



Project No: 257670

Project Acronym: cosmoIGM

Project Full Name: The Intergalactic Medium as a Cosmological
Tool

ERC-SG

Final Activity Report

Period covered: from 01/12/2010 to 30/11/2016

Start date of project: 01/12/2010

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Principal Investigator name:
Dr. Matteo Viel

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Report submitted by:
ISTITUTO NAZIONALE DI ASTROFISICA

Final Activity Report

GENERAL INFORMATION

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Final Activity Report

Summary of the major project achievements over the entire lifetime of the project

The information provided in this section will only be available to ERC staff, to members of the ERC panels, and to the Scientific Council

Explain in a clear manner the work performed during the entire lifetime of the project along the main objectives/activities of the project listed in the Description of Work (DoW). Please indicate the publications linked to these objectives/activities.

Please specify the outcome in terms of:

- research and technological achievements along the main objectives/activities (in line with the DoW)

The research themes exploited by the cosmoIGM project have fully followed the three main research areas that were outlined in the DOW document: 1) IGM and the large scale structure of the Universe; 2) IGM and fundamental physics; 3) IGM/galaxy interplay.

I will now outline the main scientific achievements that have been reached in all these three sub-areas.

IGM and the large scale structure of the Universe. The main goal of this topic was to further establish the unique role of the IGM as a tracer of the underlying density field by exploiting new data and by interpreting them with state-of-the-art hydrodynamical simulations. The cosmoIGM has analysed data sets at low, medium and high resolution from different spectrographs (SDSS-III/BOSS, X-Shooter – see Irsic, Viel et al. 2016, MNRAS, in press -- UVES/VLT and KECK/HIRES and MIKE instruments) carefully addressing how the properties of transmitted flux in the Lyman-alpha forest are related to the matter distributions by means of either numerical hydro simulations or mock data sets. The main results are: the full characterization of the 3D and 1D flux power in hydro simulations with fitting functions that have been used by the SDSS-III/BOSS collaboration in the measurement of Baryonic Acoustic Oscillations (Arinyo-i-Prats et al. 2015, JCAP, 12, 017); setup of hydro simulations to interpret the 1D flux power within the BOSS collaboration (Palanque-Delabrouille et al. 2015a,b; Rossi et al. 2015); the important synergies between intensity mapping experiments and the Lyman-alpha forest and the use of intensity mapping as a cosmological probe (Villaescusa-Navarro, Viel et al. 2014, JCAP, 09, 050); novel characterization of the cross-correlation signal between the unresolved Fermi gamma ray background and large scale structure data sets at high and low redshift that in turns allows to place constraints on the contribution of astrophysical sources to the background (Cuoco et al. 2015, ApJS, 221, 2).

IGM and fundamental physics. The main goal of this sub-topic was to see to what extent IGM structures can probe fundamental physical properties of the Universe, more importantly neutrino masses and the nature of the dark matter. In order to address this topic was necessary to develop and test hydrodynamical codes and codes that simulate warm dark matter (instead of cold) to unprecedented precision and accuracy, in a fully non-linear regime which is probed by IGM structures. To date, the cosmoIGM team has produced the tightest limits on the cold dark matter coldness (using medium resolution and high resolution spectra) – Viel et al. 2013, Physical Review D, 88, 3502; Irsic, Viel et al. 2017a submitted to Physical Review D; Irsic et al. 2017b submitted to Physical Review Letters -- and on total neutrino mass (within the SDSS-III/BOSS collaboration: Palanque-Delabrouille et al. 2015, JCAP, 02, 045; Palanque-Delabrouille et al. 2015, 11, 11). IGM data have also provided limits on dark energy and modified gravity behaviour in the high redshift universe (Baldi et al. 2014, MNRAS, 440, 1; Peirone et al. 2017, Physical Review D, in press). Cross-correlations studies at small angular scales between the Fermi unresolved extragalactic gamma

ray background and different surveys have also provided tight limits on decaying dark matter and supersymmetry models (Regis et al. 2014, Physical Review Letters, 114, 241301).

IGM/galaxy interplay. The main goal of this sub-topic was to analyse the intimate relation between gaseous matter around galaxies and the properties of galaxies themselves. The cosmoIGM team has performed hydrodynamical simulations of structure formation with a suitable ad-hoc modification of a public available code in order to implement various recipes of galactic feedback. Investigation of the impact of galactic feedback on several Lyman-alpha forest properties at low and high redshift has been analysed in the following papers under the theoretical/numerical point of view: Viel et al. 2013, 429, 1734; Bolton et al., 2017, MNRAS, 464, 897; Viel et al. 2017, MNRAS Letters in press; Barai et al. 2015, MNRAS, 447, 1. The main result is that constraints on some feedback mechanisms have been placed and the impact on neutral hydrogen and metal line statistics has also been addressed: galactic outflows to remove metals from the innermost parts of galaxies and enrich the medium, physical properties of galaxies (e.g. star formation) are also influenced by feedback mechanisms (Barai et al. 2012, 2013, 2015). Under the observational point of view, metal enrichment investigations of the IGM have been made with X-Shooter (D'Odorico et al. 2013, 435, 2) or with high-resolution spectra UVES (e.g. Kim et al. 2016, MNRAS, 457, 2).

