

# Michele Fumagalli

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## Scientific Interests

Gas accretion and galaxy formation, absorption line systems, physics of the interstellar medium, star formation, stellar initial mass function, blazar redshifts.

## Academic History

- 2014 **Lecturer**, *Durham University*.
- 2013 **Postdoctoral Fellow**, *Carnegie Observatories, Princeton University*.
- 2012 **Ph.D. in astrophysics**, *University of California, Santa Cruz*.
- 2010 **Master in astrophysics**, *University of California, Santa Cruz*.
- 2008 **Laurea specialistica (MSc)**, *Milano Bicocca University*, 110/110 with highest honor.
- 2006 **Laurea triennale (BSc)**, *Milano Bicocca University*, 110/110 with highest honor.

## Awards and Fellowships

- 2015 **Fellow of the Higher Education Academy**.
- 2014-2015 **Carnegie Visiting Associate**, *Carnegie Observatories*.  
Visiting fellowship at Carnegie Observatories.
- 2012 **Lyman Spitzer Fellowship**, *Princeton University*.  
Postdoctoral fellowship in theoretical astrophysics.
- 2012 **Carnegie-Princeton Fellowship**, *Carnegie Observatories, Princeton University*.  
Postdoctoral fellowship in observational astrophysics.
- 2012 **Hubble Fellowship**, *Carnegie Observatories*.  
Awarded to highly qualified recent postdoctoral scientists to conduct independent research.
- 2012 **CfA Fellowship**, (declined), *The Harvard-Smithsonian Center for Astrophysics*.  
Awarded to an outstanding researcher displaying significant promise in theory or observation.
- 2012 **Miller Research Fellowship**, (declined), *University of California, Berkeley*.  
Awarded to exceptional young scientists of great promise.
- 2011 **Price Prize in Cosmology and AstroParticle Physics**, *CCAPP, Ohio State University*.  
Awarded in recognition of research excellence in cosmology and astro-particle physics.
- 2011 **Chancellor's Dissertation Year Fellowship**, *UCSC*.  
Awarded based on the academic achievement of the nominee.
- 2010 **Whitford Prize**, *Department of Astronomy, UCSC*.  
Awarded for outstanding performance during the first and second years.

- 2008 **Regents' fellowship**, UCSC.  
Awarded to promising first-year graduate students.

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## Grant History

- 2016 **Astrophysics Data Analysis Program**, KODIAQ Z: Undead Metals in the Circumgalactic Medium, (co-I).  
2015 **NASA grant**, HST-GO-14127, (sci-PI).  
2014 **NASA grant**, HST-GO-13651, (co-I).  
2013 **NASA grant**, HST-GO-13364, (co-I).  
2013 **NASA grant**, HST-GO-13300, (co-I).  
2013 **NASA grant**, HST-GO-13288, (co-I).  
2013 **Archival Researcher Program**, grant HST-AR-13275-A, (co-I).  
2013 **Archival Researcher Program**, grant HST-AR-13256-A, (co-I).  
2012 **NASA Hubble Fellowship**, grant HF-51305.01-A, (PI).  
2011 **NASA grant**, HST-GO-12863, (co-I).  
2010 **NASA grant**, HST-GO-12555, (co-I).  
2010 **HIPACC grant**, University California, (PI).

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## Talks and Seminars

- Mar., 2016 **Astronomy Seminar**, *Stockholm University*, invited.  
Gas flows as fuel for star formation: a spotlight on strong absorption line systems
- Sep., 2015 **Astronomy Seminar**, *INAF/Trieste*, invited.  
Gas flows as fuel for star formation: a spotlight on strong absorption line systems
- Jun., 2015 **IGM@50**, *INAF/Firenze*, invited.  
Probing gas flows near galaxies: a spotlight on Lyman Limit Systems
- Jun., 2014 **Intergalactic Matters**, *MPIA, Heidelberg*, invited.  
A shot in the dark: the star formation rates of DLAs at  $z \sim 2 - 3$
- Apr., 2014 **Colorful galaxies: a conference for Peppo Gavazzi's birthday**, *Como, Italy*, invited.  
Can we use  $H\alpha$  to trace star formation rates?
- Apr., 2014 **Exploiting VST ATLAS... and its sister surveys**, *Durham University*, invited.  
ATLAS search for Lyman Limit Systems in quasar pairs.
- Mar., 2014 **Astronomy Friday Lunch Talks**, *Durham University*.  
Stochastically Lighting Up Galaxies: the importance of stochastic effects in stellar population synthesis.
- Jan., 2014 **DEX meeting**, *Durham University*.  
Investigations on the gaseous environment of distant galaxies.
- Dec., 2013 **TAPIR seminar**, *Caltech*, invited.  
Investigations on the gaseous environment of distant galaxies.
- Oct., 2013 **Metal Production and Distribution in a Hierarchical Universe**, *Rencontres de l'Observatoire de Paris 2013 - ESO Workshop*, invited review.  
IGM abundances in the high-redshift universe.
- Aug., 2013 **Santa Cruz Galaxy Workshop**, *UCSC*.  
Lyman limit systems and the circumgalactic medium at  $z \sim 2 - 3$ .
- Jun., 2013 **Intergalactic Interactions**, *Higgs Centre, Edinburgh*, invited.  
Lyman limit systems and the circumgalactic medium at  $z \sim 2 - 3$ .

