

Curriculum Vitæ of Massimo Marengo

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RESEARCH INTERESTS

- **Circumstellar environment:** observation and modeling of Asymptotic Giant Branch circumstellar envelopes and high mass Young Stellar objects. Study of mass loss processes around Long Period Variable stars and Cepheids. Debris disks around young Main Sequence Stars. Search of low mass companions (Brown Dwarfs and planetary mass bodies) around nearby stars.
- **Stellar Atmospheres:** radiative transfer modeling of Classical Cepheids pulsating atmospheres for Baade-Wesselink distance measurements with ground and space based interferometers.
- **Instrumentation:** supporting the in-flight calibration, test and scientific verification of the NASA Spitzer Space Telescope InfraRed Array Camera (IRAC). Techniques for Adaptive Optics High Resolution Imaging of the Circumstellar Environment around bright stars.

EMPLOYMENT

Aug 2009 - Assistant Professor, Department of Physics and Astronomy, Iowa State University
2003 - 2009 Astrophysicist at the Harvard-Smithsonian Center for Astrophysics,
Optical and Infrared Division, Spitzer/IRAC Instrument Team
2000 - 2003 Postdoctoral Research Associate at the Harvard-Smithsonian Center
for Astrophysics, High Energy Division w/ M. Karovska and D. Sasselov
1997 - 2000 Smithsonian Predoctoral Fellow at the Harvard-Smithsonian Center
for Astrophysics, Optical and Infrared Division, w/ Giovanni Fazio
1996 - 1997 Astrophysics Sector Computer System Administrator, SISSA/ISAS, Italy

EDUCATION

Jun 2000 Ph.D. in Astrophysics, Int. School for Advanced Studies (SISSA/ISAS), Trieste, Italy
Advisers: Prof. Dennis. W. Sciama, Dr. Giovanni G. Fazio and Prof. John C. Miller
Dissertation: *Mid-IR Observations and Modeling of Astrophysical Dust*
Nov 1993 Laurea cum Laude (M. Sc.) in Physics, Univ. of Torino, Italy
Advisers: Prof. Giovanni Silvestro and Prof. Maurizio Busso
Dissertation: *Imaging and Photometry of AGB Circumstellar Envelopes
with the mid-IR camera TIRCAM*
Jul 1987 Technical Degree in Computer Science, Inst. A. Avogadro, Torino, Italy

AWARDS AND FELLOWSHIPS AND GRANTS AS PI OR TC

2008 PI NASA Spitzer Space Telescope (GO Cycle 5) program
*Mass Loss from Classical Cepheids and their Progenitors II:
Spatially Resolved Spectra of Extended Emission*
2008 TC NASA Spitzer Space Telescope (GTO Cycle 5) program
*Mass Loss from Classical Cepheids and their Progenitors II:
IRAC Deep Search for Extended Emission*
2008 TC NASA Spitzer Space Telescope (GTO Cycle 5) program

2007 *Completing the Census of Embedded Population in The Vela Molecular Ridge Cloud-D*
 PI NASA Spitzer Space Telescope (GO Cycle 4) program
*IRAC Search for Planetary Mass Companions of Extrasolar Planetary Systems:
 Probing the Inner 400 AU*

2007 TC NASA Spitzer Space Telescope (GTO Cycle 4) program
Searching for Companions to a New Member of the 5 pc Sample

2007 TC NASA HST (GO Cycle 16) program
The L/T Transition in the Photospheres of Young Sub-Stellar Companions

2006 PI NASA Spitzer Space Telescope (GO Cycle 3) program
Search for Planetary Companions of ϵ Eridani and Fomalhaut

2006 TC NASA Spitzer Space Telescope (GTO Cycle 3) program
Census of the Embedded Population of the Vela Molecular Remnant Cloud-D

2006 TC NASA Spitzer Space Telescope (GTO Cycle 3) program
IRAC Characterization of Galactic AGB Stars

2006 TC NASA HST (GO Cycle 15) program
*Solving the Microlensing Puzzle:
 An HST High-Resolution Imaging Approach*

2004 PI NASA Spitzer Space Telescope (GO Cycle 1) program
An IRAC View of the Eclipsing PMS Star KH15D

2004 NASA Group Achievement Award for the Spitzer Space Telescope Payload Team

2003 Smithsonian Institution Certificate of Award

2001 American Astronomical Society Small Research Grant

2001 Grant to attend European Winter School *Observing with the VLTI*

2001 American Astronomical Society International Travel Grant for IAU Symp. 209

1997 - 2000 Smithsonian Predoctoral Fellowship

1994 - 1997 Admission and fellowship at the Int. School for Advanced Studies (SISSA/ISAS)

