

Helena Domínguez Sánchez

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ICE-Fellow
IEEC-CSIC (Barcelona)
09/2019 - present

Previous Professional Experience

University of Pennsylvania + Observatoire de Paris

09/2016 - 09/2019; Post-doctoral researcher

Universidad Complutense de Madrid

01/2014 - 12/2015; Post-doctoral researcher

Instituto de Astrofísica de Canarias

11/2012 - 09/2013; Post-doctoral researcher

Osservatorio Astronomic di Bologna

01/01/2009 - 04/2012; Ph.D. Fellow

Education

Ph. D. in Astrophysics

04/2012; Osservatorio Astronomico di Bologna + Universidad Complutense de Madrid

M.S. in Astrophysics

09/2007 - 02/2009; Universidad Complutense de Madrid

B.S. in Physics

09/2006 - 09/2007; Universidad Complutense de Madrid

09/2005 - 06/2006; Bristol University (Erasmus grant)

09/2002 - 06/2005; Universidad de Salamanca

Fellowships and awards

Ph.D Research fellowship

01/2009 - 03/2009; Università degli studi di Bologna

International PhD. grant

01/2009 - 12/2011; awarded by Instituto de Astrofísica de Canarias to complete a Ph.D. program at Osservatorio Astronomico di Bologna

Online courses

Machine Learning; Stanford University (2016)

Scale Data Manipulation Systems and Algorithms; Washington University (2016)

Languages

- **Spanish:** native
- **English:** Proficiency in English (Cambridge University, 2002)
- **Italian:** full professional proficiency
- **German:** intermediate, Deutsch Zertifikat (Goethe Institut, 2005)

Conference Participation

Oral contributions

- “*Astro Machine Learning*”; **invited review talk** at XIV Reunión Científica de la Sociedad Española de Astronomía, online, (07/2020)
- “*How to train a supervised deep learning algorithm with no training sample*”; EAS virtual meeting, online (06/2020)
- “*Stellar populations gradients and kinematics of ETGs as revealed by MaNGA*”; EAS virtual meeting, (06/2020)
- “*Stellar populations gradients and kinematics of ETGs as revealed by MaNGA*”; SDSS-V collaboration virtual meeting (06/2020)
- “*Stellar populations of Elliptical Galaxies as revealed by MaNGA*”; SDSS meeting, Ensenada (06/2019)
- “*Implications of Initial Mass Function gradients in Elliptical Galaxies as revealed by MaNGA*”; Birth, life and fate of massive galaxies and their central beating heart, Favignana (09/2018)
- “*MaNGA Deep Learning Morphology VAC: constrains on angular momentum and Initial Mass Function*”; SDSS-IV collaboration meeting, Seul (online, 06/2018)
- “*Transfer of knowledge in Convolutional Neural Networks for morphological classification of galaxies*”; European Week of Astronomy and Space Science, Prague (06/2017)
- “*Galaxy morphologies for the Dark Energy Survey*”; DES Meeting, Chicago (06/2017)
- “*Living la vida loca: how to assemble a massive dead galaxy by $z=1.0-1.5$* ”; European Week of Astronomy and Space Science, Tenerife (06/2015)
- “*Analysis of commonly used SFR indicators for a sample of Far-IR detected galaxies*”; The Unquiet Universe, Cefalù (06/2014)
- “*Comparison of star formation rate from Ha and infrared luminosity as seen by Herschel*”; Panchromatic view of galaxy evolution 30 years after IRAC, Paphos (06/2013)

Organisation contribution

- Mentor of Kavli Summer Program in Astrophysics “*Machine Learning in the era of large astronomical surveys*”; Santa Cruz (08/07-16/08/2019)
- SOC of “*Low Surface Brightness meeting*” at Centre for Computational Astrophysics; New York (03/2019)
- LOC; IAUS 321: “*Formation and Evolution of Galaxy Outskirts*”; Toledo (03/2016)
- Chair of Galaxy and Cosmology session; “*XIII Reunión Científica de la Sociedad Española de Astronomía*”; Salamanca (07/2018)

Poster contributions

- “*Deep Learning for morphological classification of galaxies*”; XIII Reunión Científica de la Sociedad Española de Astronomía, Salamanca (07/2018)
- “*The SFH of read and dead galaxies at $z=1-1.5$* ”; XI Reunión Científica de la Sociedad Española de Astronomía, Teruel (09/2014)
- “*Herschel FIR counterparts of SDSS galaxies*”; The Universe Explored by Herschel, Noorwijk (10/2013)
- “*The evolution of quiescent galaxies at high redshifts*”; Galaxy Formation, Durham (07/2011)
- “*Studying the evolution of massive galaxies at high- z* ”, Challenges in Infrared Extragalactic Astrophysics II; Agios Nikolaos (09/2010)

