

ANDREA GRAZIAN
CURRICULUM VITAE ET STUDIORUM

Personal information:

Name: Andrea Grazian

Date of birth: 10-10-1974

Place of birth: Thiene (VI) Italy

Nationality: Italian

Present address: INAF-Osservatorio Astronomico di Roma
Monte Porzio Catone (RM) ITALY

Email: grazian@oa-roma.inaf.it

Telephone: 0039-06-94286468

Recent Education:

- 1993–1997
Master degree in Astronomy, University of Padova - Italy.
- 1998
Undergraduate thesis research “**The optical Luminosity Function of low-z QSOs**”. Supervisor Prof. S. Cristiani - final grade: 110/110 *cum laude*
- 1999
Civil Service.
- 2000–2002
Ph.D in Astronomy, University of Padova.
ESO studentship, Garching - Germany.
- 28 January 2003
Ph.D dissertation:
“**QSO Clustering and Luminosity Function as Astrophysical and Cosmological tools: The Asiago-ESO/RASS QSO Survey**”.
Supervisor: L. Moscardini (University of Padova/University of Bologna)
- 2003-2004
Research fellowship at the Astronomical Observatory of Monte Porzio (Roma):
“**Software for data analysis of the LBC instrument**”.
- 2004-2006
Postdoctoral fellowship INAF at the Astronomical Observatory of Monte Porzio (Roma).
- 2006-2008
Contract with ASI Science Data Center (ASDC) of Rome:
“**Archiving and data analysis at the ASI Science Data Center**”.
- 2008-present
Researcher at the Astronomical Observatory of Monte Porzio (Roma).

REFEREED PUBLICATIONS

- 1) *The Asiago-ESO/RASS QSO Survey. I. The Catalog and the Local QSO Luminosity Function*
Grazian, A.; Cristiani, S.; D'Odorico, V.; Omizzolo, A.; Pizzella, A.
2000 *AJ* 119, 2540

- 2) *Multicolor Observations of the Hubble Deep Field South*
Vanzella, E.; Cristiani, S.; Saracco, P.; Arnouts, S.; Bianchi, S.; D'Odorico, S.; Fontana, A.; Giallongo, E.; **Grazian, A.**
2001 *AJ* 122, 2190

- 3) *The Asiago-ESO/RASS QSO Survey II. The Southern Sample*
A. Grazian, A. Omizzolo, C. Corbally, S. Cristiani, M. G. Haehnelt, E. Vanzella
2002 *AJ* 124, 2955

- 4) *A VLT/FORS2 spectroscopic survey in the HDF-S*
E. Vanzella, S. Cristiani, S. Arnouts, M. Dennefeld, A. Fontana, **A. Grazian**, M. Nonino, P. Petitjean, P. Saracco
2002 *A & A* 396, 847

- 5) *The dusty environment of Quasars. Far-IR properties of Optical Quasars*
P. Andreani, S. Cristiani, **A. Grazian**, F. La Franca, P. Goldschmidt
2003 *AJ* 125, 444

- 6) *The Asiago-ESO/RASS QSO Survey. III. Clustering analysis and its theoretical interpretation*
A. Grazian, M. Negrello, L. Moscardini, S. Cristiani, M. G. Haehnelt, S. Matarrese, A. Omizzolo, E. Vanzella
2004 *AJ* 127, 592

- 7) *The Space Density of High-redshift QSOs in the GOODS Survey*
S. Cristiani, D. M. Alexander, F. Bauer, W. N. Brandt, E. T. Chatzichristou, F. Fontanot, **A. Grazian**, A. Koekemoer, R. A. Lucas, P. Monaco, M. Nonino, P. Padovani, D. Stern, P. Tozzi, E. Treister, C. M. Urry and E. Vanzella
2004 *ApJ* 600, 119

