; Jorba, À.; Mondelo, J-M; *Using Solar Arrays for Orbital Control Near Small Bodies. Trade-offs Characterization*, Proceedings of the AIAA/AAS Astrodynamics Specialist Conference, 13-16 August 2012, Minneapolis, Minnesota, 2012.
31. **Farrés, A.**, Jorba, À., *Station Keeping of a Solar Sail around a Halo Orbits*, Proceedings of the 1st IAA Conference on Dynamics and Control of Space System, Porto, Portugal, 19-21 March 2012. (*selected for the special issue at Acta Astronautica*).
32. **Farrés, A.**, Jorba, À., *Station Keeping of a Solar Sail in the Solar System*, Proceedings of the 62nd International Astronautical Congress, Cape Town, South Africa, October 2011.
33. **Farrés, A.**, Jorba, À., *Sailing Between the Earth and the Sun*, Proceedings of the Second International Symposium on Solar Sailing. New York, USA, 20-22 July 2010. Ed: R.Ya. Kezerashvili, pp. 177-182.
34. **Farrés, A.**, Jorba, À., *Dynamics of a Solar Sail Near a Halo Orbit*, Proceedings of the 60th International Astronautical Congress, Daejon, Republic of Korea, October 2009. (*selected for the special issue of Acta Astronautica*)
35. Alessi, E.M., **Farrés, A.**, Vieiro, A., Jorba, À., Simó, C., *Jet Transport and Applications to NEO's*, Proceedings of the 1st IAA Planetary Defense Conference, Granada, Spain, April 2009.
36. **Farrés, A.**, Jorba, À., *Periodic and Quasi-Periodic Motions of a Solar Sail on the Sun-Earth System.*, Proceedings of the AAS/AIAA Astrodynamics Specialist Conference, Honolulu, Hawaii, August 2008.
37. **Farrés, A.**; Jorba, À.; *Solar Sail Surfing Along Families of Equilibrium Points*, Proceedings of the 58th International Astronautical Conference, Hyderabad, India, September 2007. (*selected for the special issue of Acta Astronautica*)
38. **Farrés, A.**, Jorba, À., *Station Keeping Close to Unstable Equilibrium Points with a Solar-Sail*, Proceedings of the AAS/AIAA Astrodynamics Specialist Conference, Mackinac Island, Michigan, August 2007.

Communications / Posters at Scientific Conferences

1. **Invited Talk:** “On the Impact of mission constraints on station-keeping at L1 and L2. Libration Point Orbits using Floquet Modes”. New Trends and Challenges in Optimization Theory Applied to Space Engineering, L’Aquila, December 13 – 15, 2023.
2. Communication: “Lissajous Orbit Selection Strategies as a Secondary Payload; the Space Weather Follow On-1 Mission”. 2023 AAS/AIAA Astrodynamics Specialist Conference, Big Sky, Montana, 13 - 17 August 2023.
3. **Invited Talk:** “Libration point orbits and space mission applications”, Horizon Maths 2022: Mathématiques et Gravitation, France, December 2022.
4. Communication: “Mitigating the Impact of Momentum Unloads on Station-Keeping around Libration Point Orbits”, 2022 AAS/AIAA Astrodynamics Specialist Conference, August 2022.
5. **Invited Talk:** “Understanding the geometry and dynamics of station-keeping around Libration Point Orbits”, Special Session on Celestial Mechanics and Applied Astrodynamics, AMS Spring Southeastern Virtual Sectional Meeting, March 2021.
6. Communication: “The Geometry of Stationkeeping Strategies Around Libration Point Orbits.” 70th International Astronautical Congress, October 2019.
7. Communication: “Solar Radiation Pressure effects on the orbital motion at SEL2 for the James Webb Space Telescope”, 2019 AAS/AIAA Astrodynamics Specialist Conference, August 2019.
8. Communication: “Wide-Field Infrared Survey Telescope and Starshade Formation Flying Dynamics at Sun-Earth L2”, 69th International Astronautical Congress, Bremen, Germany, October 2018.
9. Communication: “Orbital Maintenance for the Wide Field Infrared Survey Telescope: The Effects of Solar Radiation Pressure and Navigation Accuracies on Station Keeping”, 2018 AAS/AIAA Astrodynamics Specialist Conference, Snowbird, UT, United States, August 2018.
10. **Invited Talk:** “From Surfing waves to Surfing in Space”, SpaceUp Barcelona, May 2018.
11. Communication: “High fidelity modeling of SRP and its effect on the relative motion of Starshade and WFIRST”, AIAA SciTech Forum, 2018 Space Flight Mechanics Meeting, Kissimmee, FL, United States, January 2018.
12. Communication: “Road Map to L4/L5 with a solar sail”, AIAA SciTech Forum, 2018 Space Flight Mechanics Meeting, Kissimmee, FL, United States, January 2018.
13. **Plenary Talk:** “Dynamics and control for solar sail mission application”, 4º Congreso de Jóvenes Investigadores, Real Sociedad Matemáticas Española, Universitat de València, September 2017.
14. Communication: “Using Spherical Harmonics to model Solar Radiation Pressure accelerations”, 2017 AAS/AIAA Astrodynamics Specialist Conference Columbia River Gorge, Stevenson, WA, United States, August 2017.
15. Communication: “Solar Sailing at the L4/L5 Libration Points”, 2017 AAS/AIAA Astrodynamics Specialist Conference Columbia River Gorge, Stevenson, WA, United States, August 2017.

