

# Curriculum vitae of Paolo Marchegiani

## Academic Studies

- February 2002  
Università di Roma La Sapienza  
Laurea in Fisica (MSc)
- February 2006  
Università di Roma Tre  
Dottorato di Ricerca in Fisica (PhD)

## Postdoctoral activity

- 01/04/2007 – 30/06/2008  
Università Sapienza di Roma  
Borsa di studio per collaborazione all'attività di ricerca
- 01/01/2009 – 31/12/2010  
Università Sapienza di Roma  
Assegno di ricerca
- 01/12/2011 – 30/11/2012  
Osservatorio Astronomico di Roma  
Assegno di ricerca
- 01/09/2013 – 31/08/2017  
University of the Witwatersrand (Johannesburg)  
Postdoc Fellowship
- 01/10/2017 – 31/03/2020  
University of the Witwatersrand (Johannesburg)  
Researcher in Astrophysics

## Teaching experience

- 2009 – 2010  
Assistente per il corso "Laboratorio di Meccanica" (per studenti di Fisica del primo anno presso Università Sapienza di Roma)
- 2013 – 2020  
Supervision of postgraduate students at the University of the Witwatersrand:  
Supervisor of three PhD students (one completed in May 2019; two ongoing)  
Supervisor of one MSc student (completed in March 2020)  
Co-supervisor of one PhD student (completed in May 2015)  
Collaboration to supervision of other three PhD students without formal assignement

- 2018 – 2019

Advisor of four undergraduate students for the Physics Major III Project course at the University of the Witwatersrand

- 2018

Five lectures (3 hours for Astrophysical plasma; 2 hours for Cosmology with galaxy clusters) given for the Physical Cosmology course for Honours students at the University of the Witwatersrand

- 2020: Examiner of an MSc Dissertation for the University of the Witwatersrand

### **Scientific responsibilities and funding**

- 2019: PI of the proposal for observation with SALT: “Unraveling the nature of the unidentified gamma-ray sources via optical spectroscopy: hunting new blazars”

- 2019: Research Grant from the Faculty of Science of the University of the Witwatersrand (Rand 30,000.00) for the project “Identifying new blazars sources through optical spectroscopic observations and revision of the BZCAT catalog”

- 2020: point of contact of a Cluster Short Term Project related to the MeerKAT Legacy Galaxy Cluster Survey: “Cluster Properties Catalog”

### **Attendance to Schools, Congresses and Workshops**

Scuola Nazionale di Astrofisica, VII ciclo (2003-2004), I corso, "Le galassie del gruppo locale. I telescopi di nuova generazione"

Marciana Marina - Isola d'Elba (LI), 11-17 May 2003

5th AGILE Science Workshop

"The galactic Center and other Cosmic Accelerators"

Roma – 2 February 2005

Italian Workshop:

Astrofisica Gamma dallo Spazio - AGILE e GLAST

2 - 3 July 2007

ASI Science Data Center, ESA – ESRIN, Frascati

7th Agile Meeting – The Bright Gamma-Ray Sky

29 September – 1 October 2009

ASI Science Data Center, ESA – ESRIN, Frascati

Workshop Nazionale “New Hard X-ray Mission”

12 - 13 November 2009

ASI Science Data Center, ESA - ESRIN, Frascati

First National Meeting on Science and Technology with SKA: the Italian Pathway to SKA

Rome, 19-20 June 2012

The South African Square Kilometre Array Project - 2013 Postgraduate Bursary Conference (Stellenbosch, 25-29 November 2013)

Talk: “Probing photon decay with the SZ effect: the role of SKA”

The South African Square Kilometre Array Project - 2014 Postgraduate Bursary Conference (Stellenbosch, 04-08 December 2014)

Talk: “Probing the Dark Ages and the Epoch of Reionization with the Sunyaev-Zel’dovich effect of the cosmological 21 cm line: the role of SKA”

The South African Square Kilometre Array Project - 2015 Postgraduate Bursary Conference (Stellenbosch, 30 November - 04 December 2015)

Talk: “Is the radio emission in the Bullet cluster due to Dark Matter annihilation?”