- 8) *Photometric redshifts with the Multilayer Perceptron Neural Network: Application to the HDF-S and SDSS*
E. Vanzella, S. Cristiani, A. Fontana, M. Nonino, S. Arnouts, E. Giallongo, **A. Grazian**, G. Fasano, P. Popesso, P. Saracco and S. Zaggia
2004 *A & A* 423, 761

- 9) *The Large Binocular Camera Image Simulator*
A. Grazian, A. Fontana, C. De Santis, S. Gallozzi, E. Giallongo and F. Di Pangrazio
 2004 *Publ. Astron. Soc. Pac.* 116, 750

- 10) *Multiwavelength chase of GRB 031220 afterglow*
 A. Melandri, B. Gendre, L. A. Antonelli, **A. Grazian**, A. de Ugarte Postigo, J. Gorosabel, L. Piro, G. Kosugi, N. Kaway
 2005 *Il Nuovo Cimento* 28, 537

- 11) *GRB 050904 at redshift 6.3: observations of the oldest cosmic explosion after the Big Bang*
 G. Tagliaferri, L. A. Antonelli, G. Chincarini, A. Fernandez-Soto, D. Male-sani, M. Della Valle, P. D'Avanzo, **A. Grazian**, V. Testa, S. Campana, S. Covino, F. Fiore, L. Stella, et al.
 2005 *A & A Letter* 443, 1

- 12) *The GOODS-MUSIC sample: a multicolour catalog of near-IR selected galaxies in the GOODS-South field*
A. Grazian, A. Fontana, C. de Santis, M. Nonino, S. Salimbeni, E. Gial-longo, S. Cristiani, S. Gallozzi, E. Vanzella
 2006 *A & A* 449, 951

- 13) *Multi-wavelength analysis of the field of the dark burst GRB 031220*
 A. Melandri, B. Gendre, L. A. Antonelli, **A. Grazian**, A. de Ugarte Postigo, J. Gorosabel, L. Piro, G. Kosugi, N. Kawai, M. de Pasquale, G. P. Garmire
 2006 *A & A* 451, 27

- 14) *The clustering evolution of distant red galaxies in the GOODS-MUSIC sample*
A. Grazian, A. Fontana, L. Moscardini, S. Salimbeni, N. Menci, E. Gial-longo, C. de Santis, S. Gallozzi, M. Nonino, S. Cristiani, E. Vanzella
 2006 *A & A* 453, 507

- 15) *The great observatories origins deep survey. VLT/FORS2 spectroscopy in the GOODS-South Field: Part II*
 E. Vanzella, S. Cristiani, M. Dickinson, H. Kuntschner, M. Nonino, A. Ret-tura, P. Rosati, J. Vernet, C. Cesarsky, H. C. Ferguson, R. A. E. Fosbury, M. Giavalisco, **A. Grazian**, J. Haase, L. A. Moustakas, P. Popesso, A. Renzini, D. Stern
 2006 *A & A* 454, 423

- 16) *The Abundance of Distant and Extremely Red Galaxies: The Role of AGN Feedback in Hierarchical Models*
 N. Menci, A. Fontana, E. Giallongo, **A. Grazian**, S. Salimbeni

- 17) *The XMM-Newton survey of the ELAIS-S1 field. I: Number counts, angular correlation function and X-ray spectral properties*
S. Puccetti, F. Fiore, V. D'Elia, I. Pillitteri, C. Feruglio, **A. Grazian**, M. Brusa, P. Ciliegi, A. Comastri, C. Gruppioni, M. Mignoli, C. Vignali, G. Zamorani, F. La Franca, N. Sacchi, A. Franceschini, S. Berta, H. Buttery, J.E. Dias
2006 *A&A* 457, 501

- 18) *The Galaxy Mass Function up to $z=4$ in the GOODS-MUSIC sample: into the epoch of formation of massive galaxies*
A. Fontana, S. Salimbeni, **A. Grazian**, E. Giallongo, L. Pentericci, M. Nonino, F. Fontanot, N. Menci, P. Monaco, S. Cristiani, E. Vanzella, C. De Santis, S. Gallozzi
2006 *A & A* 459, 745

