

Cesare Barbieri - Curriculum Vitae (short version)

(Personal web page: <http://www.astro.unipd.it/planets/barbieri/>)

Professor of Astronomy, University of Padova, since 1973

Born in S. Giovanni in Persiceto (Bologna, Italy) 27/11/1942

Laurea in Physics University of Bologna 24/07/1965, awarded 110/110 cum laude;

Astronomer at the Astronomical Observatory of Padova from 08/1966 to 10/1972;

MacDonald Post-Doctoral fellow 1968-1969;

'Libero docente' in Astrophysics 1971;

Mount Stromlo Fellow 1979;

Visiting Professor, Boston University, 2003

Main Research Positions:

1985 - 1991 Director of the Astronomical Observatory of Padova

1990 - 1998 Director of the 3.5m *Telescopio Nazionale Galileo* (Canary Islands).

1980 - 1987 responsible for the Italian participation in the Halley Multicolour Camera on the ESA Mission GIOTTO to comet Halley;

1985 - 1987 member of ESA Astronomy Working Group;

1991 - 1994 member of ESA Space Science Advisory Committee and of Scientific Committee for Horizon 2000+;

1988 - 1992 member of the Scientific Technical Committee ESO;

1977 - 1994 member of the Instrument Definition Team of the Faint Object Camera for the Hubble Space Telescope;

2001 - Member of the Advisory Panel for Astronomical research in Estonia

2004-2005 Member of the Advisory panel for the Belgian Ministry of Research for the evaluation of an astronomical digitization project.

1995 to date: responsible for the Italian participation in the imaging system OSIRIS of Rosetta (Wide Angle Camera).

Current Teaching Activities

Course of *Fundamental Astronomy* for the 3-year first level, and *Astrophysics of Stars and Planets* for the 2-year second level of the 'Corso di Laurea in Astronomia'.

Course of *Elements of Astronomy and Astrophysics* in the 3+2 'Corso di Laurea in Ingegneria Aerospaziale'.

Member of the Board of the Master in Applied Optics, and of the Master in Scientific Communications.

From 2002 to 2005, Member of the Board of the European School of Observational Astronomy NEON.

Main Academic Duties

Since 2004, member of the Board of the *Scuola Galileiana di Eccellenza* dell'Università di Padova. Member of the Board of the PhD Course in Space Sciences and Technologies.

He has chaired several University and Faculty Committees.

He has chaired several national Committees for the evaluation of professors, researchers and technicians.

Ongoing Research Themes:

(see the more than 200 papers published on refereed journals. Here we concentrate in the recent activity)

1 – Photometry and Astrometry of Quasi Stellar Objects and AGNs. In the past, we discovered many quasar candidates, in particular by the two-color and objective prism techniques, and we derived one of the first luminosity functions at the bright end. In recent years, this activity has been carried out by digitizing the huge photographic archive of Asiago Observatory, and implementing automatic searches of the archives of other observatories (ASTROVIRTEL Project of ESO). The Asiago Digital Archive is internationally recognized as one of the leading projects in this field.

2 - Diffuse Sodium in the solar system: we obtained novel data on Io, Moon, comets. At present, this very successful activity is carried out mainly on Mercury's exosphere in a large International collaboration, using the high resolution spectrograph of the Galileo National Telescope. Members of this collaboration are the Universities of Boston and Arizona in the United States and the CNRS in France. The data we plan to acquire for an entire solar cycle in order to provide a precious data base of the Hermean exosphere for the space missions Mercury (NASA) and Bepi Colombo (ESA). In the frame of a recently approved research project of the Italian Space Agency it is planned to prepare new observations of the lunar exosphere in preparation for future space missions.

3 - Astrometry and spectrophotometry of Pluto, Comets, Asteroids and other Minor Bodies. The astrometry of Pluto in the period from 1970 to 1990 produced a very large set of accurate positions that were used to refine the (then) poorly known orbit of the planet. Recently, our activity has produced one of the largest data set for Near Earth Orbiting objects. We also obtained good infrared spectra with the TNG of Trans Neptunian Objects, and have been granted observing time with the IR space Telescope Spitzer.