- novel and/or unconventional methodologies

The novelty of the methodologies used can be summarized as follows: i) dealing with non-linearities using state-of-the-art modifications of public available codes in particular for neutrinos and warm dark matter simulations; ii) addressing the role of feedback by implementation of new astrophysical processes (winds and or other forms of galactic feedback) in hydrodynamical simulations by modifications of numerical codes; iii) full analysis of spectra at high, medium and low resolution in a comprehensive way in order to highlight different systematics and how they impact on physical observables; iv) providing a clear methodology of model comparison for particle physics models (fuzzy dark matter, sterile neutrinos, mixed hot/cold models) by addressing their impact on cosmological structures at small scales; v) new methodology and techniques exploited in the analysis of cross-correlations between the Fermi unresolved gamma-ray background and large scale structure tracers in order to probe the nature of dark matter; vi) realization of mock quasar spectra sample that contains all the relevant systematics, statistical and physical treatment of the different effects that impact on Lyman-alpha forest flux statistics (more importantly 1D flux power).

- inter and cross disciplinary developments

The cosmoIGM proposal is clearly inter-disciplinary. The most important synergy is between particle physics and cosmology.

The limits the team cosmoIGM has provided in terms of cold dark matter coldness and neutrino masses have triggered the interest of particle physics community that is either looking at dark matter candidates or aiming at measuring the neutrino masses.

Since these limits and numbers depend also on astrophysical quantities (e.g. galactic feedback) it was necessary to exploit also the important synergies between galaxy formation and cosmology and carefully address the role of astrophysical quantities on the cosmological quantities we aimed at measuring. This second aspect has allowed a fruitful interaction with galaxy formation experts that has lead to several publications (e.g. Viel et al. 2017, MNRAS Letters in press; Villaescusa-Navarro et al. 2016, MNRAS, 456, 14).

To summarise, the inter-disciplinary nature of the proposal has been fully exploited with the important synergies between cosmology and particle physics and cosmology with galaxy formation/astrophysics. Under the methodological point of view the proposal has dealt with different tools that went from data reduction, theoretical modeling, numerical modeling and phenomenological

exploitation of the models with data comparison.

- knowledge and technology transfer

The dissemination and transfer of knowledge was organized through periodic meetings held between the cosmoIGM team members and/or in a wider environment with other researchers working on similar topics. More than 100 publications have been published in peer-reviewed journals with high impact factor (>4.5) and are listed in the publication list below. This amounts to about 20 publications/year which is a remarkable achievement.

- enhancing the immediate research environment

The research environment was ideal for performing science related on the IGM. The team has interacted fruitfully with the researchers of INAF/OATS and with other colleagues in international institutions. Group meetings on IGM topics were organized and also collaborative meetings with speakers and/or colleagues visiting INAF/OATS. The Trieste research area (SISSA, ICTP and Trieste University) have also provided the opportunities for important collaborations and for talks/seminars/workshop where presenting the results.

- establishment and/or consolidation of the research group and team composition

The team was composed by 5 members: the PI and 4 postdoctoral fellows with complementary expertise in the 3 sub-topics addressed by the proposal. The fellows had however different scientific and social backgrounds. However, it was easy to setup the team and make the fellows interact with themselves and with other researchers. Their Phd was nevertheless done in international top-institution so they did not have any problem in interacting and consolidating their expertise in the OATS INAF environment.

- others

No other issues to be reported. Please note that there are 2 papers still to be submitted that contain the exploitation of the cosmological relevance of the X-Shooter data set (medium resolution spectroscopy) in terms of dark matter candidates and cosmological/astrophysical parameters.

Publishable brief summary of the achievement of the project

This section, which should not exceed 1 page (approx. 600 words), might be used for dissemination of the project progress/results to the general public/scientific community. For this reason, please do not reproduce here the project abstract, which is already available in CORDIS.

Stand alone description of the project and its outcomes

The cosmoIGM team has addressed the role of matter between galaxies (the IGM) as a cosmological tracer of the underlying large scale structure and as a probe of fundamental physics. Usually, matter between galaxies does not shine, it is a diffuse low density medium which contains gaseous material and dark matter. It can be probed using the light emitted by distance sources (quasars) and by carefully analyzing the cosmic journey of the photons traveling through the intergalactic medium and reaching the telescopes. On the theoretical side, time consuming super computer simulations of the Universe are made in order to compare data with a given model. The team has placed important constraints on the behavior of dark matter at small scales and on the total mass of neutrino particles in the Universe: to date these are the tightest constraints that cosmology could offer and are of course of fundamental importance for particle physics experiments. The team has also made a comprehensive analysis of data at low, high and medium resolution and constrained physical and chemical properties of the IGM and the intimate relation that exists between the IGM and the galaxies.

The intergalactic medium is a powerful and new cosmological tool that can address fundamental physical questions and aspects related to the formation of galaxies. The cosmoIGM team was composed by 5 members of different nationalities: the PI, Prof. Matteo Viel from Italy; Dr. Barai from India; Dr. Villaescusa-Navarro from Spain; Dr. Enea Di Dio from Switzerland; Dr. Tae-Sun Kim from South Korea. The unique international environment offered by Trieste Observatory has allowed the researchers to progress further in their career and they are now conducting research in other top-level internationally recognized institutions.

Overall assessment of the achievements and success of the project

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To what extent have you achieved your objectives?

I am very happy about the outcome of the cosmoIGM research. I believe we did extremely well in all the areas and objectives were fully reached.

There have been some topics on which I recognized we could have had a stronger impact. For example, I entered the BOSS/SDSS-III collaboration when the collaboration was already started and it was a bit difficult for me to lead a given project so I decided to collaborate on important topics rather than leading a new research activity. At the same level, forecasting science for E-ELT spectrographs could have been performed more intensively.

