

**Marco Delbo** *February 25, 1972*

Last update on August 31, 2023

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**Scientific Interests**

Origin and evolution of planetary systems. Study of the physical and dynamical properties of asteroids, comets and planets; observations, modelling, and laboratory experiments on meteorites and analogues of space materials. Asteroid collisional families. Formation of planets. Space mission data analysis and interpretation: ESA's Gaia (with responsibility of asteroid spectroscopy), NASA's asteroid sample return OSIRIS-REx mission and JAXA's Hayabusa2 and MMX. Spectroscopic, thermal infrared, and interferometric observations from ground and space. Mineralogy and spectroscopy in geophysics. Astronomical instrumentation. Development of telescopes and focal plane instruments. Open source scientific codes. High performance computing. Microcontrollers. Scientific databases for minor planet dynamical and physical properties.

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**Education**

Université de Nice Sophia, Observatoire de la Côte d'Azur, France. NICE, FRANCE  
**Thèse d'Habilitation à Diriger des Recherches** 2015  
 Thesis title: Studies of the physical nature of asteroids: current trends and perspectives.  
 (committee: E. Lellouch, B. Marty, S. Raymond, O. Groussin, T. Guillot, P. Michel)

DLR (German Aerospace Center), Free University of Berlin, Germany. BERLIN, GERMANY  
**PhD degree in Planetary Science** 2004  
 Thesis title: The nature of Near Earth asteroids from the study of thermal infrared emission.  
 (supervisor A. W. Harris)

Physical, Natural and Mathematical Sciences, University of Genova, Italy. GENOA, ITALY  
**Master Degree in Physics** 1997  
 Thesis title: Automatic guiding system for the astrometric telescope of the Observatory of Turin.  
 (supervisor M. Lattanzi)

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**Skills**

**Technical expertise:** Unix, Windows, Mac OS, C/C++, Python, Fortran, IDL, Assembly, Basic, Arduino, Databases (PostgreSQL, MySQL).

**Languages:** Italian (*mother tongue*), English (*full professional proficiency*), French (*full professional proficiency*), German (*basic*), Spanish (*basic*), Greek (*very basic*).

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**Current Position**

Laboratoire Lagrange, CNRS, Observatoire de la Côte d'Azur NICE, FRANCE  
**CNRS Director of Research** 2018 – Now  
 Permanent Position equivalent to full professor.

**Previous Positions**

Laboratoire Lagrange, CNRS, Observatoire de la Côte d'Azur NICE, FRANCE  
**CNRS Research Scientist** 2012 – 2018  
 Permanent Position

Laboratoire Cassiopee, CNRS, Observatoire de la Côte d'Azur NICE, FRANCE  
**CNRS Research Scientist** 2008 – 2012  
 Permanent Position

Laboratoire Cassiopée, Observatoire de la Côte d'Azur NICE, FRANCE  
**Poincaré' Postdoctoral Fellowship** 2008  
 Position left in 11/08 for the CNRS permanent position

Laboratoire Cassiopée, Observatoire de la Côte d'Azur NICE, FRANCE  
**ESA external postdoctoral fellowship** 2006 & 2007

INAF, Astronomical Observatory of Torino <b>Research Engineer</b> Permanent Position (2006 - 2008 detached at Observatoire de la Côte d'Azur)	TORINO, ITALY 2002 – 2008
Deutsches Zentrum für Luft- und Raumfahrt, DLR <b>Ph.D. Student - 1/2 Position of Research Associate</b>	BERLIN, GERMANY 2000 & 2001
INAF, Astronomical Observatory of Torino <b>Research Engineer and Data Analyst</b>	TORINO, ITALY 1998 & 1999

## Awards

2023 Lancelot M. Berkely Prize of the American Astronomical Society as part of The Gaia Collaboration.  
 NASA Silver achievement medal – OSIRIS-REx Asteroid Astronomy Science team.  
 Asteroid (16250) was named after **Delbo** by the International Astronomical Union (IAU).  
 ESA External Fellowship (2-years).  
 Poincaré post-doctoral Fellowship (2-years).