- 19) *The Luminosity Function of high-redshift QSOs - A combined analysis of GOODS and SDSS*
F. Fontanot, S. Cristiani, P. Monaco, M. Nonino, E. Vanzella, W.N. Brandt, **A. Grazian**, J. Mao
2007 *A & A* 461, 39

- 20) *ConvPhot: A Profile-Matching Algorithm for Precision Photometry*
C. De Santis, **A. Grazian**, A. Fontana, P. Santini
2007 *New Astronomy* 12, 271

- 21) *A comparison of LBGs, DRGs, and BzK galaxies: their contribution to the stellar mass density in the GOODS-MUSIC sample*
A. Grazian, S. Salimbeni, L. Pentericci, A. Fontana, M. Nonino, E. Vanzella, S. Cristiani, C. De Santis, S. Gallozzi, E. Giallongo, P. Santini
2007 *A & A* 465, 393

- 22) *Physical properties of $z \sim 4$ LBGs: differences between galaxies with and without Ly-alpha emission*
L. Pentericci, **A. Grazian**, A. Fontana, S. Salimbeni, P. Santini, C. De Santis, S. Gallozzi, E. Giallongo
2007 *A & A* 471, 433

- 23) *Black Hole Masses and Eddington Ratios of AGNs at $z \leq 1$: Evidence of Retriggering for a Representative Sample of X-Ray-selected AGNs*
L. Ballo, S. Cristiani, G. Fasano, F. Fontanot, P. Monaco, M. Nonino, E. Pignatelli, P. Tozzi, E. Vanzella, A. Fontana, E. Giallongo, **A. Grazian**, L. Danese
2007 *ApJ* 667, 97

- 24) *A Photometrically Detected Forming Cluster of Galaxies at Redshift 1.6 in the GOODS Field*
 M. Castellano, S. Salimbeni, D. Trevese, **A. Grazian**, L. Pentericci, F. Fiore, A. Fontana, E. Giallongo, P. Santini, S. Cristiani, M. Nonino, E. Vanzella
 2007 *ApJ* 671, 1497
- 25) *Reproducing the assembly of massive galaxies within the hierarchical cosmogony*
 F. Fontanot, P. Monaco, L. Silva, **A. Grazian**
 2007 *Mont. Not. R. Astr. Soc.* 382, 903
- 26) *A near-ultraviolet view of the Inner Region of M31 with the Large Binocular Telescope*
 G. Beccari, M. Bellazzini, G. Clementini, L. Federici, F. Fusi Pecci, S. Galletti, P. Montegriffo, E. Giallongo, R. Ragazzoni, **A. Grazian**, A. Baruffolo, C. De Santis, E. Diolaiti, A. Di Paola, J. Farinato, A. Fontana, S. Gallozzi, F. Gasparo, G. Gentile, R. Green, J. Hill, O. Kuhn, N. Menci, F. Pedichini, F. Pasian, R. Smareglia, R. Speziali, V. Testa, D. Thompson, E. Vernet, R. M. Wagner
 2007 *A & A Letter* 476, 193
- 27) *The red and blue galaxy populations in the GOODS field: evidence for an excess of red dwarfs*
 S. Salimbeni, E. Giallongo, N. Menci, M. Castellano, **A. Grazian**, L. Pentericci, D. Trevese, S. Cristiani, M. Nonino, E. Vanzella
 2008 *A & A* 477, 763
- 28) *The great observatories origins deep survey. VLT/FORS2 spectroscopy in the GOODS-South field: Part III*
 E. Vanzella, S. Cristiani, M. Dickinson, M. Giavalisco, H. Kuntschner, J. Haase, M. Nonino, P. Rosati, C. Cesarsky, H. C. Ferguson, R.A.E. Fosbury, **A. Grazian**, L. A. Moustakas, A. Rettura, P. Popesso, A. Renzini, D. Stern
 2008 *A & A* 478, 83
- 29) *Unveiling obscured accretion in the Chandra Deep Field South*
 F. Fiore, **A. Grazian**, P. Santini, S. Puccetti, M. Brusa, C. Feruglio, A. Fontana, E. Giallongo, A. Comastri, C. Gruppioni
 2008 *ApJ* 672, 94
- 30) *A deep Large Binocular Telescope view of the Canes Venatici I dwarf galaxy*
 N. F. Martin, M. G. Coleman, J.T. A. De Jong, H-W. Rix, E. F. Bell, D. J. Sand, J. M. Hill, C. S. Kochanek, D. Thompson, V. Burwitz, E. Giallongo, R. Ragazzoni, E. Diolaiti, F. Gasparo, **A. Grazian**, F. Pedichini,

