Dr.-Ing. Chiara MANFLETTI

Nationalities: German and Italian

CURRENT POSITION: Programme Advisor to the Director General

PROFESSIONAL EXPERIENCE

April 2016 - present **Programme Advisor to the Director General, ESA**

Mai 2016 - present **Lecturer at the Technische Universität Darmstadt, Germany**
Space Propulsion and Space Transportation Systems

2013 – April 2016 **X-TRAS Manager** reporting directly to DLR's Chairman of the Executive Board and Head of German Delegation to ESA
Manager and technical lead for DLR launcher and propulsion task force across 10 DLR institutes analysing launcher and propulsion (chemical and electric) systems [such as: Ariane 6 PPH, Ariane 62/64, VEGA-C, Falcon 9] and supporting German Space Agency decision making

2010 – April 2016 **Engine Transients Group Leader** in the field of liquid rocket propulsion
German Aerospace Center (DLR), Space Propulsion Institute, Lampoldshausen
Work and Research Areas: *Project acquisition, project lead and principal investigator, PhD supervision, Technical Assistant for the European Space Agency*

2006 – April 2016 **Research and test engineer** in the field of liquid rocket propulsion
German Aerospace Center (DLR), Space Propulsion Institute, Lampoldshausen
Work and Research Areas: *Ignition (laser and conventional), engine transients, modelling of fluid systems, test bench management and parts procurement, test campaign preparation and experimental testing - combustion and ignition testing and analysis of conventional and new propellant combinations*

June – Oct 2007 **Visiting researcher**
The Tokyo University, Japan
Research Topic: *Laser induced incandescence diagnostics set-up and program development to analyse the effect of microwave energy on soot formation*

2002 – 2006 **Research engineer** in the field of space transportation
German Aerospace Center (DLR), Space Propulsion Institute, Cologne
Work and Research Areas: *Systems analysis of launcher systems - mission requirements and trajectory analysis, analysis of advanced propulsion concepts such as rocket-based combined cycle engines*

Feb 2002 – May 2002 **Visiting graduate researcher**
SNECMA Moteurs, Snecma Group – Vernon Plant, France
Research Topic: *Identification and high-level analysis of reusable technologies for liquid rocket engines and cross feeding considerations for two-stage to orbit vehicles (TSTO)*

EDUCATION

2004 – 2009 Doctorate (Dr.-Ing.) in Engineering
RWTH Aachen University, Germany
Thesis: *Transient Behaviour Modelling of Liquid Rocket Engine Components*

2001 – 2002 Master Degree (MSc) in Master of Space Studies (MSS)
International Space University (ISU), Strasbourg, France

1997 – 2001 Master of Engineering (MEng) in Aeronautical Engineering
Imperial College of Science, Technology & Medicine, London, UK

Additional education

2008 – 2013 Bachelor of Arts (Honours) in History
The Open University, UK

PI AND PROJECT MANAGEMENT POSITIONS *(selection)*

- Cryogenic RCS Thruster Technology: Laser Ignition – European Space Agency Technology Research Programme (3 year project)
- German Collaborative Research Centre SFB TRR-75: Droplet Dynamics under Extreme Ambient Conditions TP-B4 (4 year project)
- DLR collaborative research project with industry - FOS: Upperstage Technologies and Fluid Flow Phenomena (5 year project)

Acting as Deputy Project Manager

- Rheform – Replacement of hydrazine for orbital and launcher propulsion systems –H2020 (3 year project)
- Laser Ignition Technology – European Space Agency Technology Research Programme (1.5 year project)

OTHER ACTIVITIES AND AFFILIATIONS

- IAF Space Transportation Committee Member
- Visiting Lecturer since 2009 at the following:
  - RWTH Aachen University
  - University of Stuttgart
  - Technical University Munich, Visiting Lecturer, 2012 – to present
  - Collaborative Research Centre, SFB TRR-40
- Participation in the ESA 3rd Student Parabolic Flight Campaign (October 2000) – Royal Aeronautical Society Sponsorship

LANGUAGES

Italian, German, perfect English (*American School of Milan, Italy Sept 1983 – July 1997*), fluent French, basic Japanese

