

Curriculum Vitae of Alberto Cellino

Alberto Cellino

Born in Torino, January 11, 1958

Degree in Physics, March 1982

Technician at the Astronomical Observatory of Torino (1981–1990)

Astronomer at the Astronomical Observatory of Torino (1990–2009)

“Primo ricercatore” at INAF, Astronomical Observatory of Torino since 2009

IAU tasks:

Member of Minor Planet Working Group of IAU Commission 15 (1997-2000)

Chairman of Asteroid Working Group of IAU Commission 15 (2000-2003)

Vice-President of IAU Commission 15 (2006/2009)

President of IAU Commission 15 (2009/2012)

INAF tasks:

Member of the Time Allocation Committee of the Telescopio Nazionale Galileo (2004–2005)

Starting since 2006, and until its suppression, Member of the “Comitato di Macro Area 3” (Sun and Solar System) of the INAF

Other tasks:

Member of the *Observing Programs Committee* (Panel C) of the ESO (2007)

Leader of the ISSI International Team *Light Scattering Phenomena in Small Body Surfaces* (funded by the ISSI, Bern, 2008)

Research activity:

- Between 1981 and 1984, photometry of variable stars
- Since 1984, research work in the field of Minor Bodies of the Solar System, particularly for what concerns the physical properties of asteroids. In this field, the main contributions have been on the following topics:
 - Derivation of shape and spin axis direction of asteroids from available photometric data; model of the asteroids Vesta and Gaspra; analysis of the role played by shape irregularities in the photometric lightcurves.
 - Development of a semi-empirical method of the outcomes of catastrophic break-up processes among asteroids. Application to the

analysis of laboratory experiments, and to asteroid dynamical families.

- Collisional evolution of the asteroid population, with emphasis on the evolution of the size and spin rate distributions.
- Development of a statistical method for the identification of asteroid dynamical families in the main belt.
- Analysis of the physical properties of asteroid families, particularly for what concerns size distributions, reconstruction of the original ejection velocity fields of the fragments, and size-velocity relationships.
- Characterization of the surface properties of different dynamical families by means of spectroscopic observations.
- Analysis of the size distribution of the asteroid population in the main belt, and assessment of the total inventory of the population down to small sizes, using also observations obtained by means of the ESO VLT telescope at visible wavelengths and the Spitzer satellite in the thermal Infrared.
- Mechanisms of injection of collisional outcomes of inter-asteroid collisions into chaotic dynamical regions; origin of near-Earth objects and meteorites.
- Polarimetry of asteroids, and independent albedo estimates for objects observed by the IRAS satellite.
- High-resolution observations of asteroids using Speckle Interferometry and Adaptive Optics techniques, for the direct determination of asteroid sizes and shapes (and possible binarity).
- Development of concepts of space missions aimed at achieving a better physical characterization of near-Earth objects.
- Simulations of asteroid observations by GAIA (the ESA mission planned for launch in 2011).
- VLTI observations of asteroids.

The activity has been at very high level mainly for what concerns the studies of the collisional evolution of the main belt asteroid population, the identification and physical characterization of asteroid families, and the study of the polarimetric properties of the asteroids.

The results of the research activity have been published in more than 240 articles, including 118 peer-reviewed articles on the most important scientific journals for Planetary Sciences, like *Icarus*, *Astronomical Journal*, *Astronomy and Astrophysics*, *Science*, and in specialized books (*Asteroids II*, *Asteroids III*, etc.) (The above numbers refer to July, 2010. Source: ADS)

Space Activities:

- PI of the Spaceguard-1 mission proposal, submitted to ESA in the framework of the F2/F3 flexible missions program (2000)
- Scientific PI of the study *Remote Observations of near-Earth Objects from space*, under ESA contract (2002)
- Core member of the GAIA Solar System Working Group, and Responsible for the task of developing simulation studies for the determination of the rotational properties of asteroids from GAIA disk-integrated photometric data (2003–2006).
- Since 2006, Member of the Steering Committee of the Coordination Unit 04 of the *Data Processing and Analysis Committee* (DPAC) Gaia mission of the ESA.
- Since 2007, Responsible of the Working Group on *Physical Properties of Solar System Objects* of the GAIA DPAC.

Education Activities:

- Course of Planetary Sciences (48 hours) since the Academic year 2003-2004, for the *Laurea Magistrale* in Physics at the University of Torino (Italy)
- Lectures of Physics of Asteroids for the Italian National School of Astrophysics for post-doc students in 1996 and 2001.
- *Rapporteur* for the PHD thesis of Céline Blitz (University of Paris), on *Modélisation de la propagation des ondes sismiques et des ejecta dans les astéroïdes: Application à l'érosion des cratères de l'astéroïde (433) Eros* (2009).

- Reporter of the degree thesis *Gli asteroidi Aten-Apollo-Amor: Origine, evoluzione, popolazione attuale e rischi per la Terra*, student Anna Maria Simonelli, *Università degli Studi di Torino* (1996).
- Co-reporter of the thesis *Misure di asteroidi con tecniche di alta risoluzione*, student Manuela Lippi, *Università degli Studi di Pisa* (2006).
- *Rapporteur* for the PHD thesis of Daniel Hestroffer (University of Paris), on *Astrométrie et Photométrie des Astéroïdes Observés par HIPPARCOS. Apport à l'Élaboration d'un Système de Référence Dynamique* (1994)
- Opponent for the PHD thesis of Jukka Piironen (University of Helsinki), on *Photometry of Asteroids at Small Phase Angles with Related Laboratory Measurements* (1998).
- *Rapporteur* for the PHD thesis of Aurélie Lebras (University of Paris), on *Étude de l'état de Surface des Astéroïdes par spectroscopie Infrarouge en Réflectance* (2001).
- *Rapporteur* for the appointment of the title of *Habilitation à diriger des recherches* (HDR) for Mirel Birlan, Observatory of Paris (2005).
- Co-Director of the 6th Course of the International School of Space Chemistry (Erice, 2001)
- Invited Teacher at several International Schools (France, Austria, Italy)