The South African Square Kilometre Array Project - 2016 Postgraduate Bursary Conference (Cape Town, 28 November - 02 December 2016)

Talk: “The role of Dark Matter sub-halos in the non-thermal emission of galaxy clusters”

High Energy Astrophysics in Southern Africa 2017 (Johannesburg, 3-6 October 2017)

Talk: “Studying the Dark Matter annihilation in Galaxy Clusters through radio and gravitational lensing measures”

SARAO 2017 Postgraduate Bursary Conference (Cape Town, 27 November-1 December 2017)

High Energy Astrophysics in Southern Africa 2018 (Parys, 1-3 August 2018)

Talk: “Possible Dark Matter annihilation in the galaxy cluster A520”

SARAO 2018 Postgraduate Bursary Conference (Port Elizabeth, 26 - 29 November 2018)

## **Seminars**

“Studying extragalactic extended sources via the Sunyaev Zeldovich effect”

Osservatorio Astronomico di Roma, Monte Porzio Catone, 05/04/2012

## **Membership of scientific groups**

Member of the group of the blazar catalog Roma-BZCAT (2006 – present)

Member of the HESS group at the University of the Witwatersrand (2019 – present)

Member of the collaboration MeerKAT Legacy Galaxy Cluster Survey (2020 – present)

## **Membership of scientific associations**

Member of Southern African Institute of Physics, and registered as Certified Professional Physicist (2016 – present)

## **Other scientific activities**

Referee for The Astrophysical Journal, Science, MNRAS (2006 – present)

Reviewer of a Vidi grant proposal for the Netherlands Organisation for Scientific Research (2017)

## **Bibliometric Indicators (at 11/03/2020)**

Web of Science:

Number of papers: 31

Citations: 1064

H-index: 11

Scopus:

Number of papers: 45

Citations: 1094

H-index: 14

## List of publications

### Publications in referred journals

- [A1] S. Colafrancesco, P. Marchegiani & E. Palladino,  
“The non-thermal Sunyaev-Zel'dovich effect in clusters of galaxies”, 2003, *A&A*, 397, 27
- [A2] S. Colafrancesco, P. Marchegiani & G.C. Perola,  
“Where does the hard X-ray diffuse emission in clusters of galaxies come from?”, 2005, *A&A*, 443, 1
- [A3] P. Marchegiani, G.C. Perola & S. Colafrancesco,  
“Testing the cosmic ray content in galaxy clusters”, 2007, *A&A*, 465, 41
- [A4] S. Colafrancesco & P. Marchegiani,  
“Warming rays in cluster cool cores”, 2008, *A&A*, 484, 51
- [A5] P. Giommi, S. Colafrancesco, S. Cutini, P. Marchegiani et al.,  
“AGILE and Swift simultaneous observations of the blazar S50716+714 during the bright flare of October 2007”, 2008, *A&A*, 487, L49
- [A6] E. Massaro, P. Giommi, C. Leto, P. Marchegiani, A. Maselli, M. Perri, S. Piranomonte & S. Sclavi,  
“Roma-BZCAT: A multifrequency catalogue of Blazars”, 2009, *A&A*, 495, 691
- [A7] S. Colafrancesco & P. Marchegiani,  
“On the inverse Compton scattering interpretation of the hard X-ray excesses in galaxy clusters: the case of Ophiuchus”, 2009, *A&A*, 502, 711
- [A8] A.A. Abdo et al.,  
“The Spectral Energy Distribution of Fermi Bright Blazars”, 2010, *ApJ*, 716, 30
- [A9] S. Colafrancesco, P. Marchegiani & P. Giommi,  
“Disentangling the gamma-ray emission of NGC 1275 and that of the Perseus cluster”, 2010, *A&A*, 519, A82
- [A10] S. Colafrancesco & P. Marchegiani,  
“On the ability of the spectroscopic Sunyaev-Zeldovich effect measurements to determine the temperature structure of galaxy clusters”, 2010, *A&A*, 520, A31
- [A11] S. Colafrancesco, R. Lieu, P. Marchegiani, M. Pato, L. Pieri & R. Buonanno,  
“Dark matter interpretation of the origin of non-thermal phenomena in galaxy clusters”, 2011, *A&A*, 527, A80
- [A12] S. Colafrancesco, P. Marchegiani & R. Buonanno,  
“Untangling the atmosphere of the Bullet cluster with Sunyaev-Zel'dovich effect observations”, 2011, *A&A*, 527, L1
- [A13] S. Colafrancesco & P. Marchegiani,  
“The energetics of giant radio galaxy lobes from inverse Compton scattering observations”, 2011, *A&A*, 535, A108
- [A14] P. de Bernardis, S. Colafrancesco, G. D'Alessandro, L. Lamagna, P. Marchegiani, S. Masi & A. Schillaci,  
“Low-resolution Sunyaev-Zel'dovich spectroscopy and estimates of cluster parameters”, 2012, *A&A*, 538, A86