On the other hand there have also been unexpected areas in which we made great progress, like the characterization of neutral hydrogen also in intensity mapping and the synergies between absorption and emission studies in view of future experiments like SKA.

However, the small drawbacks did not impact on the final high quality scientific outputs of the cosmoIGM science and the objectives are fully reached.

What are the most important conclusions of your research?

The most important conclusions of my research and my most successful findings are the tight constraints that myself and the cosmoIGM team have provided in terms of coldness of cold dark matter (Viel et al. 2013; Irsic, Viel et al. 2017) and on the total neutrino mass (Palanque-Delabrouille et al. 2015). Furthermore, neutrino non-linearities have been exploited at an unprecedented level of precision by using a state-of-the art code (Viel, Hahenelt and Springel 2010; Villaescusa-Navarro, Viel et al. 2014).

A full and comprehensive analysis of the statistical properties of transmitted Lyman-alpha forest flux and the interpretation of cosmological and astrophysical parameter is also an important result. This has also allowed to constrain the thermal state of the intergalactic medium by using data at low, high and medium resolutions from 5 different spectrographs (BOSS, HIRES and UVES and MIKE, Shooter).

First attempt made to provide a characterization of neutral hydrogen in absorption and emission using intensity mapping and absorption lines from $z=0$ to high redshift with forecasts for SKA and future data sets.

To what extent have you gone beyond the state of the art?

The modeling of non-linearities which was allowed by using the codes dealing with neutrinos and the exploration of beyond standard model cosmologies by using IGM data and more importantly the 1D flux power has allowed to make great progress in the field. The modeling and constraints provided by high-redshift data in terms of cosmological and astrophysical parameters has also allowed to enter a new more mature regime for which IGM data are more reliable and offer unique opportunities to perform quantitative studies.

What is the impact of the project (within the scientific community and on society)?

The project has been very prolific in terms of publications: there are 108 publications that were published in peer-review journals by the cosmoIGM team members, some other publications not peer-reviewed are not in the publication list. Few publications are now submitted to Journals and will

be uploaded soon. There have also been several participations to conferences and collaboration meetings where presentations about cosmoIGM activities were given. The PI was also invited to important conferences as a plenary speaker. Outreach activities was performed (see below). Overall in terms of scientific productivity and impact of the results on the community I regard this project as very successful.

How effectively has the project helped you start or consolidate your research group? (for Starting Grants/Consolidators Grants only)

The project has clearly allowed me to reach a more mature level in my career and become more independent. After the grant was finished I changed host institution and became Associate Professor. The grant was clearly helpful in obtaining this promotion.

How well have you been supported by your Host Institution?

Extremely well, both under the scientific and administrative point of view.

What difference did the ERC make?

A great difference. In a situation in which there was shortage of money for research it was very helpful for conducting my studies and for supporting with competitive salaries the international researchers of the team. On top of that the University at some point has had the possibility of hiring ERC winners as Associate Professor. This is how I got promoted on 01/12/2016 as an Associate Professor at SISSA University.

How many people completed a PhD in the framework of the project?

0

Comments:

My cosmoIGM team was made of postdocs. During the grant I have supervised 4 PhD students that have successfully finished the Phd program but the y were not paid by the cosmoIGM grant.

How many people started a PhD in the framework of the project?

5

Comments:

However, the students were not payed by cosmoIGM grant money.

List of free Keywords

Large Scale Structure of the Universe, Intergalactic Medium, Lyman-alpha forest, Warm Dark Matter, neutrinos, galactic feedback, galaxy/IGM interplay, hydrodynamical simulations, cosmological parameters, modified gravity, high-z universe, absorption lines, galaxy formation, galactic outflows.

Annex: Project output records

A1. Publications

LIST OF SCIENTIFIC PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES												
No.	Title / DOI	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Date of publication	Relevant pages	Does the article acknowledge ERC funding?	Is open access provided to this publication?	Type	URL
1	Turbulence driven by structure formation in the circumgalactic medium doi:10.1093/mnras/stt61	L. Iapichino, M. Viel, S. Borgani	MNRAS 432, 2529 (2013)		N/A		01/05/2013		Yes	Yes	Peer review	1
2	Neutrino signatures on the high-transmission regions of the Lyman-alpha forest doi:10.1093/mnras/stt452	F. Villaescusa-Navarro, M. Vogelsberger, M. Viel, A. Loeb	MNRAS 431, 3670–3677 (2013)		N/A		11/04/2013		Yes	Yes	Peer review	1
3	Galactic winds in cosmological simulations of the circumgalactic medium doi:10.1093/mnras/stt125	P. Barai, M. Viel, S. Borgani, E. Tescari, L. Tornatore, K. Dolag, M. Killevar, P. Monaco, V. D'Odorico, S. Cristiani	MNRAS 430, 3213–3234 (2013)		N/A		19/02/2013		Yes	Yes	Peer review	1
4	The impact of feedback from galaxy formation on the Lyman alpha transmitted flux doi:10.1093/mnras/sts465	M. Viel, J. Schaye, C. M. Booth	MNRAS 429, 1734–1746 (2013)		N/A		21/12/2012		Yes	Yes	Peer review	1
5	Statistics of cosmological Lyman alpha absorption	D. Munshi, P. Coles, M.	Mon. Not. R. Astron. Soc. 427, 2359–2375 (2012)		N/A		21/12/2012		Yes	Yes	Peer review	1

