

Curriculum Vitae

Bahram Mobasher
Professor of Observational Astronomy
University of California, Riverside

Personal Details:

Name: Bahram Mobasher
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Nationality: British (permanent resident in USA)

Marital Status: Married (2 children)

Education

- 1977-1980 Pars College, Tehran, Iran
B.Sc in Physics 1980
- 1981-1983 University of Durham, Durham, U.K.
M.Sc in Observational Cosmology 1983
M.Sc Thesis:
The Determination of Extragalactic Distance Scale
- 1984-1988 University of Durham, Durham, U.K.
Ph.D in Observational Cosmology 1988
Supervisor: Professor R. S. Ellis
Ph.D. Thesis:
An Infrared Study of a Sample of Optically Selected Galaxies
- 1989-1991 University of London. London, U.K.
M.Sc in Opto-electronics 1991
M.Sc Thesis:
Neural Nets and Dense Holographic Interconnection schemes
- 1989-1991 University of London, London, U.K.
Post-Graduate Diploma in Microwave Engineering 1991

Appointments

- July 2007-Present Full Professor of Physics and Observational Astronomy,
University of California, Riverside
- 2000-2007 Associate Astronomer, Space Telescope Science Institute
2000-2007 Staff Scientist, European Space Agency (ESA)
- 1995-2000 Research Fellow, Imperial College, University of London
- 1992-1994 Instrument Scientist on the Infrared Space Observatory (ISO),
Imperial College, University of London
- 1989-1991 University of Leicester, Leicester, U.K.
Post-Doctoral Research Associate in Astrophysics

Honors and Awards

- Award from the 'Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom' 1983-1987
- Research Fellowship, Imperial College of Science, Technology and Medicine, University of London 1995-2000
- Award from NASA for outstanding technical accomplishments for the third Servicing Mission (SM3) to HST - 2002
- Ranked among the top 5% of the STScI science staff with the highest science achievement – 2004/05
- Recognized among the top three most productive members of the science staff at the STScI - 2004/05
- Science Achievement Award from the European Space Agency- 2004
- Khwarizmi International Award (KIA) for outstanding scientific accomplishments 2007 - 1st prize in Basic Sciences
- Visiting Associate, California Institute of Technology 2008-present
- Adjunct Professor, Institute for Theoretical Physics and Mathematics, Tehran, Iran 2008-present

Membership on Panels and Committees

- Chair of NASA's Long Term Space Astrophysics (LTSA) and Astrophysical Data Processing (ADP) panel for Normal Galaxies 2004-2007
- Member of the National Optical Astronomy Observatory (NOAO) Time Allocation Committee 2005-2006
- Member of the Subaru Telescope Time Allocation Committee 2004-2006
- Chief Editor, Hubble Space Telescope Instrument Handbooks 2006
- Chief Editor, Hubble Space Telescope Data Handbooks 2006
- Editor, NICMOS Instrument Handbook on the Hubble Space Telescope 2006
- Member of STScI Director Discretionary Research Fund (DDRF)-(2004-2006), Science Evaluation (2004) and Honors and Awards Committees (2005)
- Selection committee for Space Telescope Science Institute Fellowship program (2005)
- Chair, Astronomy Faculty Search Committee, University of California, Riverside (2008)
- Chair, Science Lecture Series on "The Science of Evolution" UC Riverside 2009
- Member, ad-hoc committee, UC Riverside, 2008
- Member, Committee on Courses, UC Riverside 2009
- Chair, colloquium committee Physics and Astronomy Dept., UC Riverside 2008-09
- Member, graduate admission committee, Physics and Astronomy Dept., UC, Riverside 2007-09
- Instrument Scientist, Infrared Multi-object Spectrograph (IRMS) Instrument on the Thirty Meter Telescope (TMT) 2009-present
- Co-I and Board Member- South California Center for Galaxy Evolution

