Name:	**Daniel García Yárnoz**
Nationality:	Spanish
Date of birth:	05-07-1979
Position:	Mission Analyst, GMV Aerospace and Defence at ESA/ESOC OPS-GFA
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EDUCATION

Summer 2007 **Summer Session Program 2007 Beijing**, China, International Space University, Department: Satellite Applications.

Project: *'Technology Resources for Earthquake Monitoring and Response (TREMOR)'*

2003-2006 **Courses for PhD in Aerospace Science and Technology,** Polytechnic University of Madrid (UPM), Spain.

1997-2002 **Masters in Aeronautical Engineering,** speciality *A2: Space Vehicles*, from the Polytechnic University of Madrid, Spain.

July-Nov 2002 Final project at TU Delft, the Netherlands
'Numerical Modelling of an Active Cooling Thermal Protection System Based on Water Evaporation', part of the DART project (Delft Aerospace Re-entry Test vehicle), as ERASMUS student at the Aerospace Faculty (Aerospace Structures and Computational Dynamics department)

2002 **Prize for Academic Excellence in the Space Vehicles Speciality**

Languages: Spanish (mother tongue), English (fluent), German (good command), Italian (fair command).

PROFESSIONAL EXPERIENCE

Since May 2004 **GMV, SA at ESA/ESOC Mission Analysis Section (OPS-GFA)**

- ***Mission analyst contractor*** for the ***BepiColombo*** mission responsible for:
  - Design and optimisation of low-thrust and chemical interplanetary trajectories with multiple gravity assists,
  - Orbit determination, navigation and guidance analysis during critical phases, including planetary flybys, arrival and insertion,
  - Analysis, generation of first guesses, and optimisation of Earth escape strategies employing lunar gravity assists,
  - Launch window analysis,
  - Generation of gravitational capture approach trajectories for the arrival to Mercury through the weak stability boundary, and study of recovery opportunities and costs from a weakly captured orbit,
  - Design of multiple-burn insertion and orbital transfer strategies,
  - Orbital evolution calculations for the lifetime of both Mercury orbiters (MPO and MMO),
  - Failure analysis and mission recovery strategies,
  - Mission analysis calculations in general including eclipse, coverage from Earth during cruise and in orbit, solar conjunctions, Earth occultations,

gravity losses for the insertion, safe mode risk assessments, surface coverage of the planet, etc.

- Testing, improvement and development of software tools available in the section (INTNAV, GRAVLO, LOTNAV, orbit propagators…),
- Support to external projects and studies carried out by the industry: development of the new INTNAV graphical user interface (GMV), update and upgrade of the GRAVLO software tool (GMV), LOTNAV upgrade and low-thrust navigation assessment (Deimos-Space), Bepi-Colombo launch window analysis (GMV), and ASTROTOOLBOX for Matlab (GMV).

2001-2004 **GMV, SA. Flight Engineering (FE) Business Unit, Mission Analysis and Advanced Systems Engineering (MASE) Division**

- ***Project Engineer*** responsible for:
  - *FAMOSV2* (Rendez-vous and Docking Tool for Interplanetary Missions): design and development of a Cowell numerical propagator (3DoF), guidance algorithms for the RvD, and algorithms for a launch ascent optimisation module under MATLAB/Simulink.
  - RLVGNC (Reusable Launch Vehicles Guidance Navigation and Control): migration and improvement of a 6 DoF GNC simulation tool for launcher ascent from FORTRAN to Matlab/Simulink.
  - *ORBIMAT:* technical support and improvement of the ORBIMAT orbital analysis tool. Improvement carried out included atmospheric model upgrades, propagator upgrades, numerical algorithm refinements, …
  - Technical collaborator in multiple proposals in the MASE division.
- ***Aeronautical Engineering Trainee*** responsible for:
  - *ORIONv2:* Mission Analysis of S/C Constellations. Update of the launcher database in ORION. The launcher module was also implemented in FAMOS (Formation Flying Analysis and Mission Operations Simulator) under MATLAB for the FFDEM project.
  - ORBIMAT: Collaborate in the development of a second version of the user friendly GUI of the program and creating an online help for the tool.