## International and National Responsibilities

National Coordinator of the Minor Planet Physical Properties Catalogue (Virtual Observatory): <i>mp3c.oca.eu</i> that was approved as national service for the centres of treatment, archiving, and diffusion of data "Services d'Observations SO5" in Dec-2015	2014 – now
Member of the direction board of the research alliance Center for Planetary Origin – C4PO A training initiative at the doctoral and post-doctoral level from the IDEX – UCA JEDI	2016 – now
Referee for NASA's Research Opportunities in Space and Earth Sciences program.	2014
Referee for the ERC program of the European Union.	2019 – now
Referee for the ANR (French research agency).	2023

## Space Missions

Collaborator of miniRAD radiometer (DLR) onboard MMX lander (CNES/DLR).	2023 – now
Member of the science advisory team of ESA's NEO-MIR concept mission, to detect and characterise potential Earth-impactor near-Earth objects.	2022 – now
Collaborator of Thermal InfraRed Imager (TIRI, JAXA) onboard ESA's HERA mission.	2022 – now
Co-I of MMX InfraRed Spectrometer (MIRS, CNES) onboard the sample return Martian Moons eXploration (MMX, JAXA) mission.	2019 – now
Co-I of the Destiny+ (JAXA) mission to visit the near-Earth asteroid (3200) Phaethon.	2018 – now
Co-I of Thermal Infrared Imager (TIR, JAXA) on Hayabusa2 asteroid sample return space mission	2009 – now
Co-I of the OSIRIS-REx (NASA) sample return space mission.	2007 – now
Member of the DPAC Radiation Damage Task Force of ESA Gaia mission.	2008 – 2015
Responsible for ESA Gaia mission spectrophotometry of asteroids.	2006 – now
Member of the international consortium for the processing and analysis (DPAC) of Gaia data.	2014 – 2017
Member of the science team of the AIDA asteroid impact and deflection space mission.	

## Telescope Time Allocation Committees

Member of the board of referees of the TNG and Large Binocular Telescope (LBT).	2018 – 2022
Member of the Scientific Council of the French Virtual Observatory.	2013 – 2014
Member of the science team of MATISSE, a second generation instrument for ESO VLTI .	2012 – now
Member of the Observing Program Committee (OPC) of ESO.	2007 & 2010
Member of the time allocation committee for the Spitzer Space Telescope programs.	2006

## Referee for scientific journals and other publications

Nature Astronomy • Icarus • Science • Astronomy & Astrophysics • Advances in Space Research •  
 Planetary and Space Science • Astronomical Journal • Astrophysical Journal • Monthly Notices of the  
 Royal Astronomical Society • Journal of Geophysical Research • Space Science Reviews • Asteroids IV (the  
 fourth-edition of the decadal book of asteroid studies).

**Reviewer of PhD Thesis**

– <i>Jun Du</i> , Peking University, China and Université Côte d’Azur, Nice, France.	2019
Estimation of Lava Flow Thicknesses on the Moon and Mercury Based on Modeling the Topographic Degradation of Partially Buried Impact Craters.	
– <i>Diane Berard</i> , LESIA Observatoire de Paris Meudon	2017
Study of the rings of Chariklo by stellar occultations	
– <i>Alexander Garenne</i> , Institute of Astrophysics and Planetology of Grenoble.	2014
Hydration and Carbonation on asteroids and Mars.	
– <i>Anne-Sophie Maurin</i> , Laboratoire d’Astrophysique de Bordeaux.	2012
Characterisation of rocky exoplanets from their light-curve in the thermal infrared.	
– <i>Benoit Carry</i> , University 7 of Paris	2009
Study of the physical properties of asteroids with high angular resolution imaging.	