Research Interests

Formation and Evolution of Galaxies, Observational Cosmology, Multi-waveband Galaxy Surveys, Search for High Redshift Galaxies, Photometric Redshift Techniques, SED Fitting and Measurement of Stellar Mass of Galaxies, Imaging and Spectroscopic Data Reduction/processing, Quantitative Galaxy Morphologies, Nature of Massive and Evolved Galaxies at High Redshifts, Star Formation Activity, Dark Energy

Research Activities and Highlights

1). Multi-waveband Galaxy Surveys: I have been a core member of many recent galaxy surveys aimed at addressing the most fundamental questions in astronomy. My contributions include: formulating and designing the surveys, generating multi-waveband galaxy catalogues from different data sets, measuring photometric redshifts, stellar masses, star formation rates and rest-frame properties of galaxies and planning follow-up observations. This consist of:

a). Great Observatories Origins Deep Survey (GOODS): I have been actively involved in all aspects of the GOODS since its inception (Giavalisco & Mobasher *STScI Newsletter* April 2004). This includes the HST/ACS (398 orbits), Spitzer (700 hours) and extensive ground-based observations. I have been a key member of the group generating GOODS photometric catalogues. Recently, we finalized the TFIT (Template FITting) catalogue for the GOODS, self-consistently combining data from different telescopes/instruments to generate an ACS selected catalogue, and used that to measure photometric redshifts and stellar masses for galaxies.

b). Cosmic Evolution Survey (COSMOS): I am a core member and a co-I in the COSMOS project (Mobasher & Scoville *STScI Newsletter* November 2004). With a total of 640 HST orbits, this is the largest single project performed on the HST, performing a 2 sq. deg. Survey of a contigeous area. I have been seriously involved in multi-waveband ground-based observations of the COSMOS field. The result is the most extensive survey of galaxies in broad- intermediate- and narrow-band filters (a total of 35 bands). COSMOS has the largest number of narrow-band selected galaxies with spectroscopic confirmation. I have been leading many parts of this project, including photometric redshift, star formation rates, measurement of rest-frame properties and spectroscopic follow-up.

c). Hubble Ultra-Deep Field (HUDF): This is the deepest image of the Universe ever seen by the mankind. A result of long exposures over 2.5x2.5 sq. arcmin area by two HST instruments (ACS and NICMOS), this includes the original HUDF and its extension (PI: Massimo Stiavelli). I have been a co-I on this HUDF extension project, involved on planning and quality checking of the deep data. I used these data to search for a new population of galaxies, to constrain galaxy formation scenarios and to extend photometric redshift techniques to a new depth and accuracy.

d). Coma Cluster Treasury Program: This is an HST treasury program (160 orbits), performing a wide-area survey of the closest and richest of galaxy clusters, the Coma. I am a co-I on this project and heavily involved in formulating the project and its follow-up observations, using the space and ground-based facilities. The main aim of this project is to provide the zero redshift baseline with which to compare observations from higher redshifts and to put studies of evolution of galaxy on a firm basis. No such extensive study of a nearby cluster with HST has ever been performed.

II). Search for High Redshift Galaxies: Using the multi-waveband data from our extensive galaxy surveys and designing new observations, we carried out a search for the highest redshift galaxies (z-band dropouts). The result is two recent papers: Ouchi, Mobasher et al (2009), find a total of 22 candidates at $z \sim 7$ and explores the contribution of these galaxies to the re-ionization of the Universe. We have applied for the Keck (10m) telescope time to perform spectroscopy of these targets. Capak, Mobasher et al (2009) identify z-band dropout candidates in the COSMOS field and perform optical and near-infrared spectroscopy to confirm their redshifts.

III). Discovery of a New Population of Galaxies: Using the Balmer Break technique, we identified a population of very massive and evolved galaxies at $5 < z < 7$. This looks for Balmer break features (sensitive to the age of the stellar population), shifted between 2.2 and 3.6 micron bands, for galaxies with bright 3.6 micron flux (corresponding to large rest-frame near-infrared luminosity at $z > 5$ and hence, large stellar mass). Mobasher et al (2005) and Wiklind et al (2008) found a large number density for these galaxies. If true, they will significantly constrain galaxy formation scenarios.

