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# MARCO LOMBARDI

## PERSONAL DATA

I was born in Rieti, Italy, the 7<sup>th</sup> of May, 1973. I am an Italian citizen. I am married and have two children.

## EDUCATION

- December 2013: Italian habilitation to university professorship
- May 2000: Ph.D. degree in Physics at the Scuola Normale Superiore di Pisa, 70/70 *cum laude* (highest grade possible); thesis on “Statistical Lensing”
- September 1997: University “Diploma” of the Scuola Normale Superiore, 70/70 *cum laude* (highest grade possible)
- November 1996: Degree in Physics from the University of Pisa, 110/110 *cum laude* (highest grade possible); thesis on “Gravitational Lenses”
- July 1992: Scientific undergraduate studies “Diploma di Maturità Scientifica” from the secondary school, 60/60 (highest grade possible)

## POSITIONS

- January 2017–present: Associate Professor at the Physics Department, University of Milan
- December 2013–present: Research associate at the Smithsonian Astrophysical Observatory, CfA, Harvard
- January 2004–December 2016: Assistant Professor at the Physics Department, University of Milan
- November 2002–December 2003: Fellow at ESO, Garching
- July 2000–October 2002: Postdoctoral staff at the University of Bonn
- January 1999–May 2000: Student at ESO, Garching
- January 1997–December 1999: Graduate fellowship (“Perfezionamento”) at the Scuola Normale Superiore, Pisa (admission after a highly competitive exam)
- November 1992–October 1996: Undergraduate fellowship at the Scuola Normale Superiore (admission after a highly competitive exam)

## AWARDS

- 1997: Gravity Research Foundation, Honorable Mention
- 1992: First place in National Physics Olympiad; bronze medal at the International Mathematical Olympiad held in Helsinki
- 1992: Second place in National Mathematical Olympiad (more than 50 000 competitors); bronze medal at the International Mathematical Olympiad held in Moscow

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- 1991: Third place in National Mathematical Olympiad; member of the Italian team for the International Mathematical Olympiad held in Stockholm

## RESEARCH

My expertise in **gravitational lensing** dates back to my master's and PhD theses. Initially, my interest was mainly focused on theoretical and observational aspects of weak lensing studies of galaxy clusters and cosmic shear. I also performed weak lensing mass reconstructions of high-redshift clusters using VLT/FORS and HST/ACS data. I carried out several VLT/FORS2 and MUSE spectroscopic follow-ups on strong lens systems with the aim of studying in detail massive clusters in their central regions. More recently, I have been involved in CLASH-VLT, a large spectroscopical campaign on 13 massive galaxy clusters (part of the Hubble CLASH survey). This project has provided cluster mass density profiles with dynamical and lensing methods and a characterisation of the inner structure of cluster dark matter halos with unprecedented accuracy. Finally, in the context of gravitational lensing I also work on cosmic shear (and I am part of the *Euclid* consortium).

My second research interest is focused on **dark molecular clouds and star-formation**. In this field, I developed new methods to obtain accurate dust density estimates from multi-band observations (NICER & NICEST), which are now de facto the standard color-excess techniques. I used these techniques to investigate the structure of entire molecular cloud complexes and their star-formation efficiency. More recently, I have also used sub-millimeter data to study the structure of molecular clouds through their dust emission. I combined *Planck* and *Herschel* data, thus obtaining high-quality, large-scale maps of nearby molecular clouds. These analyses have provided new insights on the relationship between star-formation and gas column density (local Schmidt law) and on the role of gravity in molecular clouds.

Finally, I am also interested in **astrostatistics**: in a series of papers, I have studied the statistical properties of various interpolation techniques under Poisson point processes.

I have published 110 refereed papers in international journals obtaining 4300 citations and I am the first author of 30 of them (H index: 38, tori index: 22.1, riq index: 235). I presented my research result in more than 50 conferences and workshops.

## REFEREEING

I refereed ERC proposals and was a member of various selection committees in Italy and abroad. During my work at ESO I was responsible for the organization of the Observing Programme Committee (OPC) and was the ESA representative for the HST Time Allocation Committee (TAC). I collaborate with *Nature*, *Astronomy & Astrophysics*, *The Astrophysical Journal*, and *Monthly Notices of the Royal Astronomical Society* as a referee.

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**GRANTS**

- Co-PI of a university grant for a 4-year post-doc position (2014)
- Co-I of PRIN 2010-2011, € 798 700
- Co-PI of PRIN 2008, € 65 000
- Co-I of PRIN 2004, € 70 000

**OBSERVATIONAL  
EXPERIENCE**

- “Cosmic shear statistics and cosmology,” 7 nights VM WFI/2.2 [MPA time]
- “Strong lensing analysis of one of the most massive galaxy Clusters at  $z = 0.837$ ,” 11 hours SM VLT/FORS2 [PI, 072.A-0759]
- “Strong lensing analysis of a high redshift cluster,” 12 hours SM VLT/FORS2 [PI, 073.A-0832]
- “The Highest Redshift Strong Lensing Clusters,” 4 half-nights VM VLT/FORS2 + 6 hours SM VLT/VIMOS [PI, 076.A-0889]
- “Gravitational lensing on the most X-ray luminous cluster,” 4 half-nights VM VLT/FORS2 [PI, 078.A-0746]

**TEACHING**

I supervised 8 undergraduate theses, 11 master’s theses, and 3 PhD theses. I taught the following courses:

- 2005–present: Cosmology course at the Physics Department of the University of Milan (30 hours)
- 2013–present: Physics at the Department of Pharmaceutical Chemistry of the University of Milan (56 hours)
- 2010–present: Statistics for PhD students in Astronomy in the Milan area (Universities of Milano, Milano Bicocca, Como, and Lambrate observatory; 10 hours)
- June 2013: Bayesian Statistics for Astronomers at the Astrophysics Department of Vienna (16 hours)
- June 2010: Director and organizer of the Astrophysics PhD school “Francesco Lucchin” (Madonna di Campiglio, Trento)
- April 2002: Invited lectures on General Relativity at the Physics Department of the University of Milan (10 hours)

**DATA REDUCTION &  
COMPUTER SKILLS**

I have several years’ experience with image manipulation and data reduction tools, such as IDL, IRAF, SExtractor, and IMCAT (used for the lensing analysis). I have carried out many scientific projects (modeling and simulation of gravitational lenses, data reduction, Bayesian analysis) using many different languages, from C/C++ and Fortran, to Python, IDL, LISP, and Haskell. I acquired a good experience with databases (both for scientific and functional

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work), lexical analyzers, and parser generators, as well as parallel computing. I developed web interfaces to astronomical databases currently installed at ESO and ESA.

**INTERNATIONAL  
EXPOSURE**

I spent a large fraction of my academic career in Germany. I speak English and French fluently and I have a good knowledge of German.

**PERSONAL INTERESTS**

I love traveling and spending time in different places. I like playing pipe organ and violin, and listening to classical music. I practice several sports: mountaineering, skiing, caving, windsurfing, and SCUBA diving.