- 31) *Realistic simulations of gravitational lensing by galaxy clusters: extracting arc parameters from mock DUNE images*
M. Meneghetti, P. Melchior, **A. Grazian**, G. De Lucia, K. Dolag, M. Bartelmann, C. Heymans, L. Moscardini, M. Radovich
2008 *A & A* 482, 403

- 32) *The performance of the blue prime focus Large Binocular Camera at the Large Binocular Telescope*
E. Giallongo, R. Ragazzoni, **A. Grazian**, A. Baruffolo, G. Beccari, C. De Santis, E. Diolaiti, A. Di Paola, J. Farinato, A. Fontana, S. Gallozzi, F. Gasparo, G. Gentile, R. Green, J. Hill, O. Kuhn, F. Pasian, F. Pedichini, M. Radovich, P. Salinari, R. Smareglia, R. Speziali, V. Testa, D. Thompson, E. Vernet, R. M. Wagner
2008 *A & A* 482, 349

- 33) *Cosmic dynamics in the era of Extremely Large Telescopes*
J. Liske, **A. Grazian**, E. Vanzella, M. Dessauges, M. Viel, L. Pasquini, M. Haehnelt, S. Cristiani, F. Pepe, G. Avila, P. Bonifacio, F. Bouchy, H. Dekker, B. Delabre, S. D'Odorico, V. D'Odorico, S. Levshakov, C. Lovis, M. Mayor, P. Molaro, L. Moscardini, M.T. Murphy, D. Queloz, P. Shaver, S. Udry, T. Wiklind, S. Zucker
2008 MNRAS 386, 1192

- 34) *The Blue Straggler population in the globular cluster M53 (NGC5024): a combined HST, LBT, CFHT study*
G. Beccari, B. Lanzoni, F.R. Ferraro, L. Pulone, M. Bellazzini, F. Fusi Pecci, R.T. Rood, E. Giallongo, R. Ragazzoni, **A. Grazian**, A. Baruffolo, N. Bouche, P. Buschkamp, C. De Santis, E. Diolaiti, A. Di Paola, J. Farinato, A. Fontana, S. Gallozzi, F. Gasparo, G. Gentile, F. Pasian, F. Pedichini, R. Smareglia, R. Speziali, V. Testa, E. Vernet
2008 ApJ 679, 712

- 35) *AMAZE. I. The evolution of the mass-metallicity relation at $z \geq 3$*
R. Maiolino, T. Nagao, **A. Grazian**, F. Cocchia, A. Marconi, F. Mannucci, A. Cimatti, A. Pipino, S. Ballero, F. Calura, C. Chiappini, A. Fontana, G.L. Granato, F. Matteucci, G. Pastorini, L. Pentericci, G. Risaliti, M. Salvati, L. Silva
2008 *A & A* 488, 463

- 36) *The physical properties of Ly- α emitting galaxies: not just primeval galaxies?*
L. Pentericci, **A. Grazian**, A. Fontana, M. Castellano, E. Giallongo, S. Salimbeni, P. Santini

- 37) *The Fraction of Quiescent Massive Galaxies in the Early Universe*
A. Fontana, P. Santini, **A. Grazian**, L. Pentericci, F. Fiore, M. Castellano,
E. Giallongo, N. Menci, S. Salimbeni, S. Cristiani, M. Nonino, E. Vanzella
2009 *A & A* accepted, arXiv:0901.2898