4 - Telescopes and their Instrumentation, for ground and space. Main realizations have been the 182cm and Schmidt telescope in Asiago, the 3.5m Galileo Telescope in the Canaries, hardware for the Halley Multicolour Camera on board the Giotto mission to comet Halley, the participation to the

Faint Object Camera team on the Hubble Space Telescope and the hardware of the Wide Angle Camera on the Rosetta Mission. At present, a novel instrument for quantum astronomy is in preparation for the 182cm telescope in Asiago (see next point)

5 – Quantum Optics and Communications applied to Astronomy. This very new research avenue tries to transfer to ground and space astronomy the concepts and instruments of quantum optics, with the aim of opening a new frontier, namely that of the ultra-short time domain (below the nanosecond) in order to approach Heisenberg's limit in the optical astrophysical environment. This activity started three years ago with single photon transmission experiments from the ASI Matera laser ranging telescope to geodetic satellites. This experience led to the participation to an International cooperation (QIPS) funded by ESA for the transmission of single and entangled photons from space stations to ground telescope. QIPS is led by Prof. H. Weinfurter (Munich University) and comprises Prof. A. Zeilinger (Vienna), Prof. J. Rarity (Bristol) and leading industries in Europe. This very ambitious program has already achieved several milestones, and will be concluded at the end of 2006 in order to plan for even more complex experiments in the future. It must be underlined that in addition to quantum communication applications, we aim to establish the validity of quantum laws to interplanetary distances. This experience has led to a study of a 'quantum instrument' for the large telescopes of the future (study *Quanteye* for ESO, in collaboration with Prof. Dravins, University of Lund, Sweden), when the extremely large flux of photons could allow the detection of multi-photon phenomena in stellar light through the study of higher order coherence functions. A prototype for the 182cm telescope in Asiago is advanced preparation, with the aim to prove the concept and the technique. In this frame, we have been awarded (in May 2006) a grant to study the capabilities of the Galileo Satellite Navigation System for a very precise time distribution to ground and space astronomical telescopes. Prof. A. Cadez (University of Ljubljana, Slovenia) is taking part in this project with the very ambitious goal to establish the feasibility of optical intensity interferometry among two distant telescopes.

Organization of international conferences:

- European Satellite Astrometry, which paved the way to the approval of the Hipparchos astrometric satellite (ESA Conference, 1977)
- The Three Galileos: the man, the spacecraft, the telescope (in collaboration with NASA and DARA (1997, acta published by Kluwer)
- Earth-Moon Relationships, an interdisciplinary conference organized for the Padova Galilean Academy which attracted several researchers for many nations in so diverse field as psychology, zoology, botanic, and of course astronomy (2000, Acta published by Kluwer)

Books and Monographs

- *Fundamentals of Astronomy* (CRC Press, see http://www.crcpress.com/shopping_cart/products/product_detail.asp?sku=IP294&parent_id=1218&pc=)
- *Lezioni di Astronomia* (ed. Zanichelli 1999).
- *Alla scoperta dell'Universo: la nascita dell'astrofisica nel XIX secolo* (ed. CLEUP 2002).

- He has contributed a chapter to the book: *2000 Anni di Cristianesimo* (ed. Mondadori, 2000).
- He has contributed several articles for *the Enciclopedia Treccani* and other Encyclopediae (*La riscoperta del Cielo*, Ed. Riuniti, *Enciclopedia Scienza e Tecnica*, Mondadori).

Scientific exhibits:

He has organized several scientific exhibits:

- 1986: Halley and Giotto (Padova and several European cities)
- 1993: Galileo (Madrid)
- 1996: from Galileo to the Galileo Telescope (La Palma, Canary Islands)
- 1997: *Viaggio nel Cosmo* (Padova and Rome, 1997)

He gives frequent public lectures.

Memberships, Prizes and Honours

Member of the Accademia Galileiana (Padova)

Correspondent of the Istituto Veneto di Scienze Lettere e Arti.

Member of the Italian Astronomical Society (since 2001 member of its Council), of the IAU and co-founder of the European Astronomical Society.

NASA Group Award for FOC/HST.

Gold Medal of Italian Ministry for Public Education for Education, Culture and Art.

Commendatore of the Italian Republic

Selected List of Recent Publications 2003 – 2006

Barbieri C., Dravins D., Occhipinti T., Tamburini F., Naletto G., Da Deppo V., Fornasier S., D'onofrio M., Fosbury R.A.E., Nilsson R., Uthas H. (2006). *QuantEYE, a high speed photometer pushed to the Quantum limit for Extremely Large Telescopes*. *JOURNAL OF MODERN OPTICS*. vol. 1 pp. 1-10 ISSN: 0950-0340 in press

Naze, Y.; Barbieri, C.; Segafredo, A.; Rauw, G.; De Becker, M. (2006), *New light on the peculiar star HD 108*, *Information Bulletin on Variable Stars*, 5693, 1

Dravins D., Barbieri C., Fosbury R. A. E., Naletto G., Nilsson R., Occhipinti T., Tamburini F., Uthas H., Zampieri L. (2006), in T.Herbst, ed. proc. Workshop "Instrumentation for Extremely Large Telescopes", in press

Dravins D., Barbieri C., Fosbury R. A. E., Naletto G., Nilsson R., Occhipinti T., Tamburini F., Uthas H., Zampieri L. 2006, *Astronomical Quantum Optics with Extremely Large Telescopes*, in P.Whitelock, B.Leibundgut, M.Dennefeld, eds."The Scientific Requirements for Extremely Large Telescopes", IAU Symposium 232, Cambridge University Press, 2006., pp.502-505.