MANAGEMENT COURSES

DLR	Selected DLR management courses on communication, conflict resolution, risk management and project management
ELP	Elite Leadership Program (2014)
University of Wisconsin	Mastering the Transition from Technical Expert to Manager – Concerns Analysis, Decision Making, People Problem Solving, Management Style (2014)
IPM-10	International Project Management Course – Invitation by NASA (2013)
NASA PM&SE	NASA Project Management and Systems Engineering Course – Personal Invitation by NASA (for 2016)

OTHER

Interests: Hiking high mountains in faraway places, photography, ornithology, beekeeping, travelling, astronomy

ADDITIONAL INFORMATION

SELECTED PUBLICATIONS

Vacuum and Laser Ignition

Börner, M. and Manfletti, C. and Grebe, A. and Hardi, J. and Stützer, R. and Suslov, D. and Oschwald, M. (2015) *Experimental Study of a Laser-Ignited Liquid Cryogenic Rocket Engine*. 3rd Laser Ignition Conference (LIC) 2015, 27. - 30. Apr. 2015, Lemont, IL, USA.

Manfletti, C., Kroupa, (2013) G. *Laser ignition of a cryogenic thruster using a miniaturised Nd:YAG laser.* Optics Express, Vol. 21, Issue S6, pp. A1126-A1139, doi: http://dx.doi.org/10.1364/OE.21.0A1126, ISSN 1094-4087

Manfletti, C. (2014) *Laser Ignition of an Experimental Cryogenic Reaction and Control Thruster: Pre-Ignition Conditions.* Journal of Propulsion and Power, doi: http://arc.aiaa.org/doi/abs/10.2514/1.B34916, ISSN 0748-4658

Manfletti, C. (2014) *Laser Ignition of an Experimental Cryogenic Reaction and Control Thruster: Ignition Energies.* Journal of Propulsion and Power, doi: http://arc.aiaa.org/doi/abs/10.2514/1.B35115, ISSN 0748-4658

Injection and Fluid Flow Phenomena

Strauss, F. and Manfletti, C. and Schlechtriem, S. (2015) *Aufbau für experimentelle Untersuchungen transpirativ gekühlter Staustrahlantriebe*. 64. Deutscher Luft- und Raumfahrtkongress (DLRK), 22.-24. Sept. 2015, Rostock, Germany.

Bombardieri, C. and Manfletti, C. (2015) *Influence of wall material on nucleate pool boiling of liquid nitrogen*. International Journal of Heat and Mass Transfer. ISSN 0017-9310.

Bombardieri, C. and Traudt, T. and Manfletti, C. (2015) *Effect of the dissolved pressurizing gas on the pressure surge during the filling process of spacecraft feedlines*. 12th International Conference Pressure Surges 2015, 18. - 20. Nov. 2015, Dublin, Ireland. [Best Paper Award]

Traudt, T. and Bombardieri, C. and Manfletti, C. (2015) *High Speed Imaging of Water Hammer with Column Separation*. 12th International Conference Pressure Surges 2015, 18. - 20. Nov. 2015, Dublin, Ireland. [Best Paper Award]

Lamanna, G. and Kamoun, H. and Weigand, B. and Manfletti, C. and Rees, A. and Sender, J. and Oschwald, M. and Steelant, J. (2015) *Flashing behavior of rocket engine propellants*. Atomization And Sprays, 25 (10). ISSN 1044-5110.

Hydrocarbon combustion and laser diagnostics

Fabelinsky, V. I., Smirnov, V. V., Stel'makh, O. M., Vereschagin, K. A., Clauss, W., Manfletti, C., Sender, J., Oschwald, M (2010) *CARS temperature measurement in a LOX/CH4 spray flame*. Journal of Raman Spectroscopy, 41, 890–896, 2010.

Manfletti, C., Yamashita, K., Fukmoto, K., Egami, M., et al. (2007) *Implementation of Two-Colour Laser Induced Incandescence Measurements in the Investigation of the Effect of Microwaves on Soot Formation and Combustion*. In: Proceedings of the 45th Symposium (Japanese) on Combustion, September 2007, Japan

Launcher and Engine Systems

Herbertz, A. and Fromm, C. and Manfletti, C. (2014) *Performance Analysis of Low-Complexity Upper Stage Demonstrator Engines*. 50th Joint Propulsion Conference, 28. - 30. Jul. 2014, Cleveland, OH, USA.