	doi:10.1111/j.1365-2966.2012.22136.x	Viel										
6	The intergalactic medium thermal history at redshift $z = 1.7-3.2$ from the Lyman-alpha forest: a comparison of measurements using wavelets and the flux distribution doi:10.1111/j.1365-2966.2012.21223.x	A. Garzilli, J. S. Bolton, T.-S. Kim, S. Leach, M. Viel	Mon. Not. R. Astron. Soc. 424, 1723–1736 (2012)		N/A		01/08/2012	Yes	Yes	Peer review	1	
7	The Lyman alpha forest flux probability distribution at $z > 3$? doi:10.1111/j.1365-2966.2012.20811.x	F. Calura, E. Tescari, V. D'Odorico, M. Viel, S. Cristiani, T.-S. Kim, and J. S. Bolton	Mon. Not. R. Astron. Soc. 422, 3019–3036 (2012)		N/A		01/06/2012	Yes	Yes	Peer review	1	
8	Clustering of submillimetre galaxies in a self-regulated baryon collapse model doi:10.1111/j.1365-2966.2012.20705.x	Jun-Qing Xia, M. Negrello, A. Lapi, G. De Zotti, L. Danese, M. Viel	Mon. Not. R. Astron. Soc. 422, 1324–1331 (2012)		N/A		01/05/2012	Yes	Yes	Peer review	1	
9	The non-linear matter power spectrum in warm dark matter cosmologies doi:10.1111/j.1365-2966.2011.19910.x	M. Viel, K. Markovic, M. Baldi, J. Weller	Mon. Not. R. Astron. Soc. 421, 50–62 (2012)		N/A		01/03/2012	Yes	Yes	Peer review	1	
10	Massive neutrinos and the non-linear matter power spectrum doi:10.1111/j.1365-2966.2011.20222.x	S. Bird,? M. Viel,? M. G. Haehnelt	Mon. Not. R. Astron. Soc. 420, 2551–2561 (2012)		N/A		01/03/2012	Yes	Yes	Peer review	1	
11	Effects of massive neutrinos on the large-scale structure of the Universe doi:10.1111/j.1365-2966.2011.19488.x	F. Marulli, C. Carbone, M. Viel, L. Moscardini, A. Cimatti	Mon. Not. R. Astron. Soc. 418, 346–356 (2011)		N/A		01/11/2011	Yes	Yes	Peer review	1	
12	A cross-correlation study of the Fermi-LAT gamma -ray diffuse extragalactic signal	Jun-Qing Xia,? A. Cuoco, E. Branchini, M.	Mon. Not. R. Astron. Soc. 416, 2247–2264 (2011)		N/A		01/09/2011	Yes	Yes	Peer review	1	

	doi:10.1111/j.1365-2966.2011.19200.x	Fornasa, M. Viel									
13	Galactic winds and extended Lyman-alpha emission from the host galaxies of high column density quasi-stellar object absorption systems doi:10.1111/j.1365-2966.2011.18789.x	L. A. Barnes, M.G. Haehnelt, E. Tescari, M. Viel	Mon. Not. R. Astron. Soc. 416, 1723–1738 (2011)		N/A		01/09/2011	Yes	Yes	Peer reviewed	
14	CROSS-CORRELATIONS OF THE Lyman-alpha FOREST WITH WEAK-LENSING CONVERGENCE. ANALYTICAL ESTIMATES OF SIGNAL-TO-NOISE RATIO AND IMPLICATIONS FOR NEUTRINO MASS AND DARK ENERGY doi:10.1088/0004-637X/735/1/38	A. Vallinotto, M. Viel, S. Das, and D. N. Spergel	The Astrophysical Journal, 735:38 (20pp), 2011 July 1		N/A		01/07/2011	Yes	Yes	Peer reviewed	
15	The impact of spatial fluctuations in the ultraviolet background on intergalactic carbon and silicon doi:10.1111/j.1365-2966.2011.18384.x	J. S. Bolton, M. Viel	Mon. Not. R. Astron. Soc. 414, 241–252 (2011)		N/A		01/06/2011	Yes	Yes	Peer reviewed	
16	STUDYING THE WARM-HOT INTERGALACTIC MEDIUM IN EMISSION doi:10.1088/0004-637X/734/2/91	Y. Takei, E. Ursino, E. Branchini, T. Ohashi, H. Kawahara, K. Mitsuda, L. Piro, A. Corsi, L. Amati, J. W. den Herder, M. Galeazzi, J. Kaastra, L. Moscardini, F. Nicastro, F. Paerels, M. Roncarelli, M. Viel	The Astrophysical Journal, 734:91 (18pp), 2011 June 20		N/A		20/06/2011	Yes	Yes	Peer reviewed	
17	Minimally parametric power spectrum reconstruction from the	S. Bird, H. V. Peiris, M.	Mon. Not. R. Astron. Soc. 413, 1717–1728 (2011)		N/A		01/05/2011	Yes	Yes	Peer reviewed	