Barbieri C., Da Deppo V., D'Onofrio M., Dravins D., Fornasier S., Fosbury R.A.E., Naletto G., Nilsson R., Occhipinti T., Tamburini F., Uthas H., Zampieri L. 2006, *QuantEYE, the Quantum Optics Instrument for OWL*, in P.Whitelock, B.Leibundgut, M.Dennefeld, eds."The Scientific Requirements for Extremely Large Telescopes", IAU Symposium 232, Cambridge University Press, 2006., pp.506-507.

Fornasier S., Belskaya I., Fulchignoni M., Barucci M. A., Barbieri C. (2006). *First albedo determination of 2867 Steins, target of the Rosetta mission*. *Astronomy & Astrophysics*. vol. 449 pp. 9-12 ISSN: 0004-6361

Dravins D., Barbieri C., Da Deppo V., Faria D., Fornasier S., Fosbury R.A.E., Lindegren L., Naletto G., Nilsson R., Occhipinti T., Tamburini F., Uthas H., Zampieri L. (2005), *QuantEYE. Quantum Optics Instrumentation for Astronomy*, OWL Instrument Concept Study, ESO document OWL-CSR-ESO-00000-0162 (2005)

Belskaya, I. N.; Shkuratov, Yu. G.; Efimov, Yu. S.; Shakhovskoy, N. M.; Gil-Hutton, R.; Cellino, A.; Zubko, E. S.; Ovcharenko, A. A.; Bondarenko, S. Yu.; Shevchenko, V. G.; Fornasier, S.; Barbieri, C. (2005), *The F-type asteroids with small inversion angles of polarization*, *Icarus*, Volume 178, Issue 1, p. 213-221

Tsvetkov, M.; Tsvetkova, K.; Borisova, A.; Kalaglarsky, D.; Barbieri, C.; Rampazzi, F.; Kroll, P.; Sergeeva, T.; Sergeev, A.; Mink, D. Doane, A.; Samus, N. (2005), *The Pleiades Plate Database: a new update*, *Kinematika i Fizika Nebesnykh Tel*, Suppl, v. 5, p. 567-569

Keller, H. U.; Jorda, L.; Küppers, M.; Gutierrez, P. J.; Hviid, S. F.; Knollenberg, J.; Lara, L.-M.; Sierks, H.; Barbieri, C.; Lamy, P., Rickman, H.; Rodrigo, R. (2005), *Deep Impact Observations by OSIRIS Onboard the Rosetta Spacecraft*, *Science*, Volume 310, Issue 5746, pp. 281-283

Küppers, M.; Bertini, I.; Fornasier, S.; Gutierrez, P. J.; Hviid, S. F.; Jorda, L.; Keller, H. U.; Knollenberg, J.; Koschny, D.; Kramm, R.; Lara, L.-M.; Sierks, H.; Thomas, N.; Barbieri, C.; Lamy, P.; Rickman, H.; Rodrigo, R.; A'Hearn, M. F.; Angrilli, F.; Bailey, M. E.; Barthol, P.;