- 38) *The optical afterglows and host galaxies of three short/hard gamma-ray bursts*
P. D'Avanzo, D. Malesani, S. Covino, S. Piranomonte, **A. Grazian**, D.
Fugazza, R. Margutti, V. D'Elia, L. A. Antonelli, S. Campana, G. Chincarini,
M. Della Valle, F. Fiore, P. Goldoni, J. Mao, R. Perna, R. Salvaterra,
L. Stella, G. Stratta, G. Tagliaferri
2009 *A & A* accepted, arXiv:0901.4038

SCIENTIFIC ACTIVITY AND RESEARCH INTERESTS

The research I am currently pursuing concentrates on three main areas:

1. Physical properties of high redshift galaxies

The main activity conducted at the Astronomical Observatory of Rome is dealing with the use of public data archive of the GOODS Survey (Great Observatory Origin Deep Survey, PI Mark Dickinson) to study in detail the physical properties of high redshift galaxies. To this aim I have used the multicolour catalog GOODS-MUSIC (Grazian et al. 2006), with extended photometric information from the U to the $8\mu\text{m}$ bands in a relatively large area of the sky (140 sq. arcmin.). I have derived from the available multicolor photometry the physical quantities such as stellar mass, star formation, extinction and age derived through a standard SED fitting technique with stellar population synthesis models of Bruzual & Charlot (2003), Maraston (2005) and Charlot & Bruzual (2007). This catalog has been used for several scientific applications:

- The contribution of different types of galaxies (LBGs, DRGs and BzK) to the stellar mass density till $z \sim 3$ (Grazian et al. 2007).
- The comparison between Lyman Break Galaxies and Lyman- α emitters at $z \sim 4$ (Pentericci et al. 2007).
- The BH masses in AGNs at $z \sim 1$ (Ballo et al. 2007).
- The detail study of a candidate galaxy cluster at $z = 1.61$ in the GOODS-South region (Castellano et al. 2007).
- The detailed comparison of the properties of massive galaxies with the current hierarchical clustering models till $z \sim 3$ (Fontanot et al. 2007).
- The colour bimodality till $z \sim 2$ and the Luminosity Function of blue and red galaxies down to faint magnitude limits (Salimbeni et al. 2008).
- The properties of type II AGNs at $z \sim 2$ selected by medium IR imaging at $24 \mu\text{m}$ in the GOODS-South area (Fiore et al. 2008).

Currently we are using the GOODS-MUSIC dataset to study in detail the large scale structures in the GOODS-South region and derive the influence of environment to the star formation history of galaxies at $z \leq 3$ (Salimbeni et al. in preparation). The medium IR imaging at $24 \mu\text{m}$ in the GOODS-South area is important to study the obscured star formation rate in galaxies at $z \sim 1 - 3$ (Santini et al. in preparation), and to constrain the number density of passive galaxies at these redshifts (Fontana et al. A& A, submitted).

The Lyman Break Galaxies at $z \geq 3$ in the GOODS region have been also used to derive the mass-metallicity relation at high- z , with deep NIR spectroscopy with SINFONI at VLT during the AMAZE Large Program (PI Maiolino). A comparison of the mass metallicity relation with existing data at lower redshifts indicates that at $z \sim 3$ we are witnessing a “Chemical Downsizing”, i.e. a more rapid chemical enrichment for more massive galaxies (Maiolino et al. A& A, accepted).

The GOODS-South area has been imaged with deep Y band ($\sim 1\mu\text{m}$) observations of the new VLT instrument HAWK-I to search for “Z dropout” galaxies at $z \sim 7$ (PI Fontana): the relatively large area of this survey (200 sq. arcmin.) will allow us to reduce the cosmic variance uncertainties affecting current deep surveys limited to only 10-20 sq. arcmin. and derive the luminosity function of LBGs at $z \sim 7$ and their contribution to the reionization of the Universe.