1987 - 1988 Admission and fellowship at Scuola Normale Superiore (SNS) of Pisa (Italy)

PROFESSIONAL ASSOCIATIONS, COMMITTEES AND SERVICE

Since 2009 Research Associate, Harvard-Smithsonian Center for Astrophysics

2008 NASA Solar System Origin Program Review Panel

Since 2008 Referee for The Astronomical Journal

Since 2008 Referee for Physica Scripta

2007 NASA Postdoctoral Program Review Panel

2007 Spitzer Space Telescope Proposal Review Panel

2006 NSF Stellar Astrophysics Program Review Panel

Since 2006 Member of then USNC International Astronomical Union

Since 2005 Referee for The Astrophysical Journal

Since 2002 Referee for Astronomy and Astrophysics

2001 NASA ADP and LTSA Program Review Panel

Since 2000 Member of the American Astronomical Society

Since 2000 Affiliate to the Harvard College Observatory

STUDENTS AND POSTDOCS

2010 - Samantha Glick: Iowa State University Honor undergraduate student

2010 - Kimberly Booe: Iowa State University Honor undergraduate student

2009 - Valsamo Antoniou: postdoc, Iowa State University

2009 - Alan Huselbus: graduate student, Iowa State University

2009 - Sarah Willis: graduate student, Iowa State University

2009 - Derek Huelsman: SAO REU summer undergraduate student

2004 - 2008 Michael Schuster: SAO Predoctoral Fellow (Ph.D. student from Univ. of Minnesota)
 2007 Megan Reiter: SAO REU summer undergraduate student
 2005 Sarah Sonnett: SAO REU summer undergraduate student (co-adviser w/ B. Patten)
 2004 Linda Watson: SAO REU summer undergraduate student (co-adviser w/ M. Karovska)

RECENT PUBLIC TALKS AND PRESS RELEASES

1. **Solar System's Young Twin Has Two Asteroid Belts,**
 Harvard-Smithsonian CfA Press Release No. 2008-22, October 27, 2008 &
 NASA Jet Propulsion Laboratory Press Release 2008-197, October 27, 2008
<http://www.cfa.harvard.edu/press/2008/pr200822.html>
<http://www.spitzer.caltech.edu/Media/releases/ssc2008-19/release.shtml>
2. **Astronomia Infrarossa: Visualizzare i Raggi Termici Provenienti dal Cosmo,**
 Public talk, Library of Beinette, Cuneo, Italy, September 30, 2008
3. Interview for the **Adler Planetarium Podcast**, May 9, 2008
4. **Scientists Snap Images of First Brown Dwarf in Planetary System,**
 Pennsylvania State University Press Release 2006-2, September 18, 2006
<http://www.science.psu.edu/alert/Luhman9-2006-2.htm>

RECENT TALKS AND COLLOQUIA

1. **A Spitzer View of the ϵ Eridani Planetary System:**
 - Dept. of Physics Colloquium, Iowa State University, Ames, IA, January 26, 2009
 - Centro de Investigaciones de Astronomía, Merida, Venezuela, January 5, 2009
 - Adler Planetarium, Chicago, IL, May 9, 2008
 - Northwestern University, Evanston, IL, May 6, 2008
 - Dept. of Physics Colloquium, New Mexico Institute of Technology, Socorro, NM, April 24, 2008
 - Department of Astronomy, University of Minnesota, Minneapolis, MN, November 26, 2007
 - International School for Advanced Studies, SISSA/ISAS, Trieste, Italy, October 29, 2007
2. **Feeling the Heat: Infrared Astronomy in the Space Age,**
 - Assumption College, Worcester, MA, November 17, 2008
 - Department of Physics, Tufts University, Medford, MA, March 30, 2007
3. **Galactic Cepheids as Seen by Spitzer,**
 Invited talk, Conference "Celebrating the 100 Years of the Leavitt Period-Luminosity Relation", November 6, 2008, Cambridge, MA
4. **Constraining the Mass Loss Physics and Dynamics in AGB Stars,**
 Workshop "The Origins of the Elements Heavier than Iron", Torino, Italy, September 26, 2008
5. **Mid-IR Observations of AGB Stars with the MMT and Spitzer,**
 Invited talk, AGB and Related Stars Mini-Workshop, CfA, Cambridge, MA July 31, 2008
6. **Spitzer/IRAC Observations of AGB Stars,**
 Invited talk, IX Torino Workshop on AGB Stars, Perugia, Italy, October 26, 2007
7. **Spitzer/IRAC Characterization of Galactic AGB Stars,**
 Conference on Why Galaxies Care about AGB Stars, University Campus, Vienna, August 7, 2006
8. **El sistema Planetario de ϵ Eridani,**
 Coloquio sobre Estrellas Jóvenes, Mérida, Venezuela, March 16, 2006
9. **The Debris Disk of ϵ Eridani as seen by Spitzer:**
 - Steward Observatory, University of Arizona, December 16, 2005
 - Radio and Geoastronomy talk, Harvard-Smithsonian CfA, November 18, 2005
 - Workshop on Nearby Resolved Debris Disks, Space Telescope Science Institute, October 19, 2005