	Lyman # forest doi:10.1111/j.1365-2966.2011.18245.x	Viel, L. Verde									
18	THE FATE OF DWARF GALAXIES IN CLUSTERS AND THE ORIGIN OF INTRACLUSTER STARS. II. COSMOLOGICAL SIMULATIONS doi:10.1088/0004-637X/757/1/48	H. Martel, P. Barai, W. Brito	The Astrophysical Journal, 734:91 (18pp), 2011 June 20		N/A		20/09/2012	Yes	Yes	Peer reviewe	1
19	Multiphase, non-spherical gas accretion on to a black hole doi:10.1111/j.1365-2966.2012.21260.x	P. Barai, D. Proga, K. Nagamine	Mon. Not. R. Astron. Soc. 424, 728–746 (2012)		N/A		01/07/2012	Yes	Yes	Peer reviewe	1
20	Coarsed grained cosmological perturbation theory doi:10.1088/1475-7516/2012/01/019	M. Pietroni, G. Mangano, N. Saviano, M. Viel	JCAP 01 (2012) 019		N/A		04/01/2012	Yes	Yes	Peer reviewe	1
21	Constraining neutrino properties with a Euclid galaxy cluster survey doi:10.1088/1475-7516/2013/06/020	M. Costanzi Alunno Cerbolini, B. Sartoris, J.-Q. Xia, A. Biviano, S. Borgani, M. Viel	JCAP (06) 2013 020		N/A		14/01/2013	Yes	Yes	Peer reviewe	1
22	Constraints on massive neutrinos from the CFHTLS angular power spectrum doi:10.1088/1475-7516/2012/06/010	Jun-Qing Xia, B. Granett, M. Viel, S. Bird, L. Guzzo, M.G. Haehnelt, J. Coupon, H.J. McCracken, Y. Mellier	JCAP (06) 2012 010		N/A		07/06/2012	Yes	Yes	Peer reviewe	1
23	Neutrino masses and cosmological parameters from a Euclid-like survey: Markov Chain Monte Carlo forecasts including theoretical errors doi:10.1088/1475-7516/2013/01/026	B. Audren, J. Lesgourgues, S. Bird, M.G. Haehnelt, M. Viel	JCAP 01 (2013) 026		N/A		22/01/2013	Yes	Yes	Peer reviewe	1
24	Non-linear evolution of the cosmic	F.	JCAP 03 (2013) 019		N/A		18/03/2013	Yes	Yes	Peer	

	neutrino background doi:10.1088/1475-7516/2013/03/019	Villaescusa-Navarro, S.Bird, C. Pena-Garay, M. Viel								reviewed
25	Cosmography beyond standard candles and rulers 10.1103/PhysRevD.85.043520	J.-Q. Xia, V. Vitagliano, S. Liberati, M. Viel	PHYSICAL REVIEW D 85, 043520 (2012)		N/A		21/02/2012	Yes	Yes	Peer reviewed
26	THE NINTH DATA RELEASE OF THE SLOAN DIGITAL SKY SURVEY: FIRST SPECTROSCOPIC DATA FROM THE SDSS-III BARYON OSCILLATION SPECTROSCOPIC SURVEY doi:10.1088/0007-0049/203/2/21	C.P.Ahn et al.	The Astrophysical Journal Supplement Series, 203:21 (13pp), 2012 December		N/A		01/12/2012	No	Yes	Peer reviewed
27	THE BARYON OSCILLATION SPECTROSCOPIC SURVEY OF SDSS-III doi:10.1088/0004-6256/145/1/10	K.S. Dawson et al.	The Astronomical Journal, 145:10 (41pp), 2013 January		N/A		01/01/2013	No	Yes	Peer reviewed
28	Warm dark matter as a solution to the small scale crisis: New constraints from high redshift Lyman- α forest data 10.1103/PhysRevD.88.043502	Viel, Matteo; Becker, George D.; Bolton, James S.; Haehnelt, Martin G.	Physical Review D, vol. 88, Issue 4, id. 043502		N/A		01/08/2013	Yes	Yes	Peer reviewed
29	Metals in the IGM approaching the re-ionization epoch: results from X-shooter at the VLT 10.1093/mnras/stt1365	D'Odorico, V.; Cupani, G.; Cristiani, S.; Maiolino, R.; Molaro, P.; Nonino, M.; Centurión, M.; Cimatti, A.; di Serego Alighieri, S.; Fiore, F.; Fontana, A.; Gallerani, S.; Giallongo, E.; Mannucci, F.; Marconi, A.;	Monthly Notices of the Royal Astronomical Society, Volume 435, Issue 2, p.1198-1232		N/A		01/10/2013	Yes	Yes	Peer reviewed

		Pentericci, L.; Viel, M.; Vladilo, G.											
30	The one-dimensional Ly α forest power spectrum from BOSS 10.1051/0004-6361/201322130	Palanque-DeLafont, Nathalie; Yèche, Christophe; Borde, Arnaud; Le Goff, Jean-Marc; Rossi, Graziano; Viel, Matteo; et al.	Astronomy & Astrophysics, Volume 559, id.A85, 19 pp.		N/A		01/11/2013		Yes	Yes	Peer review	1	
31	Cosmology with massive neutrinos III: the halo mass function and an application to galaxy clusters 10.1088/1475-7516/2013/12/012	Costanzi, Matteo; Villaescusa-Navarro, Francisco; Viel, Matteo; Xia, Jun-Qing; Borgani, Stefano; Castorina, Emanuele; Sefusatti, Emiliano	Journal of Cosmology and Astroparticle Physics, Issue 12, article id. 012, pp. (2013)		N/A		01/12/2013		Yes	Yes	Peer review	1	
32	The clustering of galaxies in the SDSS-III Baryon Oscillation Spectroscopic Survey: weighing the neutrino mass using the galaxy power spectrum of the CMASS sample 10.1093/mnras/stt1710	Zhao, Gong-Bo; Saito, Shun; Percival, Will J.; Ross, Ashley J.; Montesano, Francesco; Viel, Matteo; et al.	Monthly Notices of the Royal Astronomical Society, Volume 436, Issue 3, p.2038-2053		N/A		01/12/2013		Yes	Yes	Peer review	1	
33	Semi-analytic galaxy formation in massive neutrino cosmologies 10.1093/mnras/stu2705	Fontanot, Villaescusa-Navarro, Bianchi Viel	Monthly Notices of the Royal Astronomical Society	447	Blackwell Publishing		01/03/2015	3361-3367	Yes	Yes	Peer review	1	
34	Cross-correlating 21cm intensity maps with Lyman Break Galaxies in the post-reionization era	Francisco Villaescusa-Navarro, Matteo Viel,	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 03	Institute of Physics Publishing	United Kingdom	01/03/2015	034-034			Peer review	1	http://stacks.iop.org/1475-7516/2015/i=03/a=034?key=