In addition, I have used deep U band imaging by the Large Binocular Camera (LBC) installed at the Large Binocular Telescope (LBT) to study the faint LBG population at $z \sim 3$ and the number counts in the U band at faint magnitude limits, $U \sim 27(AB)$, in large areas (600 sq. arcmin.) to limit the effects of cosmic variance and to compare the results of the observations with the theoretical models (Giallongo et al. 2008; Grazian et al. in preparation). Deep imaging data (UGRIZ) from LBC in the COSMOS region have been reduced and will be used to systematically study the LBG population at $z \sim 3 - 6$.

2. QSO Surveys at low and high redshifts

I have conducted a very wide ($\sim 10^4 \text{deg}^2$) survey of ~ 1000 low redshift ($z \leq 0.3$) AGNs using bright X-ray and optical catalogs (Rosat All Sky Survey, Guide Star Catalog, US Naval Observatory Catalog, Digitized Sky Survey). With this survey I have extensively studied the statistical properties of low- z QSOs, comparing in particular their Luminosity Function and Two Point Correlation Function with those at higher redshifts ($z \leq 2$). A number of issues have thus been investigated, including the lifetime of the active phase (duty cycle), the mass of central Super Massive Black Holes, the mass of the Dark Matter Halos hosting the AGN and the efficiency in converting accreted matter into radiation.

To extend the redshift interval, I start a survey of $z \sim 4$ QSOs, in the GOODS fields and using data from the ESO Archive. The number densities and luminosity functions of faint QSOs at $3.5 \leq z \leq 5.2$ are derived, and a larger sample has been assembling with the aim of study the clustering properties of high- z QSOs. The paucity of faint QSOs, compared with the relatively high number density of bright QSOs found by SDSS at $z \sim 4$ indicates that a suppression of structure formation in small dark matter halos can be in place at high redshifts.

3. Cosmic Dynamics: the expansion rate of the Universe

The idea of detecting and measuring directly the expansion rate of the Universe is an old dream. A seminal idea of Sandage (1962) was developed and reconsidered recently. The feasibility study for a super-stable high resolution spectrograph (COsmic Dynamic Experiment, CODEX) to be fed by the future ESO-ELT 42m telescope has been started. Within the activity of the CODEX Team, we try to demonstrate that not only the effect is measurable but also within the reach of the observational possibilities and instrumental capabilities of the next generation of giant ELT telescopes (Liske, Grazian et al. 2008).

TECHNICAL AND OBSERVATIONAL EXPERIENCE

Observational experience: Experience with optical observations with the following telescopes: 1.2m, 1.8m in Asiago - Italy; 3.5m TNG Galileo - Canary Island; 1.5m Danish, 2.2m ESO-MPG, NTT in La Silla - Chile; LBT at Mt Graham, Arizona.

Computer skills: Working environments: UNIX/LINUX, and Windows. Good knowledge of FORTRAN programming. Expert in handling of data (astronomical and not) with the following software packages: MIDAS (software for data analysis, visualization, table handling and application development); IRAF (image reduction and analysis facility, a software for handling optical and near-IR astronomical data); SM (Supermongo, a software for data analysis, visualization and scientific plotting).

Language skills: Italian: native language - English: fluent - German: basic.

Miscellaneous: I have experience in writing proposals for optical and IR telescopes; I have been PI and Co-I of successful proposals for ESO La Silla, ESO VLT, NOAO, Canary Island, LBT and Asiago telescopes.

I have supervised research projects carried out by senior undergraduates and young PhD students of the Astronomical Observatory of Monte Porzio (Rome). I am currently involved in the CODEX Team, to study the feasibility of a high-resolution spectrograph for the ESO-ELT 42m telescope.

I have served on the organizing committee of the workshop “AGN and Galaxy Evolution”, held in the Specola Vaticana Castel Gandolfo, Italy, October 2005.

I have been a referee for the Astrophysical Journal.