16. Communication: “Catalogue on the Dynamics of a Solar Sail around L1 and L2”, 4th International Symposium on Solar Sailing, Kyoto, Japan, January 2017.
17. Communication: “Periodic Motion for a Solar Sail close to an Astroid”, Computational perturbative methods for Hamiltonian systems - Applications in physics and astronomy, Athens, Greece, July 2016.
18. **Invited talk:** “Solar sails: a new way to travel through space”, 1st Workshop on Dynamical Systems in the Real Life (RDS2016), Castelló de la Plana, Spain, July 2016.
19. Communication: “Dynamics and Control of a Solar Sail in the RTBP”, 1st BSMath Junior Meeting, Barcelona, Catalunya, December 2015.
20. Communication: “Solar Sailing with invariant manifolds in the Earth-Sun system”, Proceedings of the 66th International Astronautical Congress, Jerusalem, Israel, October 2015.
21. Communication: “Surfeando con una vela Solar en el sistema Tierra - Luna”, Congreso de Jóvenes Investigadores de la RSME, Murcia, Spain, September 2015.
22. **Invited talk:** “Solar Surfing the Earth-Sun RTBP”, Tossa de Mar, Spain, Astronet-II International Final Conference, June 2015.
23. Communication: “Dynamical System Tools to Navigate in the Earth-Sun System”, Cadiz, Spain, XXIV Congress on Differential Equations and Applications (CEDYA’15), June 2015.
24. Poster: “Surfing of Invariant Manifolds”, Workshop 3: Geometric control and related fields, RICAM Special Semester on New Trends in Calculus of Variations, Linz, Austria November 2014.
25. **Invited talk:** “On the Dynamics of the Augmented Hill 3 Body Problem”, 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, July 2014.
26. **Invited talk:** “Symplectic Splitting Methods for Dynamical Astronomy”, 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, July 2014.
27. Communication: “Controlling a Solar Sail in the Solar System”, Conference on Hamiltonian Systems and Celestial Mechanics 2014 (HAMSYS2014), Barcelona, Spain, June 2014.
28. Communication: “Orbital Dynamics for a non-perfectly reflecting solar sail close to an Asteroid”, 2nd IAA Conference on Dynamics and Control of Space Systems, Rome, Italy, March 2014.
29. **Invited Talk:** “Splitting Methods for High-Precision Integration in Dynamical Astronomy”, 2013 International Conference on Scientific Computation and Differential Equations (SciCADE13), Valladolid, Spain, Setembre 2013.
30. **Invited Talk:** “Controlling Solar Sails using Invariant Manifolds”, XXIII Congreso de Ecuaciones Diferenciales y Aplicaciones (XXIII CEDYA), Castellon, Spain, Setembre 2013.
31. Poster: “Families of Periodic and Quasi-Periodic motion for imperfect Solar Sails around asteroid”, 6th International Meeting of Celestial Mechanics (CELMEC VI), San Martino al Cimino, Italia, Setembre 2013.
32. Communication: “Low-Thrust minimum time Earth-Moon transfer”, 6th International Meeting of Celestial Mechanics (CELMEC VI), San Martino al Cimino, Italia, Setembre 2013.