	10.1088/1475-75 16/2015/03/034	David Alonso , Kanan K. Datta , Philip Bull , Mário G. Santos										crossref?.bb4115330e3e9f?bda7 8832ce63039?588
35	Galactic outflow and diffuse gas properties at $z \geq 1$ using different baryonic feedback models 10.1093/mnras/s tu2340	P. Barai , P. Monaco , G. Murante , A. Ragagnin , M. Viel	Monthly Notices of the Royal Astronomical Society	Vol. 447/Issue 1	Blackwell Publishing	United Kingdom	11/02/2015	266-286	Yes	Yes	Peer reviewe	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stu234?0
36	Constraint on neutrino masses from SDSS-III/BOSS Ly α forest and other cosmological probes 10.1088/1475- 7516/2015/02/045	Nathalie Palanque-DeLabrouille , Christophe Yèche , Julien Lesgourgues , Graziano Rossi , Arnaud Borde , Matteo Viel , Eric Aubourg , David Kirkby , Jean-Marc LeGoff , James Rich , Natalie Roe , Nicholas P. Ross , Donald P. Schneider , David Weinberg	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 02	Institute of Physics Publishing	United Kingdom	01/02/2015	045-045	Yes	Yes	Peer reviewe	http://stacks.iop.org/1475-7516/2015/i=0 2/a=0?45?key=crossref?.733630db73f5c5?0f12 a70176544cc?3d4
37	IGM CONSTRAINTS FROM THE SDSS-III/BOSS DR9 Ly α FOREST TRANSMISSION PROBABILITY DISTRIBUTION FUNCTION 10.1088/0004- 637X/799/2/196	Khee-Gan Lee , Joseph F. Hennawi , David N. Spergel , David H. Weinberg , David W. Hogg , Matteo Viel , James S. Bolton , Stephen Bailey , Matthew M. Pieri ,	Astrophysical Journal	Vol. 799/Issue 2	Institute of Physics Publishing	United Kingdom	01/02/2015	196	Yes	Yes	Peer reviewe	http://stacks.iop.org/0004-637X/799/i=2/ a=196??key=crossref.2?0812fef5899b746?a16f ce8082a22ca?9

		William Carithers , David J. Schlegel , Britt Lundgren , Nathalie Palanque-Delabrouille , Nao Suzuki , Donald P. Schneider , Christophe Yèche										
38	The first billion years of a warm dark matter universe 10.1093/mnras/s tu2304	U. Maio , M. Viel	Monthly Notices of the Royal Astronomical Society	Vol. 446/Issue 3	Blackwell Publishing	United Kingdom	21/01/2015	2760-2775	Yes	Yes	Peer review	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stu230?4
39	The halo model in a massive neutrino cosmology ? 10.1088/1475-75 16/2014/12/053	Elena Massara , Francisco Villaescusa-Navarro , Matteo Viel	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 12	Institute of Physics Publishing	United Kingdom	01/12/2014	053-053	Yes	Yes	Peer review	http://stacks.i?op.org/1475-751?6/2014/i=1 2/a=0?53?key=crossref?.846465cd6bfd87?ff31 8e53447546f?418
40	The Lyman # forest as a cosmic thermometer ? 10.1088/1475-75 16/2014/12/024	Vid Iršič , Matteo Viel	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 12	Institute of Physics Publishing	United Kingdom	01/12/2014	024-024	Yes	Yes	Peer review	http://stacks.i?op.org/1475-751?6/2014/i=1 2/a=0?24?key=crossref?.c121a517f5d9a9?fb30 e4919a9a3b4?ff1
41	Neutrino constraints: what large-scale structure and CMB data are telling us? ? 10.1088/1475-75 16/2014/10/081	Matteo Costanzi , Barbara Sartoris , Matteo Viel , Stefano Borgani	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 10	Institute of Physics Publishing	United Kingdom	01/10/2014	081-081	Yes	Yes	Peer review	http://stacks.i?op.org/1475-751?6/2014/i=1 0/a=0?81?key=crossref?.4afa37a028ddc5?41ca 8ab44fc34c6?a5d
42	Modeling the neutral hydrogen distribution in the post-reionization Universe: intensity mapping ? 10.1088/1475-75 16/2014/09/050	Francisco Villaescusa-Navarro , Matteo Viel , Kanan K Datta , T. Roy Choudhury	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 09	Institute of Physics Publishing	United Kingdom	01/09/2014	050-050	Yes	Yes	Peer review	http://stacks.i?op.org/1475-751?6/2014/i=0 9/a=0?50?key=crossref?.1df4c66356da0d?4905 8109672f596?631
43	A coarse grained perturbation theory for the Large Scale Structure, with	Alessandro Manzotti ,	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue	Institute of Physics Publishing	United Kingdom	01/09/2014	047-047	Yes	Yes	Peer review	http://stacks.i?op.org/1475-751?6/2014/i