Participation in Surveys and collaborations

- The Cosmic Evolution Survey (COSMOS, P.I.: P. Capak, since 2009)
- PACS Evolutionary Probe meeting (PEP; P.I.: D. Lutz, since 2009)
- PACS Instrument Control Centre (P.I.: E. Sturm, since 2012)
- Survey for High-z Absorption Red and Dead Sources (SHARDS, P.I.: P. Pérez González, since 2014)
- Mapping Nearby Galaxies at APO (MaNGA, P.I.: K. Bundy, since 2016)
- Dark Energy Survey (DES, international collaboration, since 2017)
- The GaLAXy Cluster Evolution Survey (GLACE, P.I. M. Sánchez Portal)

Visits to international institutions

- **UCM** (Madrid) invited by Prof. A.Gil de Paz (09/2019)
- **CIEMAT**, (Madrid) invited by Ignacio Sevilla (01/2019)
- **UCM** (Madrid) invited by Prof. A.Gil de Paz (12/2017)
- **Universidad de Santa Cruz** invited by Prof. D. Koo (06/2017)
- **NAOC** (Beijing) invited by Dr. J. Huang (09/2015)
- **ESAC** (Madrid) invited by Dr. M. Sánchez Portal (2012/2013)

Seminars and invited talks

- KSPA alumni event, **UCSC** (07/2020)
- ICE-CSIC, Barcelona, **Spain** (06/2020)
- Southampton University, **UK** (05/2020)
- ICE-CSIC, Barcelona, **Spain** (10/2019)
- CIEMAT, Madrid, **Spain** (01/2019)
- Universidad Complutense de Madrid, **Spain** (12/2017)
- University of Santa Cruz, Santa Cruz, **USA** (07/2017)
- Lnea Webinar, **Brasil** (online, 05/2017)
- Yale University, New Haven, **USA** (03/2017)
- University of Pennsylvania, Philadelphia, **USA** (10/2016)
- National Astronomical Observatory of China, Beijing, **China** (09/2015)
- Sanhai Normal University, Shanghai, **China** (09/2015)
- Osservatorio Astronomico di Bologna, Bologna, **Italy** (07/2015)
- Space Telescope Science Instrument, Baltimore, **USA** (04/2013)
- Université Saclay, Paris, **France** (03/2013)
- European Space Agency Centre, Madrid, **Spain** (01/2013)
- Osservatorio Astronomico di Bologna, Bologna, **Italy** (09/2012)

Fundings received

National Science Foundation grant awarded by USA (2018-2019)

Proposal #: *NSF 574809*

Title: *"Deep-Learning for Galaxy Morphology in the Big Data Era"*

Budget: \$418, 218

Amazon Research credit grand (2019-2020)

Budget: \$9, 000

Mentoring and Supervision

Ph. D. thesis co-supervisor

- Co-supervision of graduate student at Universidad de Barcelona (since 05/2020)
- Co-supervision of graduate student at IFCA (since 03/2019)
- Co-supervision of graduate student at University of Pennsylvania (09/2016-11/2018, graduated with honors)

Teaching

Assistant Professor of *Physics for the grade in Biology*; Universidad Complutense de Madrid (2015)

Public Outreach

- *De San Esteban al cielo*; outreach talk for general audience; Salamanca (10/2015)
- *Charla con una astrónoma*; organized by SEA's Comisión mujer y astronomía (02/2018)

List of Publications

First/second author (refereed)