33. Communication: “Periodic motion for an imperfect Solar Sail near an asteroid”, 3rd International Symposium on Solar Sailing, Glasgow, Regne Unit, Juny 2013.
34. **Invited Talk:** “Sur les minima locaux des transferts temps min dans les Trois Corps Restreints”, Journee de Contrôle Geometrique et Transport, Nice, France Juny 2013.
35. Communication: “Solar Sail Dynamics near an Asteroid”, 14me Journees de l’Ecole Doctorale, Dijon, France, Maig 2013.
36. Communication: “Orbital Dynamics of a Solar Sail near L1 and L2 in the Elliptic Hill problem”, 63rd International Astronautical Congress. Naples, Campania, Italy, October 2012.
37. Communication: “Solar sail station keeping of high-amplitude vertical Lyapunov orbits in Sun-Earth system”, 63rd International Astronautical Congress. Naples, Campania, Italy, October 2012.
38. Communication: “Stability of the long period terms in the La2011 astronomical solution”. EGU, Vienna, Austria, April 2012.
39. Communication: “Station Keeping of a Solar Sail around a Halo Orbits”, 1st IAA Conference on Dynamics and Control of Space System. Porto, Portugal, March 2012.
40. **Invited Talk:** “Navegant amb veles solars pel sistema Terra - Sol.”, Segona Jornada SCM de Joves Investigadors en Matemàtiques. Barcelona, Spain, October 2011.
41. Communication: “Station Keeping of a Solar Sail in the Solar System.”, 62nd International Astronautical Congress, Cape Town, South Africa, October 2011.
42. **Invited Talk:** “Long-term N-Body integrations for the Solar System.”, IMAC Symposium on Dynamical Systems, Trends and Perspectives. Castellón, Spain, September 2011.
43. **Invited Talk:** “Control Strategies for Solar Sails.”, Congrès SMAI 2011, 5eme Biennale Française des Mathématiques Appliquées et Industrielles. Guidel, Bretagne May 2011.
44. Communication: “Sailing between the Earth and the Sun.”, 2nd International Symposium on Solar Sailing, New York, USA, July 2010.
45. Communication: “Control con una vela solar alrededor de una orbita Halo.”, NoLineal 2010, Cartagena, June 2010.
46. **Invited talk:** “Dynamical Systems Tools for Solar Sail.”, Emerging topics in Dynamical Systems and Partial Differential Equations (DSPDES’10), Barcelona, June 2010.
47. Communication: “Dynamics of a Solar Sail Near a Halo Orbit.”, 60th International Astronautical Congress. Daejeon, Republic of Korea, October 2009.
48. Poster: “Dynamics of a Solar Sail close to the SL1 point of the Earth-Sun system.”, 5th International Meeting of Celestial Mechanics (CELMEC V), San Martino al Cimino, Italia, September 2009.
49. Communication: “High Order Approximations for the Centre Manifold and Applications.”, 2009 International Conference on Scientific Computational and Differential Equations (SciCADE09), Beijing, May 2009.

