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When galaxy clusters collide : the impact of merger shocks on cluster gas and galaxy evolution

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Publications

Refereed Publications

1. **Stroe, A.** et al. The ‘ultimate’ cluster radio relic spectrum: observations from 150 MHz to 30 GHz. MNRAS (submitted, 2015)
2. **Stroe, A.** and Sobral, D. A large narrow band $H\alpha$ survey at $z \sim 0.2$: the bright end of the luminosity function, cosmic variance and clustering across cosmic time. MNRAS (in press, 2015)
3. **Stroe, A.** et al. Neutral hydrogen gas, past and future star-formation in galaxies in and around the ‘Sausage’ merging galaxy cluster. MNRAS (in press, 2015)
4. **Stroe, A.** et al. The rise and fall of star-formation in $z \sim 0.2$ merging galaxy clusters. MNRAS, 450, 646 (2015)
5. **Stroe, A.**, Harwood, J. J., Hardcastle, M. J., Röttgering, H.J.A. Spectral age modelling in the ‘Sausage’ radio relic. MNRAS, 445, 1213 (2014)
6. **Stroe, A.**, Rumsey, C., Harwood, J. J., Röttgering, H.J.A., Saunders, R. D. E. Highest frequency detection of a radio relic: 16 GHz AMI observations of the ‘Sausage’ cluster. MNRAS, L59 (2014)
7. **Stroe, A.**, Sobral, D., Röttgering, H.J.A., van Weeren, R. J. The role of cluster mergers and travelling shocks in shaping the $H\alpha$ luminosity function at $z \sim 0.2$: ‘Sausage’ and ‘Toothbrush’ clusters. MNRAS 438, 1377 (2014)
8. **Stroe, A.**, van Weeren, R. J., Intema, H.T., Röttgering, H.J.A., Brüggem, M. and Hoeft, M. Discovery of spectral curvature in the shock downstream region: CIZA J2242.8+5301. A&A 555, A110 (2013)
9. **Stroe, A.**, Snellen, I.A.G., Röttgering, H.J.A. A stringent upper limit to 18cm radio emission from the extrasolar planet system τ Boötis. A&A 546, A116 (2012)
10. Sobral, D., **Stroe, A.** et al. *MC²: Boosted AGN and star-formation activity in CIZA J2242.8+5301, a massive post-merger cluster at $z = 0.19$.* MNRAS, 450, 630 (2015)
11. Jee, M. J., **Stroe, A.** et al. *MC²: Constraining the dark matter contribution of the violent merging galaxy cluster CIZA J2242.8+5301: Piercing through the Milky Way.* ApJ, 802, 46 (2015)
12. Dawson, W., Jee, M. J., **Stroe, A.**, et al. *MC²: Galaxy imaging and redshift analysis of the merging cluster CIZA J2242.8+5301.* ApJ, 805, 143 (2015)
13. Emonts, B., Mao, M., **Stroe, A.**, et al. *A CO-rich merger shaping a powerful and hyperluminous infrared radio galaxy at $z = 2$: the Dragonfly Galaxy.* MNRAS, 451, 5544 (2015)

14. Heald et al. (including **Stroe, A.**) *The LOFAR Multifrequency Snapshot Sky Survey (MSSS) I. Survey description and first results.* (submitted to A&A in October 2014)
15. Akamatsu et al. (including **Stroe, A.**) *Suzaku X-ray study of the double radio relic galaxy cluster.* A&A (in press, 2015)
16. van Weeren, R. J. et al. (including **Stroe, A.**) A distant radio mini-halo in the Phoenix Cluster. *ApJ Letters*, 786, L17 (2014)
17. van Weeren, R. J. et al. (including **Stroe, A.**) The discovery of a radio halo in PLCK G147.3–16.6 at $z = 0.65$. *ApJ Letters*, 781, L32 (2014)
18. Emonts, B. et al. (including **Stroe, A.**) CO(1-0) survey of high- z radio galaxies: alignment of molecular halo gas with distant radio sources. *MNRAS*, 438, 2898 (2014)
19. Griffin, R.F. and **Stroe, A.** Photoelectric radial velocities, Paper XX: 45 years' monitoring of the radial velocities of the Redman K stars. *JOAA* 33, 245 (2012)

Conference Proceedings

1. **Stroe, A.**, van Weeren, R. J., Sobral, D., Rumsey, C., Intema, H. T., Röttgering, H. J. A., Harwood, J. J.; Saunders, R., Brüggem, M., Hoeft, M. Spectral and morphological signatures of cluster merger shocks: CIZA J2242.8+5301. Proc. of 'The Metre Wavelength Sky: Celebrating 50 years of Radio Astronomy at TIFR' (2014)
2. Harwood, J. J. et al. (including **Stroe, A.**) The spectral structure and energetics of powerful radio sources Proc. of 'The Metre Wavelength Sky: Celebrating 50 years of Radio Astronomy at TIFR' (2014)
3. Röttgering, H. J. A. et al. (including **Stroe, A.**) The 'Sausage' and 'Toothbrush' clusters of galaxies and the prospects of LOFAR observations of clusters of galaxies. *AN*, 334, 333 (2013)

Curriculum Vitae

I was born on the 19th of November 1987, in Constanța, Romania, on the beautiful coast of the Black Sea. I was fascinated by the Cosmos ever since I was a small child and wanted to become an astronaut when I grew up.