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44	New approach for precise computation of Lyman- α forest power spectrum with hydrodynamical simulations 10.1088/1475-7516/2014/07/005	Arnaud Borde , Nathalie Palanque-Delabrouille , Graziano Rossi , Matteo Viel , James S. Bolton , Christophe Yèche , Jean-Marc LeGoff , Jim Rich	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 07	Institute of Physics Publishing	United Kingdom	01/07/2014	005-005	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2014/i=07/a=0705?key=crossref?9bed8514b50b65?156d8543f230ac5?089
45	Cosmic degeneracies - I. Joint N-body simulations of modified gravity and massive neutrinos 10.1093/mnras/stu259	M. Baldi , F. Villaescusa-Navarro , M. Viel , E. Puchwein , V. Springel , L. Moscardini	Monthly Notices of the Royal Astronomical Society	Vol. 440/Issue 1	Blackwell Publishing	United Kingdom	01/05/2014	75-88	Yes	Yes	Peer review	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stu259
46	Quasar-Lyman α forest cross-correlation from BOSS DR11: Baryon Acoustic Oscillations 10.1088/1475-7516/2014/05/027	Andreu Font-Ribera , David Kirkby , Nicolas Busca , Jordi Miralda-Escudé et al.	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 05	Institute of Physics Publishing	United Kingdom	01/05/2014	027-027	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2014/i=05/a=027?key=crossref?267e8aefd0333a?0632294bdc0c39
47	Simulated star formation rate functions at $z = 4-7$, and the role of feedback in high- z galaxies 10.1093/mnras/stt2461	E. Tescari , A. Katsianis , J. S. B. Wyithe , K. Dolag , L. Tornatore , P. Barai , M. Viel , S. Borgani	Monthly Notices of the Royal Astronomical Society	Vol. 438/Issue 4	Blackwell Publishing	United Kingdom	11/03/2014	3490-3506	Yes	Yes	Peer review	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stt2461
48	A consistent determination of the temperature of the intergalactic medium at redshift $\langle z \rangle = 2.4$ 10.1093/mnras/stt2374	J. S. Bolton , G. D. Becker , M. G. Haehnelt , M. Viel	Monthly Notices of the Royal Astronomical Society	Vol. 438/Issue 3	Blackwell Publishing	United Kingdom	01/03/2014	2499-2507	Yes	Yes	Peer review	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stt2374

49	Cosmology with massive neutrinos I: towards a realistic modeling of the relation between matter, haloes and galaxies 10.1088/1475-7516/2014/03/011	Francisco Villaescusa-Navarro , Federico Marulli , Matteo Viel , Enzo Branchini , Emanuele Castorina , Emiliano Sefusatti , Shun Saito	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 03	Institute of Physics Publishing	United Kingdom	01/03/2014	011-011	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2014/i=03/a=011?key=crossref.11186547f331e6?cd3f0c25e765947?0c4
50	The Sloan Digital Sky Survey quasar catalog: tenth data release 10.1051/0004-6361/201322691	Isabelle Pâris , Patrick Petitjean , Éric Aubourg , Nicholas P. Ross , et al.	Astronomy and Astrophysics	Vol. 563	EDP Sciences	France	01/03/2014	A54			Peer review	http://www.aand?arxiv=10.1051/0004-6361/201322691
51	The SDSS-III Baryonic Oscillation Spectroscopic Survey: constraints on the integrated Sachs-Wolfe effect ? 10.1093/mnras/stt2312	C. Hernandez-Monteagudo , A. J. Ross , A. Cuesta , R. Genova-Santos , J.-Q. Xia , F. Prada , G. Rossi , M. Neyrinck , M. Viel , J.-A. Rubino-Martin , C. G. Scoccola , G. Zhao , D. P. Schneider , J. R. Brownstein , D. Thomas , J. V. Brinkmann	Monthly Notices of the Royal Astronomical Society	Vol. 438/Issue 2	Blackwell Publishing	United Kingdom	21/02/2014	1724-1740	Yes	Yes	Peer review	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stt2312
52	Cosmology with massive neutrinos II: on the universality of the halo mass function and bias 10.1088/1475-7516/2014/02/049	Emanuele Castorina , Emiliano Sefusatti , Ravi K. Sheth , Francisco Villaescusa-Navarro , Matteo Viel	Journal of Cosmology and Astroparticle Physics	Vol. 2014/Issue 02	Institute of Physics Publishing	United Kingdom	01/02/2014	049-049	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2014/i=02/a=049?key=crossref.dac2d9393a6a8c?2907ea8fa057026?34c