50. Poster: “Jet Transport and Applications to NEO’s.”, 1st IAA Planetary Defense Conference, Granada, April 2009.
51. Communication: “Normally Hyperbolic Invariant Manifolds and Solar Sails.”, Bifurcations, Mathematical & Quantum Aspects & Applications (BIFUR08), Tres Cantos, Madrid, 9-12 December 2008.
52. **Invited talk:** “Nonlinear Dynamics Near Equilibrium Points for a Solar Sail.”, Workshop on Stability and Instability in Mechanical Systems: Applications and Numerical Tools, Barcelona, December 2008.
53. Communication: “Aproximaciones de la Variedad Central para una Vela Solar en el Sistema Tierra - Sol.”, Ddays 2008, El Escorial, Madrid, October 2008.
54. Communication: “Solar Sails and Dynamical Systems.”, Astronet Meeting at the Glasgow IAC, Glasgow, UK, October 2008.
55. Communication: “Periodic and Quasi-Periodic Motions of a Solar Sail on the Sun-Earth system.”, 2008 AAS/AIAA Astrodynamics Specialist Conference, Honolulu, Hawaii, August 2008.
56. Communication: “Approximating Centre Manifolds on a Model for a Solar Sail.”, Fourth International Conference on Applications of Computer Algebra, Linz, Austria, July 2008.
57. Communication: “Solar Sail Surfing Along Families of Equilibrium Points.”, 58th International Astronautical Congress, Hyderabad, India, September 2007.
58. Communication: “A Dynamical Systems Approach for the Station Keeping of a Solar Sail Near an Unstable Point.”, 2007 AAS/AIAA Astrodynamics Specialist Conference, Michigan, August 2007.
59. Communication: “Nonlinear Dynamics for a Solar Sail Near an Equilibrium Point of the Sun-Earth System.” Chaos, Complexity and Transport: Theory and Application, Marseille, June 2007.
60. Communication: “A Dynamical Systems Approach to Solar Sailing.”, Second Czech-Catalan Conference in Mathematics, Barcelona, September 2006.
61. Communication: “Solar Sailing Near a Collinear Point.”, in AIMS’ Sixth International Conference on Dynamical Systems, Differential Equations and Applications, Poitiers, June 2006.

Seminars

1. “Misiones Espaciales alrededor de los puntos de Lagrange”, 1 February 2023, at the Applied Mathematics Colloquium, Institute in Applied Mathematics and Systems, National Autonomous University of Mexico.
2. “The Geometry Behind Station-keeping at the L1/L2 Libration Points”, 28 September 2022, at the Seminar of the UMC Aerospace Engineering Seminar Series, Maryland.
3. “On the Geometry and Dynamics of Station-Keeping around Libration Point Orbits”, 22 January 2022, at the Séminaire McTAO, Nice.

4. “Una Mirada Matematica al Espacio”, 22 June 2021, OpenClass at the International University of La Rioja.
5. “Optimal Aerobrake maneuver estimation for MAVEN”, 1 March 2019, at the Seminar of the UB-UPC Dynamical System group, Barcelona.
6. “Solar Radiation Pressure Modeling and its effects at Libration Point Orbits”, 16 May 2018, at the Seminar of the UB-UPC Dynamical System group, Barcelona.
7. “Orbital Dynamics and Control for Solar Sails around Libration Points”, 11 January 2017, at JAXA Institute of Space and Astronautical Science, Sagamihara.
8. “Orbital Dynamics and Control for Solar Sails”, 27 June 2016, at NASA Goddard Space Flight Centre, Maryland.
9. “High-Order Symplectic Splitting Methods for Dyamical Astronomy”, 18 February 2015, at the Seminar of the UB-UPC Dynamical System group, Barcelona.
10. “Gravity: realitat o ficció?”, 16 December 2013, at the *Seminari Informal de Matemàtiques de Barcelona (SIMBa)*, Universitat de Barcelona.
11. “Cómo simular de forma precisa el movimiento de nuestro Sistema Solar”, 25 April 2013, at the *Seminario IMAC de Análisis numérico y dinámica computacional* organised by the Department of Mathematics ESTCE at the Universitat Jaume I, Castelló.
12. “Symplectic Methods for Long-Term Integration of the Solar System”, 22 April 2013, at the *Seminari Informal de Matemàtiques de Barcelona (SIMBa)*, Universitat de Barcelona.
13. “Solar Sails the Earth - Sun System”, 5 October 2012, at the Séminaire étudiants IMB, Université de Bourgogne.
14. “Station Keeping Strategies for Solar Sails”, 4 July 2012, at the Seminar of the UB-UPC Dynamical System group, Barcelona.
15. “Solar Sails: una nova manera de navegar per l’espai”, 8 May 2012, at the *Seminari Informal de Matemàtiques de Barcelona (SIMBa)*, Universitat de Barcelona.
16. “High Order Symplectic Integrators for Long-Term Integrations of the Solar System (State of the Art)”, 25 January 2012, at the Departament of Computational Science and Artificial Inteligence in the Universidad del Pais Vasco in San Sebastian.
17. “High Order Symplectic Integrators for Long-Term Integrations of the Solar System”, 3 November 2011, at the *S’eminaires 2011/2012 Astronomie et Systèmes Dynamiques* organised by Alain Albouy, Alain Chenciner and Jacques Laskar in the IMCCE.
18. “Solar Sailing in the Earth-Sun system”, 21 February 2011, at the Seminar *Temps & Espace* in the IMCCE.
19. “Periodic and quasi-periodic motions for a Solar sail”, 23 November 2010 at the Thematic Seminars of the *i-Math DocCourse: Computational Methods in Dynamical Systems and Applications* in the IMUB.