- Barucci, M. A.; Bertaux, J.-L.; Burns, J. A.; Cremonese, G.; Curdt, W.; De Cecco, M.; Debei, S.; Fulle, M.; Gliem, F.; Ip, W.-H.; Kührt, E.; Llebaria, A.; Lopez Moreno, J. J.; Marzari, F.; Naletto, G.; Sabau, L.; Sanz Andrés, A.; Sivan, J. P.; Tondello, G.; Wenzel, K.-P. (2005), *A large dust/ice ratio in the nucleus of comet 9P/Tempel 1*, *Nature*, Volume 437, Issue 7061, pp. 987-990
- Johnson, J. A.; Winn, J. N.; Rampazzi, F.; Barbieri, C.; Mito, H.; Tarusawa, K.; Tsvetkov, M.; Borisova, A.; Meusinger, H. (2005), *The History of the Mysterious Eclipses of KH 15D. II. Asiago, Kiso, Kitt Peak, Mount Wilson, Palomar, Tautenburg, and Rozhen Observatories, 1954-1997*, *The Astronomical Journal*, Volume 129, Issue 4, pp. 1978-1984
- Barbieri, C.; Marchi, S.; Migliorini, A.; Magrin, S.; Skvarč, J.; Marzari, F.; Scholl, H.; Albrecht, R. (2005), *A search of outer Trojans on ASTROVIRTEL images*, *Planetary and Space Science*, Volume 53, Issue 6, pp. 643-651
- Omizzolo, A.; Barbieri, C.; Rossi, C. (2005), *3C 345: the historical light curve (1967-1990) from the digitized plates of the Asiago Observatory*, *Monthly Notices of the Royal Astronomical Society*, Volume 356, Issue 1, pp. 336-342.
- Barucci, M. A.; Fulchignoni, M.; Fornasier, S.; Dotto, E.; Vernazza, P.; Birlan, M.; Binzel, R. P.; Carvano, J.; Merlin, F.; Barbieri, C.; Belskaya, I. (2005), *Asteroid target selection for the new Rosetta mission baseline. 21 Lutetia and 2867 Steins*, *Astronomy and Astrophysics*, v.430, p.313-317
- Villoresi P., Tamburini F., Aspelmeier M., Jennewein T., Ursin R., Pernechele C., Bianco G., Zeilinger A., Barbieri C. 2004, *Space-to-ground quantum-communication using an optical ground station: a feasibility study*, SPIE Annual Meeting, August 2004
- Barbieri C., Verani S., Cremonese G., Sprague A., Mendillo M., Cosentino R., Hunten D. (2004), *First Observations Of The Na Exosphere Of Mercury With The High Resolution Spectrograph Of The 3.5M Telescopio Nazionale Galileo*. *Planetary And Space Science*. Vol. 52 Pp. 1169-1175 ISSN: 0032-0633
- Da Deppo V., Naletto G., Nicolosi P., De Cecco M., Debei S., Parzianello G., Ramous P., Zaccariotto M., Fornasier S., Verani S., Barbieri C., Et Al. (2004). *Preliminary Calibration Results For The Wide Angle Camera Of The Imaging Instrument Osiris For The Rosetta Mission*. ICSO 2004 Fifth International Conference On Space Optics. 30 March - 2 April. Toulouse.
- Fornasier S., Dotto E., Barucci M. A., Barbieri C. (2004). *Water ice on the surface of the large TNO 2004 DW*. *Astronomy & Astrophysics*. vol. 422, pp. L43-L46 ISSN: 0004-6361.
- Fulle M., Barbieri C., Cremonese G., Rauer H., Weiler M., Milani G., Ligustri R. (2004). *The dust environment of comet 67P/Churyumov-Gerasimenko*. *Astronomy & Astrophysics*. vol. 422, pp. 357-368 ISSN: 0004-6361.
- Lazzarin M., Marchi S., Barucci M.A., Di Martino M., Barbieri C. (2004). *Visible And Near Infrared Spectroscopy Of Near-Earth Objects At Eso: First Results*. *Icarus*. Vol. 169, Pp. 373-384 Issn: 0019-1035.
- Marchi S., Barbieri C., Lazzarin M. (2004). *Mass Transfer In The Satellite System Of Neptune: Implications For Triton's Crater Asymmetry*. *Planetary And Space Science*. Vol. 52, Pp. 671-677 Issn: 0032-0633.

Marchi S., Barbieri C., Lazzarin M., Owen T., Corsini E.M. (2004). *A 0.4-2.5 Mm Spectroscopic Investigation Of Triton's Two Faces*. *Icarus*. Vol. 168, Pp. 367-373 Issn: 0019-1035.

Barbieri C., Blanco C., Bucciarelli B., Coluzzi R., Di Paola A., Lanteri L., Li Causi G.L., Marilli E., Massimino P., Mezzalana V., Mottola S., Nesci R., Omizzolo A., Pedichini F., Rampazzi F., Rossi C., Stagni R., Tsvetkov M., Viotti R. (2003). *Digitization And Scientific Exploitation Of The Italian And Vatican Astronomical Plate Archives*. *Experimental Astronomy*. Vol. 15(1), Pp. 29-43 ISSN: 0922-6435.

Fornasier S., Barucci M.A., Binzel R.P., Birlan M., Fulchignoni M., Barbieri C., Bus S.J., Harris A.W., Rivkin A.S., Lazzarin M., Dotto E., Bertini I. (2003). *A Portrait Of 4979 Otawara, Target Of The Rosetta Space Mission*. *Astronomy & Astrophysics*. Vol. 398, Pp. 327-333 Issn: 0004-6361.

Marchi S., Lazzarin M., Magrin S., Barbieri C. (2003). *Visible Spectroscopy Of The Two Largest Known Trans-Neptunian Objects: Ixion And Quaoar*. *Astronomy & Astrophysics*. Vol. 408, Pp. L17-L19 Issn: 0004-6361.