1. *Hidden AGNs in Dwarf Galaxies Revealed by MaNGA: Light Echoes, Off-nuclear Wanderers, and a New Broad-line AGN*; Mezcu M.; Domínguez Sánchez, H.; 2020; *The Astrophysical Journal Letters*, Volume 898, Issue 2, id.L30
2. *The stellar mass Fundamental Plane: the virial relation and a very thin plane for slow rotators*; Bernardi, M.; Domínguez Sánchez, H.; Margalef-Bentabol, B.; Nikakhtar, F.; Sheth, R. K.; 2020; *MNRAS*, 494, Issue 4, p.5148-516
3. *Galaxy properties as revealed by MaNGA-III. Kinematic profiles and stellar population gradients in S0*; Domínguez Sánchez, H.; Bernardi, M.; Nikakhtar, F.; Margalef-Bentabol, B.; Sheth, R. K.; 2020; *MNRAS*, 495, Issue 3, p.2894-2908
4. *Galaxy properties as revealed by MaNGA-II. Differences in stellar populations of slow and fast rotator ellipticals and dependence on environment*; Bernardi, M.; Domínguez Sánchez, H.; Brownstein, J. R.; Drory, N.; Sheth, R. K.; 2019; *MNRAS*, 489, Issue 4, p.5633-5652
5. *Galaxy properties as revealed by MaNGA-I. Constrains on IMF and M^*/L gradients in ellipticals*; Domínguez Sánchez, H.; Bernardi, M.; Brownstein, J. R.; Drory, N.; Sheth, R. K.; 2019; *MNRAS*, 489, Issue 4, p.5612-5632
6. *Transfer learning for galaxy morphology from one survey to another*; Domínguez Sánchez, H.; Huertas Company, M.; Bernardi, M. et al.; 2019; *MNRAS*, 484, Issue 1, p.93-100
7. *SDSS-IV MaNGA PyMorph Photometric and Deep Learning Morphological Catalogues and implications for bulge properties and stellar angular momentum*; Fischer J.L.; Domínguez Sánchez, H.; M.; Bernardi, M. ; 2019; *MNRAS*, 483, Issue 2, p.2057-2077
8. *Improving galaxy morphologies for SDSS with Deep Learning*; Domínguez Sánchez, H.; Huertas Company, M.; Bernardi, M. et al.; 2018; *MNRAS*, 476, Issue 3, p.3661-3676
9. *Pathways to quiescence: SHARDS view on the Star Formation Histories of massive quiescent galaxies at $1.0 < z < 1.5$* ; Domínguez Sánchez, H.; Pérez González, P.G. et al.; 2016; *MNRAS*, 457, Issue 4, p.3743-3768
10. *Herschel FIR counterparts of SDSS galaxies: Analysis of commonly used Star Formation Rate Estimates*; Domínguez Sánchez, H., Bongiovani, A. et al.; 2014; *MNRAS*, 441, Issue 1, p.2-23
11. *Comparison of Star Formation Rates from H α and infrared luminosities as seen by Herschel*; Domínguez Sánchez, H.; Mignoli, M. et al.; 2012; *MNRAS*, 426, Issue 1, pp. 330-341
12. *The evolution of quiescent galaxies at high z ($z > 1.4$)*; Domínguez Sánchez, H., Pozzi F.; Gruppioni, C., Cimatti, A. et al.; 2011; *MNRAS*, 417, Issue 2, pp. 900-915

Deep Learning related

1. *The Hubble Sequence at $z \sim 0$ in the IllustrisTNG simulation with deep learning*; Huertas-Company, M.; Rodriguez-Gomez, V.; Nelson, D.; Pillepich, A.; Bottrell, C.; Bernardi, M.; Domínguez Sánchez, H. et al. (2019), MNRAS, 489, pp. 1859-1879
2. *Deep Learning Identifies High- z Galaxies in a Central Blue Nugget Phase in a Characteristic Mass Range*; Huertas-Company, Primack, Dekel, Koo, Lapiner, Ceverino, Simons, Snyder, Bernardi, Chen, Domínguez Sánchez, H. et al. (2018), ApJ, 858, 114
3. *Deep learning for galaxy surface brightness profile fitting*; Tucillo, Huertas-Company, Decenci re, Velasco-Forero, Domínguez Sánchez, H., et al. (2018), MNRAS, 475, 894
4. *A catalogue of polycromatic bulge-disk decompositions of 17,000 galaxies in CANDELS*; Dimauro, Huertas-Company, Daddi, P rez-Gonz lez, Bernardi, Mariangela; Barro, Buitrago, Caro, Cattaneo, Domínguez Sánchez, H. et al. (2018), MNRAS, 478, 4