Sep 2001 **Internship at MAI**, Moscow, Russia, (Moscow Aviation Institute, Aircraft Flight Safety Provision Systems Department of the Airplane and Helicopter Design and Construction faculty) with IAESTE:

- ***Trainee*** responsible for the study of the YAK-42 hydraulic system: influence of design parameters in the hydraulic system performance of the YAK-42 and related airplanes.

COMPUTER SKILLS

	Excellent	Good command	Fair command	Basic
Platforms		Windows 9x/NT Sun/Solaris	SUSE Linux	
Programming Languages	MATLAB/Simulink FORTRAN	UNIX Shell Scripts HTML	TCL/Tk	C++
Mission analysis tools and libraries	INTNAV ORBIMAT orblib	DITAN LOTNAV GRAVLO	ORION STK	USOC SEPNAV
Generic tools	Gnuplot	MS Office LaTeX		

PUBLICATIONS

De Pascale, P., **García Yárnoz, D.** & Jehn, R. 2007, 'Recovery Opportunities for the BepiColombo Mission to Mercury', IAC-07-C1.7.05, *58th International Astronautical Federation Congress*, 24-28 Sept., Hyderabad, India.

Christensen, I.A., Fletcher, L.E., Liberda, J.J. ***et al.*** 2007, 'Socio-economic Benefits of Using Space Technologies to Monitor and Respond to Earthquakes', IAC-07-E3.2.07, *58th International Astronautical Federation Congress*, 24-28 Sept. , Hyderabad, India.

International Space University **Team Project TREMOR** 2007, *Technology Resources for Earthquake Monitoring and Response (TREMOR). Final Report*, Summer Session Program 2007, ISU, Beijing, China.

Jehn, J., Companys, V., Corral, C., **García Yárnoz, D.** & Sánchez, N. 2007, 'Navigating BepiColombo during the weak-stability capture at Mercury', *New Trends in Astrodynamics and Applications IV Conference*, 27-29 June, Princeton, USA.

García Yárnoz, D., Jehn, R. & de Pascale, P. 2006, 'Trajectory Design for the Bepi-Colombo Mission to Mercury', IAC-06-C1.8.7, *57th International Astronautical Federation Congress*, 2-6 October, Valencia, Spain.
Published at: *Journal of the British Interplanetary Society*, vol. 60, pp. 202-208, June 2007.

García Yárnoz, D., Jehn, R. & Sánchez, N. 2006, 'BepiColombo: Navigation Challenges on the Way to Mercury', ISTS 2006-d-05, *Proceedings of the 25th International Symposium on Space Technology and Science & 19th International Symposium on Space Flights Dynamics* , 4-11 June, Kanazawa, Japan, pp. 422-427.

García Yárnoz, D., Jehn, R. & Croon, M. 2006, 'Interplanetary Navigation along the Low-Thrust Trajectory of BepiColombo', IAC-05-C1.7.05, *Selected Proceedings of the 56th International Astronautical Federation Congress, 17-21 October 2005, Fukuoka, Japan*, published in *Acta Astronautica*, July-Sept. 2006, vol. 59, No. 1-5, pp. 284-293.

Jehn, R., Campagnola, S., **García, D**. & Kemble, S. 2004, 'Low-Thrust Approach and Gravitational Capture at Mercury', *Proceedings of the 18th International Symposium on Space Flight Dynamics*, ESA SP-548, 11-15 October, Munich, Germany, pp. 487-492.

Bengoa Endemaño, G., Alonso Zotes, F., **García Yárnoz, D.**, Graziano, M., Beech, T. & Ortega, G. 2004, 'FAMOS-V2: Formation Flying and Rendezvous and Docking Tool for Exploration Mission in Circular and Elliptical Orbits', *Proceedings from the 2nd International Symposium on Formation Flying Missions and Technologies*, 14-16 September, Washington DC, USA.
Also presented in the *2nd ESA Workshop on Astrodynamics Tools and Techniques*, 13-15 September 2004, ESTEC, Noordwijk, the Netherlands.

Jehn, R., **García Yárnoz, D.**, et al, *Mission Analysis Office Working Papers 466, 476, 484, 486 and 495* about the mission analysis of BepiColombo.