Editorial Activities:

- Referee for the major journals specialized in Solar System studies, like *Icarus* and *Planetary and Space Science*.
- Co-Editor of the "Asteroids, Comets, Meteors 1993" book, published by Kluwer in 1994.
- Associated Editor of a special issue of the *Planetary and Space Science* journal devoted to proceedings of the 1999 IMPACT Workshop in Torino, Italy (2000)

- Co-Editor of the Asteroids III book, published by the University of Arizona Press (2002)
- Associated Editor of a special issue of *Advances in Space Research* (Vol.33, n.9, 2004), devoted to the proceedings of Session *NEO Impact Hazards on Earth and Other Solar System Bodies*, at the COSPAR meeting in Houston (2002).
- Associated Editor of a special issue of *Advances in Space Research* (2005), devoted to the proceedings of Session *NEO Impact Hazards on Earth and Other Solar System Bodies*, at the COSPAR meeting in Paris (2004)
- Associated Editor of a special issue of *Advances in space Research* (2007) devoted to the proceedings of Session *Small Bodies Exploration: Past, Present and future Missions to Comets and Asteroids*, at the COSPAR meeting in Beijing (2006)

Other Activities:

- Organizer of the IV Course of the "Scuola Nazionale di Astrofisica", (1996).
- Organizer of the Torino IMPACT Workshop, in Torino (Italy) (1999).
- Invited talks in several Observatories and Universities in Italy and abroad.

Invited Reviews and Talks at Meetings:

- "The identification of Asteroid Families", XVIII Ecole de Goutelas, Goutelas dans le Forez, France (1994).
- "Polarimetry", International School of Space Science (L'Aquila, 1995).
- "Structure and Inventory of the Asteroid Main Belt Population", Asteroids, Comets, Meteors 1996 meeting, Versailles, France (1996).

- "Asteroid Families", 5th Catastrophic Disruption Workshop, Timberline Lodge, Mt. Hood, Oregon (1998).
- "Minor Bodies: Spectral Gradients and Relationships with Meteorites", From Dust to Terrestrial Planets ISSI Workshop, Bern, Switzerland (1999).
- "Physical Properties of Near-Earth Objects: Open Problems", 33th COSPAR Scientific Assembly, Warsaw, Poland (2000)
- "Asteroids as Origins of Meteoritic Materials", Salting the Early Soup: Trace Nuclei from Stars to the solar System Workshop, Torino, Italy
- "Osservazioni di near-Earth objects dallo spazio nell'IR termico", Convegno Nazionale di Astronomia Infrarossa, Perugia (Italy) (2001).
- "Asteroid Families as Probes to Interiors", Workshop *Interior Structures of Small Bodies*, Meudon, France (2002).
- "Rationale and possible options for a dedicated space-based observatory for NEOs", *COSPAR Scientific assembly*, Houston, USA (2002).
- "Asteroid Families as Probes to Interiors", International Workshop *Interior Structures of Small Bodies*, Meudon, Francia (2002).
- "Asteroid Families", *6th Catastrophic Disruption Workshop*, Cannes, France (2003).
- "Ground-based optical observations of asteroids", *IAU General Assembly, Joint Discussion 19*, Sydney, Australia (2003).
- "NERO: General Concept of a NEO Radiometric Observatory", *35th COSPAR Scientific Assembly*, Paris, France (2004).
- "Asteroid Families", International School of space Science (L'Aquila, 2004).
- "Observations of Minor Planets with GAIA", International School of Space Science (L'Aquila, 2004).

- “GAIA observations of asteroids: sizes, taxonomy, shapes and spin properties”, *The Three Dimensional Universe with Gaia*, Paris-Meudon, France (2004).
- “The expected role of GAIA for asteroid science”, *Asia Oceania Geosciences Society 2nd Annual Meeting*, Singapore, (2005).
- “Some input from Polarimetry”, *Asia Oceania Geosciences Society 3rd Annual Meeting*, Singapore, (2006).
- “Asteroid science with Gaia: sizes, spin properties, overall shapes and taxonomy”, *36th COSPAR Scientific Assembly*, Beijing, China (2006).
- “Asteroid Families”, *7th Catastrophic Disruption Workshop*, Alicante, Spain (2007).
- “Asteroid shapes: From LASPA to Current Ideas”, *International Workshop on Paolo Farinella (1953-2000): The Scientist and the Man*, Pisa, Italy (2010)

Other Activities:

- *Principal Investigator* and/or *Visiting Astronomer* for several approved observing proposals at Italian and International facilities, including the Italian *Telescopio Nazionale Galileo*, the ESO La Silla telescopes, the ESO VLT.
- Co-investigator in two approved programs using the *Hubble Space Telescope*.
- Collaboration in the development and testing of the UBVRi photopolarimeter of the Osservatorio Astronomico di Torino (1990).
- Over the years, member of the *Scientific Organizing Committee* of several national and international meetings and workshops.
- Organizer of the Session *Asteroid Science in the Hayabusa Era* in the Second Meeting of the *Asia Oceania Geosciences Society* (Singapore, 2005).

- Organizer of the Session *What do we really know about asteroid compositions?* in the Third Meeting of the *Asia Oceania Geosciences Society* (Singapore, 2006).
- Invited Researcher at the *Institut de Mécanique Céleste et Calcul des éphémérides* of the Astronomical Observatory of Paris (2003, 2006, 2008, 2009).

Honours

- Asteroid 3857 is named Cellino, as an acknowledgement of the research activities mentioned above