**Funded grant proposals and other projects**

<b>CNES</b> – Support to the science activity related to the MIRS instrument Thermal Modeling for the selection of sampling site of JAXA’s MMX mission (10kEu/year) from CNES.	2019 – now
<b>CNES &amp; Obs. Côte d’Azur</b> – PhD thesis Scientific exploitation of Gaia asteroid spectra (107 kEu) Co-funding from CNES and Observatoire de la Côte d’Azur).	2021 – 2024
<b>ANR ORIGINS</b> – Discovering the original planetesimals of our Solar System Post doc (3 years) and PhD (3 years) funding Four-year grant (458kEu) from the French National Research Agency (ANR)	2019 – 2023
<b>NASA</b> – Sample Return Mission OSIRIS-REx). Geological interpretation of OSIRIS-REx thermal infrared measurements. Post-doc funding (2 years). Grant of (234k USD) NASA - OSIRIS-REx	2019 – 2020
<b>IDEX Jedi</b> – Center for Planetary Origin (C4PO). Modeling Fracture: From metallic alloys to comets. Collaboration with CEMEF Mines-ParisTech. Funding for 1/2 PhD contract. Grant of (43 k) from the IDEX of the Université Côte d’Azur	2018-2020
<b>IDEX Jedi</b> – Academies of Excellence of UCA. Uncovering the nature of celestial bodies with methods of material sciences. Advanced modelling of asteroid surfaces. Collaboration with CEMEF Mines-ParisTech Grant of (48 kEu) from the IDEX of the Université Côte d’Azur	2017
<b>EU Horizon 2020</b> – NEOShield-2: Science and Technology for Near-Earth Object Impact Prevention Grant of (80 kEu) as CoI	2015 – 2018
<b>PNP</b> – Primitive asteroids and asteroid families. Identification of very old asteroid families (> 2-3 Ga) and search for the asteroids composed by the most primitive material in the Solar System Grant of (4.5k,4.5k,7k,5kEu) from the National Program of Planetology (PNP)	2015 – 2018
<b>ANR SHOCKS</b> – Shocks in the Solar System: The importance of thermal processes and collisions for the formation of regolith on the surfaces of minor bodies and other small particles. Four-year grant (420kEu) from the French National Research Agency (ANR)	2011 – 2015
<b>CNES</b> – Support to the science activity related to the OSIRIS-REx Thermal Modeling and Study of the origin of the mission target asteroid Grant of 15kEu/year) as a CoI from the French Space Agency (CNES).	2010 – 2015
<b>PNP</b> – Formation and evolution of regolith on asteroids by thermal cracking. An experimental approach. Grant of (5kEu) from the National Program of Planetology (PNP)	2011
<b>BQR</b> – Study of metamorphism of asteroids and meteorites by radiative overheating from close encounters with the Sun Four contracts (20kEu) <i>Bonus Qualité Recherche</i> (BQR Géoazur, University of Nice and OCA).	2010

<b>ESA contract</b> – Explore NEOs: Physical characterisation of 700 Earth-crossing asteroids using IR thermal observations from Spitzer. Contract (15kEu) with the European Space Agency for extraction of asteroid sizes and albedos.	2010
<b>Helmholtz-Gemeinschaft Deutscher Forschungszentren</b> Planetary Evolution and Life.	2008 – 2013
<b>International Space Science Institute (ISSI) Bern</b> Light Scattering Phenomena in Small Body Surfaces.	2008
<b>Competitive time at major observing facilities</b> PI and Co-I of more than 70 observational programs ESO VLT, VLTI, 3.6m, 2.2m; Keck; Spitzer; NASA-IRTF; TNG; Gemini.	2000 – now

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### Organisation of Scientific Meetings and others activities (seminars)

4 <sup>st</sup> International Conference on Thermal Models for Planetary Science (TherMoPS) ESA ESTEC	2023
SOC of the Section Small Bodies, Asteroids and Near Earth Asteroids, international European Planetary Science Congress (EPSC), Granada, Spain	2022
SOC of the Section Small Bodies, Asteroids and Near Earth Asteroids, international European Planetary Science Congress (EPSC), Virtual	2021
Leader of the SOC of the Section Small Bodies, Asteroids and Near Earth Asteroids.	2020
International European Planetary Science Congress (EPSC), Virtual	
SOC of the Section Small Bodies, Asteroids and Near Earth Asteroids, international European Planetary Science Congress and Division of Planetary Sciences of the American Astronomical Society (EPSC-DPS), Geneve	2019
3 <sup>st</sup> International Conference on Thermal Models for Planetary Science (TherMoPS), Budapest.	2019
Workshop on Minor Planet Databases – Nice, France.	2017
Astrometry and Astrophysics in the Gaia Sky. IAU Symposium, Nice, France.	2017
International Workshop: Primitive material in the Solar System II: The outer Solar System perspective Villedufranche sur Mer, France	2016
2 <sup>nd</sup> International Conference on Thermal Models for Planetary Science (TherMoPS), Tenerife	2015
Convener of the Section Small Bodies, international European Planetary Science Congress, Nantes	2015
International Workshop: Carbonaceous chondrites: their parent bodies and their link with primitive asteroids, Villedufranche sur Mer, France	2014
Co-convener of the Section Small Bodies, Asteroids and Near Earth Asteroids, international European Planetary Science Congress and Division of Planetary Sciences of the American Astronomical Society (EPSC-DPS), Nantes	2011
Co-convener of the Section Small Bodies and Planetary Moons – Comets, Asteroids and TNOs, International European Planetary Science Congress (EPSC), Rome	2010
Scientific Seminars of OCA	2009 – 2012
1 <sup>st</sup> International Conference on Thermal Models for Planetary Science (TherMoPS)	2008
Earth-Based Support to Gaia Solar System Science, Beaulieu	2008
Colloquium: Observations of minor bodies in the thermal infrared, Torino	2002