MaNGA survey and IMF studies

1. *SDSS-IV MaNGA PyMorph Photometric and Deep Learning Morphological Catalogs and implications for bulge properties and stellar angular momentum*, Fischer, J.L, Domínguez Sánchez, H., Bernardi, M. et al. (2019), MNRAS, 483, Issue 2, p.2057-2077
2. *The Fifteenth Data Release of the Sloan Digital Sky Surveys: First Release of MaNGA Derived Quantities, Data Visualization Tools and Stellar Library*, The SDSS collaboration (2019), ApJS, 240, 2, 23, 25 pp.
3. *M^*/L gradients driven by IMF variation: Large impact on dynamical stellar mass estimates*; Bernardi, M.; Sheth, R. K.; Domínguez Sánchez, H. et al. (2018); MNRAS, 477, 2, p.2560-2571
4. *Stellar mass functions and implications for a variable IMF*; Bernardi, M.; Sheth, R. K.; Fischer, J.-L.; Meert, A.; Chae, K.-H.; Domínguez Sánchez, H., et al. (2018); MNRAS, 475, 1, 757-771
5. *The stellar initial mass Function at $0.9 < z < 1.5$* ; Mart n-Navarro, I.; P rez-Gonz lez, P. G.; Trujillo, I.; Esquej, P.; Vazdekis, A.; Domínguez Sánchez, H.; et al.; (2015); ApJL, 798, 1, article id. L4, 6 pp.

SHARDS survey

1. *The CANDELS/SHARDS Multiwavelength Catalog in GOODS-N: Photometry, Photometric Redshifts, Stellar Masses, Emission-line Fluxes, and Star Formation Rates*; Barro, Guillermo; P rez-Gonz lez, Pablo G.; Cava, Antonio; Brammer, Gabriel; Pandya, Viraj; Eliche Moral, Carmen; Esquej, Pilar; Dom nguez-S nchez, Helena; et al. (2019), ApJS, 243, 2, 22, 41 pp.
2. *Optically faint massive Balmer Break Galaxies at $z > 3$ in the CANDELS/GOODS fields*, Alcalde Pampliega, B; P rez-Gonz lez, P.G.; Barro, G.; Dom nguez S nchez, H. et al.; (2019), ApJ, 876, 2, 135, 26 pp
3. *A deeper look at the dust attenuation law of star-forming galaxies at high redshift*; Tress, M.; Ferreras, I.; P rez-Gonz lez, P. G.; Bressan, A.; Barro, G.; Dom nguez-S nchez, H.; Eliche-Moral, C.; (2019); MNRAS, 488, 2, 2301-2311
4. *Star-forming galaxies at low-redshift in the SHARDS survey*; Lumbreras-Calle, Mu oz-Tu  n, M ndez-Abreu, Mas-Hesse, P rez-Gonz lez, Alcalde Pampliega, Arrabal Haro, Cava, Dom nguez S nchez H. et al. (2019), A&A, 621, 52
5. *SHARDS: Constraints on the dust attenuation law of star-forming galaxies at $z \sim 2$* ; Tress, M.; M rmol-Queralto, E.; Ferreras, I.; P rez-Gonz lez, P. G.; Barro, G.; Alcalde Pampliega B.; Cava, A.; Dom nguez S nchez, H.; et al.; (2018); MNRAS, 475, 2, 2363-2374
6. *A simultaneous search for high- z LAEs and LBGs in the SHARDS survey*; Arrabal Haro, P.; Rodr guez Espinosa, J. M.; Mu oz-Tu  n, C.; P rez-Gonz lez, P. G.; Dannerbauer, H.; Bongiovanni,  .; Barro, G.; Cava, A.; Lumbreras-Calle, A.; Hern n-Caballero, A.; Eliche-Moral, M. C.; Dom nguez S nchez, H.; et al (2018); MNRAS, 478, 3, 3740-3755

7. *SHARDS Frontier Fields: Physical Properties of a Low mass Lyman-alpha Emitter at $z=5.75$* ; Hernán Caballero A.; Pérez-González, P. G.; Diego, J. M.; Lagattuta, D.; Richard, J.; Schaerer, D.; Alonso-Herrero, A.; Marino, R.A.; Sklias, P.; Alcalde Pampliega, B.; Cava, A.; Conselice, C. J.; Dannerbauer, H.; Domínguez-Sánchez, H.; et al. (2017); ApJ, 849, 2, article id. 82, 13 pp.
8. *SHARDS: A global view of the star formation activity at $z\sim 0.84$ and $z\sim 1.23$* ; Cava A. Pérez-González, P. G.; Eliche-Moral, M. C.; Ricciardelli, E. Vidal-García, A.; Alcalde Pampliega, B.; Alonso-Herrero, A.; Barro, G.; Cardiel, N.; Cenarro, A. J.; Charlot, S.; Daddi, E.; Dessauges-Zavadsky, M.; Domínguez Sánchez, H.; et al. (2015); ApJ, 812, 2, 155, 22 pp.