- Jun., 2013 **ENIGMA workshop**, *MPIA*, invited.  
Lyman limit systems and the circumgalactic medium at  $z \sim 2 - 3$ .
- Apr., 2013 **Lunch Talk**, *Carnegie Observatories*.  
Beyond the disk: The role of halo gas in galaxy formation.
- Mar., 2013 **Hubble Fellows Symposium**, *STScI, Baltimore*.  
Optically-thick hydrogen in the  $z=3$  universe
- Dec., 2012 **University of Milano-Bicocca**, *Milan*, invited.  
The gaseous environment of distant galaxies
- Nov., 2012 **UT Astronomy Colloquium**, *Austin*, invited.  
The gaseous environment of distant galaxies
- Sep., 2012 **Keck Science Meeting**, *San Diego*.  
Pristine gas two billion years after the Big Bang
- Jun., 2012 **Metals in Tuscany**, *INAF/Firenze*, invited.  
Pristine gas two billion years after the Big Bang
- May., 2012 **Price Prize lecture**, *CCAPP Ohio State University*, invited.  
Cosmology with absorption line systems
- Apr., 2012 **Astronomy Colloquium**, *Osservatorio Astronomico di Brera*, invited.  
Cosmology with absorption line systems
- Mar., 2012 **Turbulence in Cosmic Structure Formation**, *Arizona State University*.  
Detection of pristine gas two billion years after the Big Bang
- Jan., 2012 **DARK Cake Meeting**, *DARK Cosmology Centre*.  
Detecting cold accretion and metal poor gas around galaxies
- Jan., 2012 **219th AAS Meeting**, *Austin, TX*.  
Exploring the gas cycle in high-redshift galaxies: a joint effort of theory and observations
- Dec., 2011 **Theory meeting of the Galaxy and Cosmology group**, *MPIA Heidelberg*.  
Probing inflow in high-redshift galaxies
- Oct., 2011 **Theoretical Astrophysics Center seminar**, *UC Berkeley*, invited.  
Exploring the gas cycle in high-redshift galaxies: a joint effort of theory and observations
- Oct., 2011 **Lunch Talk**, *Carnegie Observatories*.  
Exploring the gas cycle in high-redshift galaxies: a joint effort of theory and observations
- Oct., 2011 **Astronomy Tea Talk**, *Caltech*.  
Exploring the gas cycle in high-redshift galaxies: a joint effort of theory and observations
- Aug., 2011 **Santa Cruz galaxy workshop**, *Santa Cruz*.  
Cold streams and primordial gas at high redshift
- Jul., 2011 **Celebrating the career of A. Wolfe**, *Schloss Ringberg*, invited.  
Detecting cold streams with absorption line systems
- Jul., 2011 **MPIA**, *Heidelberg*.  
Stochastic star formation and IMF (non) variation
- Jun., 2011 **Odyssey of cosmic baryons**, *Marseille*.  
Detecting cold streams with absorption line systems
- Jun., 2011 **Gas in galaxies**, *Kloster Seeon, Germany*.  
Detecting cold streams with absorption line systems
- Dec., 2010 **CASS, UCSD**, *San Diego*.  
Gas in and around galaxies
- Aug., 2010 **Santa Cruz galaxy workshop**, *Santa Cruz*.  
Gas in simulations of  $z > 2$  galaxies
- May, 2010 **Como+Milano+Heidelberg+Marseille**.  
Images and simulations to connect gas and stars in  $z > 2$  galaxies