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### Membership of Scientific Societies and Consortia

Member of the light pollution committee between and City of Nice	2021 – now
Member of the American Astronomical Society (AAS) and the Division of Planetary Sciences	2006 – now
Member of the International Astronomical Union – IAU	2004 – now

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### Summary of Scientific Contributions

Refereed publications (h-index 45): 160  
 Refereed Proceedings: 17  
 Refereed book Chapters: 3  
 Non-Refereed Proceedings and Talks: 202  
 Invited Talks in International Conferences: 30  
 Invited Seminars: 31

## Advisory and Direction of Research

### Post-doc

<i>Chrysa Avdellidou</i> – (UCA-JEDI) Massive Asteroid Data Base.	2018-2022
<i>Andrew Ryan</i> – (UCA-JEDI/NASA) Thermal modelling of asteroids.	2018-2021
<i>Josef Hanus</i> – (ANR/CNES) Thermal modelling of asteroids.	2013-2016
<i>Victor Ali-Lagoa</i> – (ANR/NEOSheid2) Thermal cracking of comets.	2014-2016
<i>Mathieu Niezgodá</i> – (ANR) Laboratory experiments of the thermal fracture of the meteorites.	2012-2013
<i>Naomi Murdoch</i> – (ANR) Analysis of the thermal fracture of meteorites.	2012
<i>Julie Gayon-Markt</i> – (CNES) Towards a new mineralogical map of the main asteroid belt.	2010-2012
<i>Michael Mueller</i> – (Poincaré) Determination of the size distribution of main belt (up to km-size) and Near Earth asteroids.	2009-2011

### PhD

<i>Marjorie Galiner</i> : Supervisor – Scientific exploitation of Gaia asteroid spectra.	2021-2024
<i>Saverio Cambioni</i> : Co-supervisor with University of Arizona, Tucson, USA – Constraining the thermal properties of planetary surfaces using machine learning.	2018-2020
<i>Diego Uribe</i> : Co-Supervisor – Modeling Fracture: From metallic alloys to comets.	2018-2021
<i>Bryce Bolin</i> : Supervisor – Identification of asteroid families older than 2 billions of years.	2014-2018
<i>Victor Ali-Lagoa</i> : Co-supervisor with IAC, Spain – Determination of the physical properties of asteroids from the WISE data in the thermal IR.	2009-2010
<i>Alexis Matter</i> : Co-supervisor at OCA – Determination of the physical properties of asteroids from interferometric observations in the thermal IR.	2009-2010

### Master Thesis (\*produced paper or technical note)

<i>Salvatore Ferrone*</i> – Identification of 4.3 billion year old asteroid family and planetesimal population in the Inner Main Belt.	2022
<i>Andrew Marshall-Lee*</i> – Study of asteroid collisional family halos.	2019-2020

### Internships (\*produced paper or technical note)

<i>Salvatore Ferrone</i> – Efficiency characterisation of asteroid family detection methods.	2021
<i>Robert Melikyan*</i> – Long term dynamical evolution of asteroid families.	2021
<i>Edhah Munaibari*</i> (Co-Tutor) – Real-time detection of impact flashes on the lunar surface.	2019-2020
<i>Saverio Cambioni*</i> – Constraining the thermal properties of planetary surfaces using machine learning.	2018-2019
<i>Chrissy Comfort*</i> – Thermal cracking of asteroid surfaces: preparation for OSIRIS-REx.	2014
<i>Luca Lionni*</i> – Thermophysical properties of near-Earth asteroid (341843) from WISE data.	2013
<i>Tristan Dequaire*</i> – Test of the algorithm for the classification of asteroid spectra from Gaia.	2013
<i>Clara Maurel</i> – Study of the fracturing of meteorites.	2013
<i>Emilie Marchese*</i> (Co-Tutor) – Software development: Shape model determination of asteroids.	2010
<i>Kelsey Hargrove</i> – WISE Observations of Primitive Asteroid Families.	2009
<i>Mathieu Havel*</i> (Co-Tutor) – Yarkovsky Effect on asteroids with Gaia: a feasibility study	2007
<i>Valeire Seymour</i> (Tutor of exchange student) – Asteroid Photometry	2001
<i>Martin Prescher</i> (Co-Tutor) – Physical properties of small bodies from IRAS data	2001