IV). Extensive Spectroscopy of High-z Galaxies in GOODS & COSMOS: In collaboration with Peter Capak and Nick Scoville (Caltech), I formulated an ambitious spectroscopic study of high redshift galaxies using DEIMOS instrument on the Keck telescope. We have been awarded 18 nights of observing time on the Keck telescope and have obtained medium resolution spectra for high redshift galaxies. The aim is to obtain DEIMOS spectroscopy for ~ 2000 galaxies in the range $4 < z < 7$, and use the spectroscopic diagnostic lines to measure the star formation rate and metallicity and their evolution with cosmic time.

V). Dark Energy: I was a core member of the team exploring dark energy and its evolution with time by searching for SNe type Ia in the GOODS fields. We found the highest redshift SNe Ia's at $z > 1.25$ and, for the first time, put observational constraint on the equation of state of dark energy and its evolution with cosmic time (Riess et al 2004, 2007). I am a full member of the SuperNovae Acceleration Probe (SNAP) and was a member of the European Dark Energy Mission project- Spectroscopic All-sky Cosmic Explorer (SPACE).

Press Releases

Nature of Dark Energy (Adam Riess)

New clues about the nature of Dark Energy: Einstein may have been right after all

<http://www.spaceref.com/news/viewpr.html?pid=13698>

Dark Matter in COSMOS from Gravitational Lensing (Richard Massey)

First 3D Map of the Universe's Dark Matter Scaffolding

<http://www.spacetelescope.org/news/html/heic0701.html>

Discovery of a Massive and Evolved Galaxy at High Redshift (Bahram Mobasher)

Big Baby galaxies in New Born Universe

http://www.nasa.gov/home/hqnews/2005/sep/HQ_05286_HST_Big_Baby.html

Formation of Bars at High Redshifts (Kartik Sheth)

Astronomers describe the bar scene at the beginning of the Universe

<http://www.sciencedaily.com/releases/2008/07/080729133527.htm>

A sub-mm detected star-forming Galaxy at high redshifts (Peter Capak)

Rare "Star-making Machine" found in Distant Universe

http://www.nasa.gov/mission_pages/spitzer/news/spitzer-20080710.html

Discovery of Galaxies at $z \sim 7$ (Masami Ouchi)

"Dropouts" Pinpoint Earliest Galaxies

http://www.ciw.edu/news/dropouts_pinpoint_earliest_galaxies

Invited Talks (2007-2009)

European Space Agency- Noordwijk, Netherlands May 2007

Royal Astronomical Society- London July 2007

University of California, Davis- November 2007

Winter School in Cosmology- El Escorial, Spain December 2007

Canada-France-Hawaii Telescope- Kona, Hawaii February 2008

Liverpool John Moores University June 2008

Keck Science Meeting- University of California, Santa Cruz September 2008

Universidad Autonoma de Madrid, Spain April 2009

Public Outreach

Public lectures (2008-2009):

San Jacinto high school, Mark Twain Elementary School (Riverside)

Teacher's Academy (August 2008 and 2009)

Physics and Astronomy Dept. Open Day Lecture in Cosmology (May 08)

Science Lecture Series (UC Riverside): Let there be light: the First Billion Years (May 09)

Lecture to prospective graduate students- "Astronomy at UC Riverside" (March 2008/09)

Public Lecture in Madrid, Spain on "Advances in Modern Cosmology" (April 09)

Huntington Library "What do we Know about the History of the Universe?" (Nov 09)

Newspaper Articles and Press Interviews:

- Article in Press Enterprise, newspaper of California Inland Empire (May 2009)

"Did we need to fix the Hubble?"

- Interview with BBC- London (May 2009)

- Article in Keyhan Newspaper- London (August 2009)

- Press interview with Pasadena Sun and San Gabriel Tribune newspapers (Nov 2009)

Teaching

University of California, Riverside: I developed and taught three different courses: I gave an undergraduate course in “Adventures in Astronomy” in which I have had 270 students. This course gives a general background in astronomy to students. I gave graduate courses in “Cosmology and Galaxy Evolution” and “Astrophysics of Interstellar Medium”, in which I have had 5-7 students. These are aimed at preparing graduate students to start doing research.