- Apr., 2010 **UCSC, Santa Cruz.**  
Hunting gas and stars in galaxies across the Universe
- Aug., 2009 **Santa Cruz Galaxy Workshop, Santa Cruz.**  
A shot in the dark: probing galaxies giving rise to DLAs at  $z > 2$
- Aug., 2009 **UCSC Friday Lunch Talk, Santa Cruz.**  
Molecular gas deficiency in HI poor galaxies
- Jun., 2009 **University of Chicago, Chicago.**  
A shot in the dark: imaging of DLAs
- Mar., 2009 **Università dell'Insubria, Como, Italy.**  
Star formation  $z = 0 - 3$
- Dec., 2008 **CASS, UCSD, San Diego.**  
The star formation rate and gas content in local spiral galaxies
- Jul., 2008 **Università di Milano-Bicocca, Milano, Italy.**  
The relationship between gas content and star formation rate in spiral galaxies

## Proposal History (PI)

- 2016 WHT; 12 nights, 2016A.
- 2016 ESO/VLT; 106 hours, P97-100 (LP).
- 2015 WHT; 9 nights, 2015B.
- 2015 ESO/VLT; 9 hours, P96.
- 2015 Hubble Space Telescope; 55 orbits, cycle 23.
- 2014 ESO/VLT; 28 hours, P95.
- 2014 ESO/VLT; 5 hours, P94.
- 2014 Gemini-S Telescope; 30 hours, 2014A.
- 2014 Magellan Telescope; 4 nights, 2014A.
- 2013 Magellan Telescope; 5 nights, 2013B.
- 2013 Keck Telescope; 1 night, 2013B.
- 2012 Keck Telescope; 1 night, 2013A.
- 2012 Magellan Telescope; 4 nights, 2013A.
- 2012 Magellan Telescope; 4 nights, 2012B.
- 2011 IRAM 30m Telescope; 64 hours, 2011B.

## Teaching and Advising

- 2016 PHYS1101: Discovery Skills in Physics, Durham.
  - 2015 PHYS1081: Introduction to Astronomy, Durham.
  - 2015 PHYS1101: Discovery Skills in Physics, Durham.
  - 2014 PHYS1081: Introduction to Astronomy, Durham.
  - 2014 PHYS1101: Discovery Skills in Physics, Durham.
  - 2009 Ay2: Overview of the Universe, UCSC.
- PhD Students    Mr. Greg Ashworth (2014), Durham University.  
                      Mr. Ruari Mackenzie (2014), Durham University.

Ms. Stephanie Bartle (2014), Durham University.

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## Membership and Activities

- 2012- Peer reviewer, Astrophysical Journal
- 2012- Peer reviewer, Monthly Notices of the Royal Astronomical Society
- 2012- Peer reviewer, Astronomy and Astrophysics
- 2011-2012 Graduate Student Mentor, UCSC Astronomy & Astrophysics Department
- 2011-2015 Member, European Physical Society
- 2011-2012 Member, American Astronomical Society
- 2008-2015 Member, Società Italiana di Fisica