- [A15] S. Colafrancesco, P. Marchegiani, P. de Bernardis & S. Masi,  
“A multi-frequency study of the SZE in giant radio galaxies”, 2013, *A&A*, 550, A92
- [A16] Colafrancesco, S.; Marchegiani, P.,  
“Probing photon decay with the Sunyaev-Zel'dovich effect”, 2014, *A&A*, 562, L2
- [A17] Colafrancesco, S.; Emritte, M. S.; Mhlahlo, N.; Marchegiani, P.,  
“Multifrequency constraints on the nonthermal pressure in galaxy clusters”, 2014, *A&A*, 566, A42
- [A18] Colafrancesco, S.; Marchegiani, P.; Beck, G.,  
“Evolution of dark matter halos and their radio emissions”, 2015, *JCAP*, 02, 032
- [A19] Massaro, E.; Maselli, A.; Leto, C.; Marchegiani, P.; Perri, M.; Giommi, P.; Piranomonte, S.,  
“The 5th edition of the Roma-BZCAT. A short presentation”, 2015, *Ap&SS*, 357, 75
- [A20] Colafrancesco, S.; Emritte, M. S.; Marchegiani, P.,  
“The impact of non-Planckian effects on cosmological radio backgrounds”, 2015, *JCAP*, 05, 006
- [A21] Marchegiani, P.; Colafrancesco, S.,  
“Is the radio emission in the Bullet cluster due to dark matter annihilation?”, 2015, *MNRAS*, 452, 1328
- [A22] Colafrancesco, S.; Mhlahlo, N.; Jarrett, T.; Oozeer, N.; Marchegiani, P.,  
“Discovery of a suspected giant radio galaxy with the KAT-7 array”, 2016, *MNRAS*, 456, 512
- [A23] Emritte, M.S.; Colafrancesco, S.; Marchegiani, P.,  
“Polarization of the Sunyaev-Zel'dovich effect: relativistic imprint of thermal and non-thermal plasma”,  
2016, *JCAP*, 07, 031
- [A24] Colafrancesco, S.; Marchegiani, P.; Emritte, M. S.,  
“Probing the physics and history of cosmic reionization with the Sunyaev-Zel'dovich Effect”, 2016, *A&A*,  
595, A21
- [A25] Marchegiani, P.; Colafrancesco, S.,  
“The role of Dark Matter sub-halos in the non-thermal emission of galaxy clusters”, 2016, *JCAP*, 11, 033
- [A26] Marchegiani, P.; Colafrancesco, S.,  
“Effect of the non-thermal Sunyaev-Zel'dovich effect on the temperature determination of galaxy clusters”,  
2017, *MNRAS*, 469, 4644
- [A27] Colafrancesco, S.; Marchegiani, P.; Paulo, C.M.,  
“The correlation between radio power and Mach number for radio relics in galaxy clusters”, 2017, *MNRAS*,  
471, 4747
- [A28] Malu, Siddharth; Datta, Abhirup; Colafrancesco, Sergio; Marchegiani, Paolo; Subrahmanyam, Ravi;  
Narasimha, D.; Wieringa, Mark H.,  
“Relativistic inverse Compton scattering of photons from the early universe”, 2017, *Scientific Reports*,  
Volume 7, id. 16918

[A29] P. Marchegiani, S. Colafrancesco, N.F. Khanye,  
“The role of dark matter annihilation in the radio emission of the galaxy cluster A520”, 2019, MNRAS, 483, 2795