SUMMARY OF RESEARCH EXPERIENCE

- **From Aug 2009:** Assistant Professor at the Physics Department, Iowa State University (Ames, IA).
- **2003-2009:** Astrophysicist at the Harvard-Smithsonian Center for Astrophysics (Cambridge, MA).

In June 2003 joined the InfraRed Array Camera (IRAC) Science Group at the Smithsonian Astrophysical Observatory (Cambridge, MA) lead by Giovanni Fazio to work on the calibration and scientific data processing of the InfraRed Array Camera (IRAC) for the Spitzer Space telescope cryogenic and warm mission. As part of the instrument team I have worked on the characterization of the IRAC Point Spread Function and of the long term latent images created by bright sources on the IRAC detectors.

My primary scientific focus concerns the study of the circumstellar environment, with a vigorous research activity in the field of mass loss from evolved stars (Asymptotic Giant Branch, Planetary Nebulae, Supergiants, Cepheids) and in massive star forming regions. This focus extends also to the study of young planetary systems and the search of sub-stellar mass objects (T and Y dwarfs) companions of nearby stars and in the field.

My research activity combines observations from ground (MMT, IRTF, Magellan telescopes, PTI and Keck interferometers) and space based facilities (Spitzer, HST) with modeling of stellar atmospheres, circumstellar disks and envelopes necessary for their interpretation. In collaboration with Mayly Sanchez at Argonne National Lab I have developed statistical tools based on the k -Nearest Neighbor Method for the photometric classification of astronomical sources, which is particular suitable to the search of rare objects in large spectro-photometric databases. I am leading the nearby star program of the IRAC Guaranteed Time science group and I am participating in ongoing Spitzer legacy projects, like the SAGE spectroscopic surveys of the Magellanic Clouds and the GLIMPSE 360 “Exploration” survey of the galactic plane for the Spitzer Warm mission. I am also a co-investigator of the Hi-GAL survey of the galactic plane and the HERITAGE survey of nearby galaxies with the Hershel Space Telescope.

- **2000-2003:** Postdoctoral position with Margarita Karovska and Dimitar Sasselov at the Harvard-Smithsonian Center for Astrophysics (Cambridge, MA).

Radiative transfer calculation of the stellar atmospheres of Classical Cepheids based on time-dependent hydrodynamic models. Derivation of accurate time- and wavelength dependent limb darkening corrections for interferometric observations in the visible (NPOI interferometer) and in the infrared (IOTA and PTI interferometers) to derive Cepheids distances with the geometric Baade-Wesselink method.

High spatial resolution Adaptive Optics mid-IR observations of circumstellar envelopes and extragalactic sources with the infrared camera MIRAC at the MMT (Mt. Hopkins, AZ) and Magellan (Las Campanas, Chile) telescopes. Mid-IR imaging of massive YSOs with the TIMMI2 camera at the ESO 3.6m telescope (La Silla, Chile), in collaboration with the University of Michigan. Applied models of dust condensation in evolved stars to predict dust formation in quasar outflows.

- **1997-2000:** Smithsonian Predoctoral Fellow at the Harvard-Smithsonian Center for Astrophysics (Cambridge, MA), under the supervision of Giovanni Fazio.