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## Refereed publications

1. Consolandi, G., Gavazzi, G., **Fumagalli, M.** et al. 2016, A&A in press. *Robust automatic photometry of local galaxies from SDSS. Dissecting the color magnitude relation with color profiles.*
2. Boselli, A. et al. 2016, A&A in press (arXiv:1601.04978). *Spectacular tails of ionised gas in the Virgo cluster galaxy NGC 4569*
3. Grasha, K. et al. 2015, ApJ, 815, 93. *The Spatial Distribution of the Young Stellar Clusters in the Star Forming Galaxy NGC 628.*
4. **Fumagalli, M.**, O'Meara, J.M., Prochaska, J.X. 2016, MNRAS, 455, 4100. *The physical properties of  $z > 2$  Lyman limit systems: new constraints for feedback and accretion models.*
5. Fossati, M., **Fumagalli, M.**, Boselli, A. et al. 2016, MNRAS, 455, 2028. *MUSE sneaks a peek at extreme ram-pressure stripping events. II. The physical properties of the gas tail of ESO137-001.*
6. Farina, E., **Fumagalli, M.**, Decarli, R. et al. 2016, MNRAS, 455, 618. *The Cluster-Scale Environment of PKS 2155-304.*
7. Krumholz, M. R., Adamo, A., **Fumagalli, M.**, et al. 2015, ApJ, 812, 147. *Star Cluster Properties in Two LEGUS Galaxies Computed with Stochastic Stellar Population Synthesis Models.*
8. Calzetti, D. et al. 2015, ApJ, 811, 75. *The Brightest Young Star Clusters in NGC 5253.*
9. Prochaska, J.X. et al. 2015, ApJS, 221, 2. *The Keck+Magellan Survey for Lyman Limit Absorption III: Sample Definition and Column Density Measurements.*
10. Crighton, N. et al. 2015, MNRAS, 452, 217. *The Neutral Hydrogen Cosmological Mass Density at  $z = 5$ .*
11. Krumholz, M., **Fumagalli, M.**, da Silva, R., Rendahl, T., Parra, J. 2015, MNRAS, 452, 1447. *SLUG – Stochastically Lighting Up Galaxies. III: A Suite of Tools for Simulated Photometry, Spectroscopy, and Bayesian Inference with Stochastic Stellar Populations.*
12. Gavazzi, G. et al. 2015, A&A, 580, 116. *Halp3: an H $\alpha$  imaging survey of HI selected galaxies from ALFALFA . VI. The role of bars in quenching star formation from  $z = 3$  to the present epoch.*

13. Carnall, A. C. et al. 2015, MNRAS, 451, 16. *Two bright  $z > 6$  quasars from VST ATLAS and a new method of optical plus mid-infra-red colour selection.*
14. Cucchiara, A., **Fumagalli, M.**, Rafelski, M., Kocevski, D., Prochaska, J.X., Cooke, R.J., Becker, G.D. 2015, ApJ, 804, 51. *Unveiling the Secrets of Metallicity and Massive Star Formation Using DLAs along Gamma-ray Bursts.*
15. Gavazzi, G. et al. 2015, A&A, 576, 16. *Halpa3: an Halpa imaging survey of HI selected galaxies from ALFALFA . V. The Coma supercluster survey completion.*
16. Calzetti, D. et al. 2015, AJ, 149, 51. *Legacy ExtraGalactic UV Survey (LEGUS) with The Hubble Space Telescope. I. Survey Description.*
17. **Fumagalli, M.**, O'Meara, J.M., Prochaska, J.X., Rafelski, M., Kanekar, N. 2015, MNRAS, 446, 3178. *Directly imaging damped Ly $\alpha$  galaxies at  $z > 2$ . III: The star formation rates of neutral gas reservoirs at  $z \sim 2.7$ .*
18. Crighton, N. et al. 2015, MNRAS, 446, 18. *Metal-enriched, sub-kiloparsec gas clumps in the circumgalactic medium of a faint  $z = 2.5$  galaxy.*
19. **Fumagalli, M.**, Fossati, M., Hau, G. et al. 2014, MNRAS, 445, 4335. *MUSE sneaks a peek at extreme ram-pressure stripping events. I. A kinematic study of the archetypal galaxy ESO137-001.*
20. Aliu, E. et al. 2014, ApJ, 797, 89. *Investigating Broadband Variability of the TeV Blazar 1ES 1959+650.*
21. Boselli, A. et al. 2014, A&A, 570, 69. *The GALEX Ultraviolet Virgo Cluster Survey (GUViCS). IV: The role of the cluster environment on galaxy evolution*
22. Worseck, G. et al. 2014, MNRAS, 445, 1745. *The Giant Gemini GMOS survey of  $z > 4.4$  quasars. I: Measuring the mean free path across cosmic time.*
23. da Silva, R.L., **Fumagalli, M.**, Krumholz, M. 2014, MNRAS, 444, 3275. *SLUG - Stochastically Lighting Up Galaxies. II: Quantifying the Effects of Stochasticity on Star Formation Rate Indicators.*
24. **Fumagalli, M.**, O'Meara, J.M., Prochaska, J.X., Kanekar, N., Wolfe, A. 2014, MNRAS, 444, 1282. *Directly imaging damped Ly $\alpha$  galaxies at  $z > 2$ . II: Imaging and spectroscopic observations of 32 quasar fields.*
25. Lusso, E. et al. 2014, MNRAS, 441, 316. *The nature of massive black hole binary candidates: II. Spectral energy distribution atlas.*
26. Finn, C. et al. 2014, MNRAS, 440, 3317. *A compact, metal-rich, kpc-scale outflow in FBQS J0209-0438: Detailed diagnostics from HST/COS extreme UV observations.*
27. da Silva, R.L., Krumholz, M., **Fumagalli, M.**, Fall, M. 2014, MNRAS, 438, 2355. *An Analytic Method to Compute Star Cluster Luminosity Statistics.*
28. Wright, E. et al., 2014, AJ, 147, 61. *The First AllWISE Proper Motion Discovery: WISEA J070720.50+170532.7.*
29. Rafelski, M., Neeleman, M., **Fumagalli, M.**, Wolfe, A.M., Prochaska, J.X. 2014, ApJL, 782, 29. *The Rapid Decline in Metallicity of Damped Ly- $\alpha$  Systems at  $z \sim 5$ .*
30. Prochaska, J.X., Madau, P., O'Meara, J.M., **Fumagalli, M.** 2014, MNRAS, 438, 476. *Towards a Unified Description of the Intergalactic Medium at Redshift  $z \sim 2.5$ .*
31. **Fumagalli, M.**, Hennawi, J., Prochaska, J.X., Kasen, D., Dekel, A., Ceverino, D., Primack, J. 2014, ApJ, 780, 74. *Confronting Simulations of Optically Thick Gas in Massive Halos with Observations at  $z = 2 - 3$ .*