[A30] P. Marchegiani,  
“Probing the low-energy spectrum of non-thermal electrons in galaxy clusters with soft gamma ray observations”, 2019, Ap&SS, 364, 41

[A31] P. Marchegiani,  
“Effect of turbulent reacceleration on electrons produced by dark matter annihilation in the Coma cluster”, 2019, MNRAS, 488, 1401

### **Publications in referred conference proceedings**

[B1] S. Colafrancesco, P. Marchegiani & E. Palladino,  
“Non-thermal vs. thermal SZ effect in galaxy clusters”,  
Proceedings of the 2K1BC Workshop EXPERIMENTAL COSMOLOGY AT MILLIMETRE  
WAVELENGTHS, Breuil-Cervinia; 2002, AIPC, 616, 316

[B2] E. Palladino, S. Colafrancesco & P. Marchegiani,  
“Spatial features of non-thermal SZ effect in galaxy clusters”,  
Proceedings of the 2K1BC Workshop EXPERIMENTAL COSMOLOGY AT MILLIMETRE  
WAVELENGTHS, Breuil-Cervinia; 2002, AIPC, 616, 363

[B3] E. Massaro, P. Giommi, C. Leto, P. Marchegiani, A. Maselli, M. Perri, S. Piranomonte, S. Sclavi,  
“Roma-BZCAT: a multifrequency blazar catalogue”, 2008, MmSAI, 79, 262

[B4] E. Massaro, P. Giommi, C. Leto, P. Marchegiani, A. Maselli, M. Perri, S. Piranomonte, S. Sclavi,  
“Roma BZCAT: a Multifrequency Blazar catalogue”,  
Proceedings of the Workshop on Blazar Variability across the Electromagnetic Spectrum. April 22-25, 2008  
Palaiseau, France, PoS(BLAZARS2008), 048

[B5] L. Ferrari et al.,  
“Spectroscopic Active Galaxies and Clusters Explorer”,  
Proceedings of THE THIRTEENTH INTERNATIONAL WORKSHOP ON LOW TEMPERATURE  
DETECTORS-LTD13, 2009, AIPC, 1185, 483

[B6] P. De Bernardis et al.,  
“SAGACE: the Spectroscopic Active Galaxies And Clusters Explorer”,  
Proceedings of the 12th Marcel Grossman Meeting, 2010, Paris 12-18 July 2009, page 2133 (2012)

[B7] A. Coppolecchia et al.,  
“OLIMPO: A 4-bands imaging spectro-photometer for balloon-borne observations of the Sunyaev-Zel'dovich effect”, 2014, in Proceedings of the International School of Physics "Enrico Fermi" Volume 186, 2014, Pages 257-264

[B8] Grainge, Keith; Borgani, Stefano; Colafrancesco, Sergio; Ferrari, Chiara; Scaife, Anna; Marchegiani, Paolo; Emritte, S.; Weller, J.,  
“Galaxy Cluster Science with the Sunyaev-Zel'dovich Effect”, 2014, in Proceedings of 'Advancing  
Astrophysics with the Square Kilometre Array', PoS(AASKA14)170

[B9] Colafrancesco, Sergio; Regis, Marco; Marchegiani, Paolo; Beck, Geoff; Beck, Rainer; Zechlin, Hannes; Lobanov, Andrei; Horns, Dieter,  
“Probing the nature of Dark Matter with the SKA”, 2014, in Proceedings of 'Advancing Astrophysics with the Square Kilometre Array', PoS(AASKA14)100