20. “On the dynamics of a Solar Sail near L_1 ”, 6 May 2009, at the Seminar of the Dynamical System UB - UPC group.
21. “The Circular Restricted 3 Body Problem (CRTBP): Part III”, 20 March 2009, at the Working Seminar of the Dynamical Systems group in Barcelona.
22. “Efficient Usage of Self Validated Integrators for Space Applications (II)”, 14 November 2008, at the Working Seminar of the Dynamical Systems group in Barcelona.
23. “A dynamical system approach for Solar Sails”, 20 February 2008, at Strathclyde University, Glasgow.
24. “Solar Sailing en el Sistema Terra-Lluna”, 21 October 2005, at the Working Seminar of the Dynamical Systems group in Barcelona.

Keynote Talks

1. “Aventures Matemàtiques a l’Espai (sobre la geometria del control en orbites de libracio)”, Keynote at the Opening Ceremony and General Assembly of the Society of Mathematics, November 2022.
2. Keynote Speaker at the Opening Ceremony of the Barcelona International Youth Science Challenge, June 2022.
3. “How to become an astronaut? Using space exploration to motivate STEM education” at the 4th Scientix International Conference, Organized by the European Schoolnet, November 2022.

Mentoring Experience

Final Degree projects

- “Construcció d’eines didàctiques per a l’estudi de problemes de mecaànica celeste”, by Laura Marimon (Notable Alt) June 2010, University of Barcelona.
- “Ray-Tracing techniques for tSolar Radiation Pressure computation on satellites with mobile pieces” by Alber Mir moncho (Excellent) June 2022, University of Barcelona.
- “Study and Optimization of transfer orbits to the L4 and L5 Lagrange Points of the Earth-Sun system” by Aitor Urruticoechea (Excellent Cum-Lauden), February 2023, Polytechnic University of Catalonia.
- “Study on the viability of transfer trajectories to the stability region around L4 and L5 Lagrange Points in the Earth-Sun system”, Alejandro Sanchez (Excelent), June 2023, Polytechnic University of Catalonia.

Final Masater projects

- “Developing an efficient algorithm for computing Solar Radiation Pressure” by Leandro Zardain (Excellent) September 2019, Polytechnic University of Catalonia.
- “Estrategia de control optimal para la dinámica de un satélite CubeSat equipado con una vela solar para la conjunción Tierra-Sol-Marte”, by Leonor Cui Domingo (Excellent) July 2022, Complutense University of Madrid
- “Interplanetary trajectories optimization for a Mars Sample Return mission”, by Leonor Cui Domingo (Excellent) December 2023, University of Florence.

PhD Thesis

- Co-Advisor of the PhD Thesis of Marc Jorba-Cuscó, “Dynamics of Solar Sails in the Earth-Moon system”, defended on February 2019.
- Co-Advisor of the PhD Thesis of Leandro Zardain, “High-Fidelity modeling of Solar Radiation Pressure and applications”, in process (3rd year student).
- Co-Advisor of the PhD Thesis of Franco Criscola, “Advancing the study of Lunar occultations from the Earth-Moon L4 point”, in process (1st year student).

Outreach Activities

Live Talk “De la Tierra a Marte: La Missio Hypatia”, organized by CosmoCaixa Science Museum in Barcelona, Spain, 7 February 2024. (<https://www.youtube.com/watch?v=W0lvrynJOLE>)

Crew-Scientist of the Hypatia I Martian analog mission. Hypatia I is a female-led mission to the Mars Desert Research Station in April 2023. Our crew aims to advance Martian research, promote space exploration and enhance scientific vocation (<https://hypatiamars.com/>).