32. VERITAS collaboration et al., 2013, ApJ, 779, 92. *Long term observations of B2 1215+30 with VERITAS.*
33. **Fumagalli, M.**, O'Meara, J.M., Prochaska, J.X., Worseck, G. 2013, ApJ, 775, 78. *Dissecting the properties of optically-thick hydrogen at the peak of cosmic star formation history.*
34. Decarli, R., Dotti, M., **Fumagalli, M.**, et al. 2013, MNRAS, 433, 1492. *The nature of massive black hole binary candidates: I. Spectral properties and evolution.*
35. Furniss, A., **Fumagalli, M.**, Falcone, A., Williams, D. A. 2013, ApJ, 770, 109. *The Blazar Emission Environment: Insight from Soft X-ray Absorption.*
36. Furniss, A. et al. 2013, ApJ, 768, L31. *The Firm Redshift Lower Limit of the Most Distant TeV-Detected Blazar PKS 1424+240.*
37. Fossati, M. et al. 2013, A&A, 553, 91. *Halpa3: an Halpa imaging survey of HI selected galaxies from ALFALFA. IV. The structure of galaxies in the Local and Coma Superclusters.*
38. Gavazzi, G. et al. 2013, A&A, 553, 90. *Halpa3: an Halpa imaging survey of HI selected galaxies from ALFALFA. III. Nurture shapes up the Hubble sequence in the Great Wall.*
39. Gavazzi, G., **Fumagalli, M.**, Fossati, M. et al. 2013, A&A, 553, 89. *Halpa3: an Halpa imaging survey of HI selected galaxies from ALFALFA. II. The star formation properties of galaxies in the Virgo cluster and surroundings.*
40. Furniss, A., **Fumagalli, M.**, Danforth, C., Williams, D., & Prochaska, X. 2013, ApJ, 766, 35. *On the Redshift of the Very High Energy Blazar 3C66A.*
41. Farina, E., Montuori, C., Decarli, R., **Fumagalli, M.** 2013, MNRAS, 431, 1019. *Caught in the Act: Discovery of a Physical Quasar Triplet.*
42. Aliu, E. et. al 2012, ApJ, 759, 102. *VERITAS Observations of Six Bright, Hard-Spectrum Fermi-LAT Blazars.*
43. **Fumagalli, M.**, Furniss, A., O'Meara, J., Prochaska, X., Williams, D., Farina, E. 2012, A&A, 545, 68. *On the redshift of the blazar PKS0447-439.*
44. Fossati, M., Gavazzi, G., Boselli, A., **Fumagalli, M.** 2012, A&A, 544, A128. *65 kpc of ionized gas trailing behind NGC 4848 during its first crossing of the Coma cluster.*
45. Gavazzi, G., **Fumagalli, M.**, Galardo, V., et al. 2012, A&A, 545, 16. *H $\alpha$ <sup>3</sup>: H $\alpha$  imaging survey of HI selected galaxies from ALFALFA. I. Catalogue in the local supercluster.*
46. **Fumagalli, M.**, Dessauges-Zavadsky, M., Furniss, A., et al. 2012, MNRAS, 424, 2276. *A search of CO emission lines in blazars: the low molecular gas content of BL Lac objects compared to quasars.*
47. Arrigoni Battaia, F. et al. 2012, A&A, 543 A112. *Stripped gas as fuel for newly formed HII regions in the encounter between VCC1249 and M49: a unified picture from NGVS and GUViCS.*
48. da Silva, R.L., **Fumagalli, M.**, & Krumholz, M. 2012, ApJ, 745, 145. *SLUG - Stochastically Lighting Up Galaxies I: Methods and Validating Tests.*
49. **Fumagalli, M.**, O'Meara, J.M., & Prochaska, J.X. 2011, Science, 334, 1245. *Detection of pristine gas two billion years after the Big Bang.*
50. Barth, A. et al. 2011, ApJ, 743, L4. *The Lick AGN monitoring project 2011: reverberation mapping of Markarian 50.*