Mid-IR observations of AGB circumstellar envelopes with the camera MIRAC3 at the NASA IRTF telescope (Mauna Kea, Hawaii). Development of radiative transfer models of the dusty circumstellar envelopes of Mira and Semiregular variables. Analysis of the correlations between long period variability and mass loss in the last stages of stellar evolution.

- **1994-1997:** Ph.D. thesis research at the International School for Advanced Studies (SISSA/ISAS), under the supervision of Dennis Sciama.

Mid-IR observations of AGB circumstellar envelopes, Young Stellar Objects (YSOs) and star forming regions with the infrared camera CAMIRAS at the TIRGO telescope (Gornergratt, Switzerland). Spectroscopic observations of hydrogen emission lines from the “warm chromospheres” of AGB stars (Asiago and Loiano telescopes, Italy). Stage at the Service d’Astrophysique of C.E.A. Saclay (Gyf-sur-Yvette, France). Development of data analysis and deconvolution techniques of diffraction limited mid-IR imag-

ing data. Radiative transfer calculations of dusty astrophysical plasmas to explore the effect of dust emission to the Sunyaev-Zeldovic effect.

- **1992-1993:** Undergraduate research thesis at the University of Torino and the Observatory of Torino, under the supervision of Giovanni Silvestro and Maurizio Busso, and in the collaboration with the Institute for Space Astrophysics of CNR (Roma, Italy). Mid-IR observations of AGB circumstellar envelopes with the infrared cameras TIRCAM and TC-MIRC. Optical polarimetry and imaging of AGB sources. Development of radiative transfer models for AGB dusty circumstellar models.

SELECTED REFEREED PAPERS

1. **Galactic Cepheids with Spitzer: I. Leavitt Law and Colors**, Marengo, M. et al. 2009, *The Astrophysical Journal*, 709, 120
2. **Spitzer/IRAC Limits to Planetary Companions of Fomalhaut and ϵ Eridani**, Marengo, M. et al. 2009, *The Astrophysical Journal*, 700, 1647
3. **A Review of AGB Mass Loss Imaging Techniques**, Marengo, M. 2009, *Publications of the Astronomical Society of Australia*, 26, 365
4. **A k -NN Method to Classify Rare Astronomical Sources: Photometric Search of Brown Dwarfs with Spitzer/IRAC**, Marengo, M., Sanchez, M. C., 2009, *The Astronomical Journal*, 138, 63
5. **Imaging the Cool Hypergiant NML Cygni's Dusty Circumstellar Envelope with Adaptive Optics**, Schuster, M., Marengo, M. et al. 2009, *The Astrophysical Journal*, 699, 1423
6. **ϵ Eridani's Planetary Debris Disk: Structure and Dynamics Based on Spitzer and Caltech Submillimeter Observatory Observations**, Backman, D., Marengo, M. et al. 2009, *The Astrophysical Journal*, 690, 1522
7. **A Spitzer/IRAC Search for Substellar Companions of the Debris Disk Star ϵ Eridani**, Marengo, M. et al. 2006, *The Astrophysical Journal* 647, 1437
8. **The Infrared Array Camera (IRAC) for the Spitzer Space Telescope**, Fazio, G. G. et al. 2004, *Astrophysical Journal Supplement*, 154, 10
9. **Theoretical Limb Darkening for Classical Cepheids: II. Corrections for the Geometric Baade-Wesselink Method**, Marengo, M., Karovska, M., Sasselov, D. D., Armstrong, J. T., Nordgren, T. E. 2003, *The Astrophysical Journal* 589, 968
10. **Smoking Quasars: A New Source for Cosmic Dust**, Elvis, M., Marengo, M., Karovska, M. 2002, *Astrophysical Journal Letters* 567, L107
11. **Theoretical Limb Darkening for Pulsating Cepheids**, Marengo, M., Sasselov, D. D., Karovska, M., Papaliolios, C., Armstrong, J. T. 2002, *The Astrophysical Journal* 567, 1131
12. **100-year Mass Loss Modulation on the Asymptotic Giant Branch**, Marengo, M., Ivezić, Ž., Knapp G. R. 2001, *Monthly Notices of the Royal Astronomical Society* 324, 1117
13. **Mid-Infrared Observations of the Mira Circumstellar Environment**, Marengo, M. et al. 2001, *Astrophysical Journal Letters* 556, L47

Complete list available at <http://kaze.physics.iastate.edu/mmarengo/pub.pdf>