Sippel, M., Manfletti, C., Burkhart, H. (2006) *Long-Term/Strategic Scenario for Reusable Booster Stages.* Acta Astronautica, Volume 58, Issue 4. February 2006.

SELECTED PROJECTS

2011 – present **SFB TRR-75: Droplet Dynamics Under Extreme Ambient conditions (Project Partners: University of Stuttgart, Darmstadt, and several other universities)**

Objective:

Investigation into vacuum and high-altitude transient injection phenomena (such as flash evaporation)

My tasks:

- currently: Scientific project manager and principal investigator for subproject TP-B4
- previously: Experimental investigation of liquid oxygen flash evaporation using a number of different injector configurations and vacuum conditions

2010 – 2013 **FOLAN (Project Partner: Astrium)**

Objective:

Investigation of injection systems, chamber cooling and simulation of storable propulsion systems in the thrust range 3-20 kN

My tasks:

- Modelling of pressure-fed fluid systems, steady-state and transient with particular interest for multi-phase flow and water hammer phenomena
- Student supervision

2009 – present **Forschungsverbund Oberstufe (Project Partner: Astrium)**

Objective:

Investigation in fluid flow systems and phenomena related to upper-stage and in-space propulsion

My tasks:

- currently: supervision of test bench design & construction, as well as PhD supervision in the topics of: modelling of fluid systems, steady-state and transient with particular interest for multi-phase flow and water hammer phenomena and modelling of heat-transfer effects such as chilldown with cryogenic fluids
- previously: Test bench design and construction, parts procurement

2009 – 2012 **Cryogenic RCS Thruster Technology: Laser Ignition – European Space Agency Technology Research Programme (Project Lead: DLR, Subcontractors: Astrium and CTR)**

Objective:

Investigation into the feasibility of laser ignition for cryogenic reaction and control and orbital manoeuvring system

My tasks:

- Project procurement and management
- Thruster design and manufacturing supervision, parts procurement
- Test campaign preparation and experimental testing of thruster and laser systems
- Software development for experimental data analysis
- Analysis and reporting of test results

2007 – 2009 **ESA TRP Green Propellants (DLR Subcontracting for Astrium)**

Objective:

Investigation of the ignition and steady-state combustion behaviour of three "green" propellant combinations: LOx/C3H8, LOx/C3H6, LOx/Flamal

My tasks:

- Design and manufacturing supervision of a new coaxial injector element for the three propellant combinations
- Optical diagnostics set-up
- Test bench re-design for new propellants and parts procurement
- Test campaign preparation and experimental testing of both single and penta-injector configurations
- Propellant management
- Analysis and reporting of test results including sensor data and optical imaging

2007 **Implementation of Two-Color Laser Induced Incandescence Measurements in the Investigation of the Effect of Microwaves on Soot Formation and Combustion (Project Partners: University of Tokyo, Honda Motor Co.)**

Objective:

Investigation into the impact of microwave radiation on soot formation using two-colour laser induced incandescence (2-colour LII)

My tasks:

- Project lead
- Literature review of laser induced incandescence methods
- Design, parts procurement and set-up of the 2-colour LII optical diagnostic system
- Modification and parts procurement of the microwave oven and of the C2H2-air burner
- Test campaign preparation and experimental testing
- Software development for experimental data analysis
- Analysis and reporting of test results

2007 **Material Investigations**

Objective:

Hot gas testing of ceramic materials

My tasks:

- Test chamber modification, parts procurement and chamber assembly
- Test campaign preparation and experimental testing
- Software development for experimental data analysis
- Analysis and reporting of test results

2005 – 2006 **EU Framework 6: LAPCAT I (Long-Term Advanced Propulsion Concept Tech. I)**

Objective:

Design of injection system for a rocket-based combined cycle propulsion system

My tasks:

- Design and construction of a ejector and scram-injector system
- Analysis and computation of the penetration height of various injection systems
- Analysis and computation of the necessary chamber length and shape for complete mixing, combustion, and flame stabilization