51. **Fumagalli, M.**, da Silva, R.L., & Krumholz, M. 2011, ApJ, 741, L26. *Stochastic star formation and a (nearly) uniform stellar initial mass function.*
52. Aliu, E. et al. 2011, ApJ, 742, 127. *Multiwavelength Observations of the Previously Unidentified Blazar RX J0648.7+1516.*
53. Cucchiara, A. et al. 2011, ApJ, 743, 154. *Constraining GRB Emission Physics with Extensive Early-Time, Multiband Follow-up.*
54. **Fumagalli, M.**, Prochaska, J.X., Kasen, D., Dekel, A., Ceverino, D., & Primack, J.R. 2011, MNRAS, 418, 1796. *Absorption line systems in simulated galaxies fed by cold streams.*
55. Barth, A. et al. 2011, ApJ, 732, 121. *Broad-line Reverberation in the Kepler-field Seyfert Galaxy Zw 229-015.*
56. Abdo, A.A. et al. 2011, ApJ, 726, 43. *Multi-wavelength Observations of the Flaring Gamma-ray Blazar 3C 66A in 2008 October.*
57. **Fumagalli, M.**, O'Meara, J.M., Prochaska, J.X., & Kanekar, N. 2010, MNRAS, 408, 362. *Directly imaging damped Lyman- $\alpha$  galaxies at  $z > 2$  - I. Methodology and first results.*
58. **Fumagalli, M.**, Krumholz, M.R., & Hunt, L.K. 2010, ApJ, 722, 919. *Testing models for molecular gas formation in galaxies: hydrostatic pressure or gas and dust shielding?*
59. **Fumagalli, M.**, Krumholz, M.R., Prochaska, J.X., Gavazzi, G., & Boselli, A. 2009, ApJ, 697, 1811 *Molecular hydrogen deficiency in HI-poor galaxies and its implications for star formation.*
60. **Fumagalli, M.**, & Gavazzi, G. 2008, A&A, 490, 571. *The relationship between gas content and star formation rate in spiral galaxies. Comparing the local field with the Virgo cluster.*
61. Gavazzi, G. et al. 2008, A&A, 482, 43. *HI content and other structural properties of galaxies in the Virgo cluster from the Arecibo Legacy Fast ALFA Survey.*

## Non-refereed publications

1. **Fumagalli, M.** 2014, MmSAI, 85, 355. *Metal abundances in the high-redshift intergalactic medium.*
2. **Fumagalli, M.** 2012, Ph.D. dissertation, University of California, Santa Cruz. *Food for stars: the role of hydrogen in the formation and evolution of galaxies.*
3. **Fumagalli, M.**, da Silva, R., Krumholz, M., & Bigiel, F. 2011, Astronomical Society of the Pacific Conference Series, 440, 155. *SLUG: A New Way to Stochastically Light Up Galaxies.*
4. **Fumagalli, M.** 2008, MSc thesis, Università Milano-Bicocca. *High resolution multifrequency analysis of gas behavior and star formation in spiral galaxies.*
5. **Fumagalli, M.** 2006, BSc thesis, Università Milano-Bicocca. *Impact of low frequencies measurements on the knowledge of spectral distortions expected for Cosmic Microwave Background Radiation.*