GLACE survey

1. *GLACE survey: OSIRIS/GTC tuneable filter Halpna imaging of the rich galaxy cluster ZwCl 0024.0+1652 at $z=0.395$. I. Survey presentation, TF data reduction techniques, and catalogue*; Sánchez-Portal M. Sánchez-Portal, M.; Pintos-Castro, I.; Pérez-Martínez, R.; Cepa, J.; Pérez García, A. M.; Domínguez-Sánchez, H. et al. (2015); A&A, 578, A30, 22
2. *A multi-wavelength landscape of the young cluster RXJ1257.2+4738 at $z=0.866$* ; Sanchez-Portal, M.; Pintos-Castro, I.; Perez-Martinez, R.; Cepa, J.; Perez Garcia, A. M.; Dominguez-Sanchez, H. et al. (2013); A&A, 558, A100, 15 pp

PEP survey

1. *A multiwavelength consensus on the main sequence of star-forming galaxies at $z\sim 2$* ; Rodighiero G. et al. (2014); MNRAS, 443, Issue 1, 19-13
2. *The ultraviolet to far-infrared spectral energy distribution of star-forming galaxies in the redshift desert*; Oteo I. et al. (2014); MNRAS, 439, 2, p.1337-1363
3. *Serendipitous detection of an overdensity of Herschel-SPIRE 250 micron sources south of MRC1138-26*; Valtchanov, I. et al. (2013); MNRAS, 436, 3, p.2505-2514
4. *The Herschel PEP+HerMES Luminosity Funtion I: Probing the Evolution of PACS selected Galaxies up to $z \sim 4$* ; Gruppioni, C. et al. (2013); MNRAS, 432, 1, p.23-52
5. *Far-infrared-detected Lyman-break galaxies at $z \sim 3$. Dust attenuation and dust correction factors at high redshift*; Oteo, I. et al. (2013); A&A, 554, id.L3, 8
6. *The effect of environment on star forming galaxies at redshift. I. First insight from PACS*; Popesso, P et al.; 2011; A&A, 532, A14
7. *PACS Evolutionary Probe (PEP) – A Herschel key program*; Lutz et al. (2011); A&A; 532, A90
8. *PEP: First Herschel probe of dusty galaxy evolution up to $z \sim 3$* ; Gruppioni, C. et al. (2010); A&A, 518, L27
9. *Herschel unveils a puzzling uniformity of distant dusty galaxies*; Elbaz, D. et al. (2010); A&A, 518, L29
10. *Dissecting the cosmic infra-red background with Herschel/PEP*; Berta, S. et al. (2010); A&A, 518, L30
11. *The far-infrared/radio correlation as probed by Herschel*; Ivison, R. et al. (2010); A&A, 518, L31
12. *The star-formation rates of $1.5 < z < 2.5$ massive galaxies*; Nordon R. et al. (2010); A&A, 518, L24
13. *Far-infrared properties of submillimeter and optically faint radio galaxies*; Magnelli, B. et al. (2010); A&A, 518, id.L28
14. *Evolution of dust temperature of galaxies through cosmic time as seen by Herschel*; Hwang , S. et al. (2010); MNRAS, 409, 1, pp. 75-82
15. *A First Glimpse Into the Far-IR Properties of High- z UV-selected galaxies: Herschel/PACS Observations of $z \sim 3$ LBGs*; Magdis, G. et al. (2010); ApJL, 720, 2, L185-L189
16. *Herschel FIR counterparts of selected Ly α emitters at $z \sim 2.2$. Fast evolution since $z\sim 3$ or missed obscured AGNs?*; Bongiovanni, A. et al. (2010); A&A, 519, L4
17. *Herschel deep far-infrared counts through Abell 2218 cluster-lens*; Altieri, B. et al. (2010); A&A, 518, L17

18. *Unveiling far-infrared counterparts of bright submillimeter galaxies using PACS*; Dannerbauer, H. et al. (2010); ApJL, 720, Issue 2, L144-L148
19. *The dust content of high-z submillimeter galaxies revealed by Herschel*; Santini, P. et al.; 2010; A&A, 518, L154
20. *Star formation in AGN hosts in GOODS-N*; Shao, L. et al. (2010); A&A, 518, L26
21. *The first Herschel view of the mass-SFR link in high-z galaxies*; Rodighiero, G. et al. (2010); A&A, 518, L257