Invited to talk at the Podcast *She has a voice* Podcast by Elisabet Tremps in which she interviews women in the fields of technology, science, engineering and mathematics (STEM) to inspire other women to pursue careers in these fields. Episode: “Ariadna Farrés: NASA, Matemáticas e Hypatia” (March 2023)

Invited to talk at *La Nova Mobilitat* Podcast by Miquel Testar i Martí Pascual and the support of the Industrial Engineers Mobility Commission of Catalonia. Episode: “LaNovaMobilitat 9 - Veles Solars i Hypatia, amb Ariadna Farrés” (Decembre 2022). (<https://www.fullsdenginyeria.cat/la-nova-mobilitat-el-podcast>)

Invited to talk at *Scietifica’t* Podcast by Neurones Fregides, where they talk about science in an open and intimate way. Doing scientific dissemination of quality and rigor in Catalan. Episode: “Cientifica’t #12: Telescopi James Webb amb la Dr. Ariadna Farrés” (August 2022). (<https://cientificat.buzzsprout.com/1761930/11235566>)

Invited to talk at *Masterminds* by Franc Carreras is a podcast produced thanks to Emprendedores, the leading economic magazine on the market in Spain. Episode: “De Barcelona a la NASA” (March 2022). (<https://emprendedores.es/gestion/oportunidades-espaciales-ariadna-farres>)

Live Talk “Surfeando entre puntos de Lagrange” organized by CosmoCaixa Science Museum in Barcelona, Spain, 19 October 2022. (<https://www.youtube.com/watch?v=F5Eoo--ssmM&t=2s>)

Surfeando entre Orbitas, Science Webinar in the cycle BITESIZE NASA organized by Españoles Centíficos en USA (ECUSA), 24 June 2020.

Space Exploration, 2020 Science Webinars, organized by St. Peters School Barcelona, 5 May 2020.

Re-Visitant la Lluna, Talk for the general public on the Apollo 11 Mission, organized by the Delegation of the Government of Catalonia in Washington DC, 28 september 2019.

Participation in the **2a Festa de la Ciència** organised by La UB divulga, with the activity “Caos en sistemes dinàmics”, 30 april 2016. (<http://www.ub.edu/laubdivulga/festacienciaub/>)

Participation in the **1a Festa de la Ciència** organised by La UB divulga, with the activity “Caos en sistemes dinàmics”, 22 may 2015. (<http://www.ub.edu/laubdivulga/festacienciaub/>)

Participation to the programme of **MOBILE EXPLORERS CLUB 2015**, with a three hour workshop session entitled ‘Programming - Design and Editing’ delivered to group of children aged between 8 and 15 years old, during the Mobile World Congress 2015 at Fira Gran Via on 4 March 2015.

Participation in “L’Espai Ciència del Saló de l’Ensenyament” in collaboration with La UB divulga, editions March 2014, 2015.

Invited Talk “Space Debris, un problema real!” at MateFest-InfoFest, 26 March 2014.
(http://mat.ub.edu/futurs_ub/activitats/Matefest/conferencies.php)

Co-organiser and teacher of the summer-school: “Introduction to astrodynamics, astrophysics and space mission design” at the Estades d’Estiu de Ciència per la Caixa Catalunya (E2C3) in the **Program Joves i Ciència de Caixa Catalunya**, in the editions: July 2009, 2010 and 2011.
(<http://jovesiciencia.catalunyacaixa.es/>)

Participated in the **8a edició de la Fira de Recerca en Directe** organised by the Parc Científic de Barcelona, 20, 21 and 22 of April 2010.

Press article selected by Atomium Culture: E.M. Alessi, **A. Farrés**, À. Jorba, C. Simó and A. Vieiro. “*The hammer of God*” *The eventuality of a collision of an asteroid with the Earth*. Published in The Irish Times (07/08/2011).

Collaboration with different **Xerrades - Tallers** organised by the Mathematics Faculty at the University of Barcelona from 2004 to 2009. **Workshops**: ‘Cryptography’, ‘When you play you do mathematics?’, ‘Noncooperative game theory’, ‘Graphs’, ‘Scientific 3D data visualisation’, ‘Quizzical Statistics’, ‘Robot Eyes’, ‘Fractals’, ‘Artificial Intelligence: the last frontier’, ‘Maps and Mathematics’. (<http://www.ub.edu/futursinousestudians/ubicat/xerrades.htm>)