### Engineers

<i>Nicolas Bruot</i> – New interface for the Minor Planet Physical Properties Catalogue.	2020-2021
<i>Pierre Deram</i> – Asteroid spectroscopic tool.	2019
<i>Pascal Bottein</i> – A new data database for the Minor Planet Physical Properties Catalogue.	2016-2017
<i>Jerome Gerakis</i> – Development of a database for the Minor Planet Physical Properties Catalogue.	2012-2014

## Teaching Activities and Public Engagement

### Postgraduate Schools for Astrophysics

Winter School for Astronomy – First solids and planetesimals: formation conditions and evolution	LES-HOUCHES, FRANCE
<b>Constraints on initial size distribution of planetesimals</b>	2020
International School for optical interferometry	PORQUEROLLES, FRANCE
<b>Infrared interferometry of solar system minor bodies</b>	2010

National School of Astronomy for the scientific administration <b>Astronomy in Dante's Divine Comedy.</b>	PORQUEROLLES, FRANCE 2009
International School for Dynamics of Gravitational Systems: challenges and perspectives. <b>Yarkovsky and YORP effects: the link between the dynamics and the physical properties of small bodies</b>	AUSSOIS, FRANCE 2009
International School of Space Chemistry, 6 <sup>th</sup> Course/Workshop <b>The Physical Properties of Potential Earth Impactors: Know your Enemy</b>	ERICE-SICILY, ITALY 2001
<b>University</b> Cycle of Lectures at the Master of astrophysics, Université Côte d'Azur <b>Physics of asteroids, Moon, and hypervelocity collisions</b>	NICE, FRANCE 2018-2020
Cycle of Lectures, Centre de Recherches Pétrographiques et Géochimiques <b>Space missions to asteroids</b>	NANCY, FRANCE 2014-2016
Cycle of Lectures, Charles University <b>Asteroid physical properties</b>	PRAGUE, CZECH REPUBLIC 2011
Cycle of Lectures, University of Nice Sophia Antipolis <b>Asteroid dynamic properties</b>	NICE, FRANCE 2010
Teaching Assistant, University of Nice Sophia Antipolis <b>Laboratory of experimental physics (Electromagnetism)</b>	NICE, FRANCE 2007
<b>Schools</b> Coordinator of teaching programs, University of Genova <b>Laboratory of Astronomy – Science Exhibition 'Imparagiocando 3' (learn by playing)</b>	GENOVA, ITALY 1996 – 1999
<b>Laboratory of Astronomy – Astronomy for students and teachers (primary and high schools)</b>	1996 – 1999
<b>Co-author of a didactic guide for teaching Astronomy in the primary and high schools.</b>	1996 – 1999
Coordinator of teaching programs, University of California – Berkeley <b>'How to teach Astronomy in the primary and the high schools' (with Prof. C. Sneider)</b>	, 1996

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## Scientific Visitor

Lunar and Planetary Laboratory, the University of Arizona, Tucson AZ, USA.	2019
The Discovery Channel Telescope (DCT) and Lowell Observatory, Flagstaff AZ, USA.	2019
Leiden Observatory, The Netherlands, Visiting Scientist.	2017
European Space Agency ESTEC, The Netherlands, Visiting Scientist.	2016-2017
University of Manoa, Hawaii, USA. Visiting Scientist.	2012 & 2015 & 2017
Infrared Telescope Facility (IRTF), Hawaii, USA. Visiting astronomer.	2013,2017
SouthWest Research Institute, Boulder (CO), USA. Visiting Scientist.	2011 – 2013
Astronomical Institute of the Charles University, Prague, CZ. Invited visiting Professor.	2011
European Southern Observatory, Garching, Germany	2011
Jet Propulsion Laboratory, Pasadena (CA), USA. Visiting Scientist.	2010
European Southern Observatory, Paranal. Visiting astronomer.	2006 – 2010
German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt - DLR), Berlin, Germany.	2002 – 2004
European Southern Observatory, La Silla. Visiting astronomer.	2001 – 2004
Institute for Radioastronomy, Bologna, Italy.	2001
Keck Observatory, Waimea, Hawaii, USA. Visiting astronomer.	2000 – 2002
Institute of Astronomy, Hilo, Hawaii, USA. Visiting astronomer.	2000 – 2001