I completed my pre-university education in 2007 as valedictorian at the ‘Mircea cel Batrân’ National College, with a focus on Mathematics, Computer Science, Physical and the English language and literature. Upon realising that my chances of becoming an astronaut were very slim, I decided I wanted to move people into space, so I participated in a series of space settlement design competition organised by NASA, where I designed habitable space settlements orbiting around the Earth, Mars and located on the Moon and on Mars.

My strong interest in all things space related lead me to to study Physics and Astronomy at Jacobs University in Bremen, Germany. During my undergraduate degree, I took part in a number of research internships. In the summer of 2008, I returned as a mentor for the 15th NASA International Space Settlement Design Competition. In the winter of 2009, I spent one month researching an innovative deployment mechanism for solar cells installed on spacecrafts within the OHB System satellite company in Bremen. During the first half of the 2009 summer, I analysed data from the Cluster II spacecraft to understand the physics of the neutral sheet of Earth’s magnetosphere, within the Department of Space Plasma at the Max Planck Institute for Extraterrestrial Physics in Garching bei München, Germany. I spent the second half of the summer within the Optical Interferometry group at the Cavendish Laboratory, University of Cambridge, UK, where I wrote the *visim* software, an imaging simulator used for the upcoming Magdalena Ridge Observatory Interferometer. I also gained teaching experience by supervising the 1st year physics laboratory. I was also teaching assistant for the second year Analytical Mechanics course. I graduated in 2010 with honours, in the top 5% of my class, with two degrees: a Bachelor of Science in Physics and a Bachelor of Science in Earth and Space Sciences, with the focus Astrophysics. I wrote two theses on the topics the Earth’s neutral sheet (*Multipoint Analysis of Local Magnetohydrostatic Equilibria in the Earth’s Magnetotail using Cluster II data*, under the guidance of Prof. Dr. Joachim Vogt) and on simulated optical interferometric observations of a star with a disk (*Assessment of the Feasibility of Proposed Observations for the Magdalena Ridge Observatory Interferometer with the visim Software*, under the supervision of Prof. Dr. Marcus Brüggen).

I then moved on to University of Cambridge, where I pursued a Master of Advanced Study in Experimental and Theoretical Physics, hosted by the Cavendish Laboratory. I wrote my Master’s thesis under the supervision of Dr. Manda Banerji and Prof. Dr. Richard McMahon, at the Institute of Astronomy, on the topic *Infra-red Properties of Galaxy Clusters Selected Using the Sunyaev-Zel’dovich Effect*. I graduated in 2011 with Merit.

My MSc work sparked my interest for multi-wavelength studies of galaxy clusters. As a result, I chose to do a PhD in Astronomy at Leiden Observatory, with Prof. Dr. Huub Röttgering, working on merging clusters hosting diffuse radio emission, combining radio and optical imaging and spectroscopy with modelling to study the effect of cluster merger shocks on the intra-cluster medium and the cluster galaxies. I have presented my work at national and international conferences in Nice (France), Bonn (Germany), Pune (India), Nijmegen (Nether-

lands), Dubrovnik (Croatia), Jeju (South Korea), Ringberg (Germany) and at other institutes (Hertfordshire, UC Davis, U Porto, U Lisbon, IAC Tenerife, INTA/CSIC Madrid, UCLA, UC Riverside, Stanford, Berkeley, Caltech, Harvard, ESAC Madrid, MPIA Heidelberg). I attended meetings, workshops and schools in Madrid (Spain), Bielefeld (Germany), Socorro (US), Garching (Germany), Manchester (UK) and Seattle (US).

In October 2015, I will move to Garching bei München to take up an ESO Fellow position.

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At Leiden Observatory, I was fortunate to be part of a diverse and stimulating research group. I would like to thank present and past members of the 'radio astronomy' group (even though we do much more than radio) for many interesting scientific discussions: Leah and Emma (thanks for being great office mates), Wendy, Tim, Julius, George, Duy, Edwin, Gabriela, Aayush, Bas, Reinout, David R., Laura.

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Finally, this thesis is dedicated to my mother, who has been the single most important driving force in my life and career. Mama, I miss you more every day.