- [B10] Sergio Colafrancesco, Paolo Marchegiani, M. Shehzad Emritte,  
 “Cosmology with galaxy clusters: studying the Dark Ages and the Epoch of Reionization in the SKA era”,  
 2014, in Proceedings of 'Advancing Astrophysics with the Square Kilometre Array', PoS(AASKA14) 034
- [B11] Colafrancesco, S.; Marchegiani, P.,  
 “High-Energy Phenomena in Galaxy Clusters”, 2015, in Proceedings of ‘XI Multifrequency Behaviour of  
 High Energy Cosmic Sources Workshop’, PoS(MULTIF15) 012
- [B12] Mekuria R.R., Colafrancesco S., Faltenbacher A., Marchegiani P.,  
 “Multi-wavelength emission from dark matter annihilation processes in galaxy clusters using cosmological  
 simulations”, in Proceedings of ‘High Energy Astrophysics in Southern Africa 2016’, POS(HEASA 2016)  
 009
- [B13] Paulo C.M., Colafrancesco S., Marchegiani P.,  
 “The origin of radio relics in galaxy clusters: a combined gamma and radio wavelength analysis”, in  
 Proceedings of ‘High Energy Astrophysics in Southern Africa 2016’, POS(HEASA 2016) 012
- [B14] P. Marchegiani and S. Colafrancesco,  
 “Studying the dark matter annihilation in galaxy clusters through radio and gravitational lensing measures”,  
 in Proceedings of ‘High Energy Astrophysics in Southern Africa 2017’, POS(HEASA 2017) 006
- [B15] C.M. Takalana, S. Colafrancesco and P. Marchegiani,  
 “Analysis of differential observations of the cosmological radio background: studying the SZE-21cm”, in  
 Proceedings of ‘High Energy Astrophysics in Southern Africa 2017’, POS(HEASA 2017) 008
- [B16] C.M. Takalana, S. Colafrancesco and P. Marchegiani,  
 “Differential observation techniques for the SZE-21cm and low frequency radio emission”, in Proceedings of  
 ‘FAST-MeerKAT and SKA Pathfinders Synergies’, 2018, p.138
- [B17] C.M. Takalana, S. Colafrancesco and P. Marchegiani,  
 “Differential Observation Techniques for the SZE-21cm and radio sources”, in Proceedings of ‘High Energy  
 Astrophysics in Southern Africa 2018’, POS(HEASA 2018) 006
- [B18] P. Marchegiani, S. Colafrancesco, N.F. Khanye,  
 “Possible Dark Matter annihilation in the galaxy cluster A520”, in Proceedings of ‘High Energy  
 Astrophysics in Southern Africa 2018’, POS(HEASA 2018) 030

## **Thesis and monographs**

- [C1] P. Marchegiani,  
 MSc Thesis in Physics:  
 “L'effetto SZ non-termico negli ammassi di galassie: un approccio completo”, 2002, Università La Sapienza  
 di Roma
- [C2] P. Marchegiani,  
 PhD Thesis in Physics:  
 “Il contenuto non-termico degli ammassi di galassie”, 2006, Università di Roma Tre
- [C3] E. Massaro, P. Giommi, C. Leto, P. Marchegiani, A. Maselli, M. Perri, S. Piranomonte & S. Sclavi,  
 “Multifrequency catalogue of BLAZARS”, 2008, Vol. II (6h-12h), Aracne, Roma
- [C4] E. Massaro, P. Giommi, C. Leto, P. Marchegiani, A. Maselli, M. Perri, & S. Piranomonte,  
 “Multifrequency catalogue of BLAZARS”, 2011, 3rd Edition, Aracne, Roma



[C5] E. Massaro, A. Maselli, C. Leto, P. Marchegiani, M. Perri, P. Giommi, S. Piranomonte, “The Roma BZCAT - 5th edition, Multi-frequency Catalogue of Blazars, Edition 5.0.0”, 2015, Aracne, Roma, ISBN 978-88-548-7918-8

### **Non-referred publications**

[D1] E. Massaro, P. Giommi, C. Leto, P. Marchegiani, A. Maselli, M. Perri, S. Piranomonte & S. Scavi, “The 2nd edition of the Roma-BZCAT Multi-frequency Catalogue of Blazars”, arXiv:1006.0922

[D2] C. Armitage-Caplan et al., “COre (Cosmic Origins Explorer) A White Paper”, arXiv:1102.2181

### **Papers published as member of the H.E.S.S. collaboration**

[E1] H.E.S.S. Collaboration, “Detection of very-high-energy  $\gamma$ -ray emission from the colliding wind binary  $\eta$  Car with H.E.S.S.”, 2020, A&A, 635, A167

[E2] H.E.S.S. Collaboration, “Very high energy  $\gamma$ -ray emission from two blazars of unknown redshift and upper limits on their distance, 2020, MNRAS, in press (arXiv:2004.03306)