Imperial College, London: I prepared and gave lectures in “Radiative Transfer” to graduate students. I was also responsible for tutorials and problem classes to undergraduates and was a demonstrator in the Computational physics Lab.

University of Leicester, England: I gave an entire undergraduate course in “Galaxies: Their Formation and Evolution”

University of Durham, England: I was a demonstrator in undergraduate Physics and Computational Physics Laboratories. Each lab had around 15-20 students.

Student Supervision

Past and present graduate students:

- Andrew Hopkins Ph.D. 1997 Univ. of Sydney (co-supervised with Prof. L. Cram)
The Phoenix Multi-wavelength Deep Survey
- Lisa Stephenson Ph.D. 1998 Imperial College, London
Determination of Local Velocity Field from a Uniform Galaxy Survey
- Antonis Georgakakis Ph.D. 1999 Imperial College, London
The Nature and Statistical properties of Sub-mJy Radio Sources
- Jose Afonso Ph.D. 2002 Imperial College, London
On the Star Formation Properties of Faint Radio Sources
- Edward Villanoeva MSc 2008 University of California, Riverside
Photometry of GOODS Galaxies Using TFIT Photometric Technique

I currently supervise three graduate students: Hugo Messias (Lisbon University, co-supervise with Prof. Jose Afonso), Corinna Jobe and Hooshang Nayyeri (UC Riverside)

Post-Doctoral Scholars

Tomas Dahlen (2002-2005): Was a GOODS project post-doctoral researcher at the Space Telescope Science Institute working, in part, with me. He worked on luminosity function and star formation activity in galaxies and photometric redshift techniques.

Thomas Puzia (2003-2006): Was on a fellowship from the European Space Agency (ESA) to work with me at the Space Telescope Science Institute. His main work was on study of the nature of E+A galaxies.

Masami Ouchi (2004-2007): Was a Hubble Fellow at the STScI. I was Masami's faculty contact and main collaborator at the institute. He mainly worked on dropout and search for $z \sim 7$ galaxies and the nature of high- z galaxy candidates.

Leigh Jenkins (2005-2007): Worked with Dr. Ann Hornschemeier (Goddard Space Flight Center) and I. She was on the Spitzer grant and worked on Spitzer observations of galaxies in the Coma cluster.

Nimish Hathi (2008-present): Is working with me as a post-doctoral fellow at the University of California, Riverside. His work is on the nature and properties of high redshift galaxies.

South California Center for Galaxy Evolution (CGE)

I am a co-I and board member of the newly established “South California Center for Galaxy Evolution”. We initiated this center after we received a \$2M Dollar grant from the UC Office of the President. The aim of the center is to foster research activities between different UC campuses in southern California. We hire two post-doctoral research fellows each year, for three years, and organize workshops to allow the faculty, post-doctoral scholars and graduate students in astronomy at the UC campuses in southern California to interact and to collaborate.

Workshop Organization

Co-chair (with Jose Afonso) of the conference on:

At the Edge of the Universe: Latest Results from the Deepest Astronomical Surveys

Sintra, Portugal- 9-13 October 2006

Astronomical Society of the Pacific, Conference Series, Volume 380

Edited by: Afonso, J., Ferguson, H. C., Mobasher, B. & Norris, R.

International Astronomical Union (IAU) General Assembly

Co-chair with T. Wiklind and V. Broom - Joint Discussion # 12

First Light: Observational Clues and Theoretical Predictions

Rio de Janeiro 10 -11 August 2009

Publication Record

I have over 150 papers published in refereed journals (as of October 2009). I have made significant contributions to all these papers, ranging from planning the projects, writing telescope time proposal, observing, reducing, processing, analyzing and interpreting the data and writing the paper.