53	Lyman- α Forest and Cosmic Weak Lensing in a Warm Dark Matter Universe ? 10.1017/pasa.2013.43	Katarina Markovi β , Matteo Viel	Publications of the Astronomical Society of Australia	Vol. 31	CSIRO	Australia	01/01/2014	XXX	Yes	Yes	Peer reviewe	http://www.journals.cambridge.org/abstract/S1300043X
54	Kinetic or thermal AGN feedback in simulations of isolated and merging disc galaxies calibrated by the M-r relation 10.1093/mnras/stt1977	P. Barai , M. Viel , G. Murante , M. Gaspari , S. Borgani	Monthly Notices of the Royal Astronomical Society	Vol. 437/Issue 2	Blackwell Publishing	United Kingdom	11/01/2014	1456-1475	Yes	Yes	Peer reviewe	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stt1977
55	TOMOGRAPHY OF THE FERMI-LAT γ -RAY DIFFUSE EXTRAGALACTIC SIGNAL VIA CROSS CORRELATIONS WITH GALAXY CATALOGS ? 10.1088/0067-0049/217/1/15	Jun-Qing Xia , Alessandro Cuoco , Enzo Branchini , Matteo Viel	Astrophysical Journal, Supplement Series	Vol. 217/Issue 1	Institute of Physics Publishing	United Kingdom	01/03/2015	15	Yes	Yes	Peer reviewe	http://stacks.iop.org/0067-0049/217/i=1/a=15?key=crossref.d966ba7af3d92dd6e
56	VIDE: The Void Identification and Examination toolkit 10.1016/j.ascom.2014.10.002	P.M. Sutter , G. Lavaux , N. Hamaus , A. Pisani , B.D. Wandelt , M. Warren , F. Villaescusa-Navarro , P. Zivick , Q. Mao , B.B. Thompson	Astronomy and Computing	Vol. 9	Elsevier	Netherlands	01/03/2015	1-9	Yes	Yes	Peer reviewe	http://linkinghub.elsevier.com/retrieve/pii/S221313371400049?3
57	Constraining warm dark matter with high-z supernova lensing ? 10.1093/mnras/stu785	S. Pandolfi , C. Evoli , A. Ferrara , F. Villaescusa-Navarro	Monthly Notices of the Royal Astronomical Society	Vol. 442/Issue 1	Blackwell Publishing	United Kingdom	21/07/2014	13-19	Yes	Yes	Peer reviewe	http://mnras.oxfordjournals.org/cgi/doi/10.1093/mnras/stu785
58	Black hole spin dependence of general relativistic multi-transonic accretion close to the horizon 10.1016/j.newast.2014.11.007	Tapas K. Das , Sankhasubhra Nag , Swathi Hegde , Sourav Bhattacharya , Ishita Maity , Bozena Czerny , Paramita Barai , Paul J.	New Astronomy	Vol. 37	Elsevier	Netherlands	01/05/2015	81-104	Yes	Yes	Peer reviewe	http://linkinghub.elsevier.com/retrieve/pii/S138410761400183?3

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59	MAJOR CLUSTER MERGERS AND THE LOCATION OF THE BRIGHTEST CLUSTER GALAXY ? 10.1088/0004-63 7X/786/2/79	Hugo Martel , Fidèle Robichaud , Paramita Barai	Astrophysical Journal	Vol. 786/Issue 2	Institute of Physics Publishing	United Kingdom	10/05/2014	79	Yes	Yes	Peer reviewe	<a href="http://stacks.i?op.o
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60	THE BOSS Ly# FOREST SAMPLE FROM SDSS DATA RELEASE 9 10.1088/0004-62 56/145/3/69	Khee-Gan Lee , Stephen Bailey , Leslie E. Bartsch , William Carithers , Kyle S. Dawson , David Kirkby , Britt Lundgren , Daniel Margala , Nathalie Palanque-Delabrouille , Matthew M. Pieri , David J. Schlegel , David H. Weinberg , Christophe Yèche , Éric Aubourg , Julian Bautista , Dmitry Bizyaev , Michael Blomqvist , Adam S. Bolton , Arnaud Borde , Howard Brewington , Nicolás G. Busca ,	Astronomical Journal	Vol. 145/Issue 3	Institute of Physics Publishing	United Kingdom	01/03/2013	69			Peer reviewe	<a href="http://stacks.i?op.o
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61	Fitting methods for baryon acoustic oscillations in the Lyman- α forest fluctuations in BOSS data release 9 ? 10.1088/1475-7516/2013/03/024	David Kirkby , Daniel Margala , Anže Slosar , Stephen Bailey , Nicolás G Busca , Timothée Delubac , James Rich , Julian E Bautista , Michael Blomqvist , Joel R Brownstein , Bill Carithers , Rupert A.C Croft , Kyle S Dawson , Andreu Font-Ribera , Jordi Miralda-Escudé , Adam D Myers , Robert C Nichol , Nathalie Palanque-Delabrouille , Isabelle Pâris , Patrick Petitjean , Graziano Rossi , David J Schlegel ,	Journal of Cosmology and Astroparticle Physics	Vol. 2013/Issue 03	Institute of Physics Publishing	United Kingdom	01/03/2013	024-024			Peer reviewe	http://stacks.iop.org/1475-7516/2013/i=03/a=0?24?key=crossref?.153b09c872fa52?3ecc2b3fc744034?5a8

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62	Baryon acoustic oscillations in the Ly # forest of BOSS quasars 10.1051/0004-63 61/201220724	N. G. Busca , T. Delubac , J. Rich , S. Bailey , A. Font-Ribera ,et al.	Astronomy and Astrophysics	Vol. 552	EDP Sciences	France	01/04/2013	A96			Peer reviewed	http://www.aand?ar.g/10.1051/0?004-6361/2 01220?724	
63	Measurement of baryon acoustic oscillations in the Lyman-# forest fluctuations in BOSS data release 9 10.1088/1475-75 16/2013/04/026	Anže Slosar , Vid Iršič , David Kirkby , Stephen Bailey , Nicolás G Busca , et al.	Journal of Cosmology and Astroparticle Physics	Vol. 2013/Issue 04	Institute of Physics Publishing	United Kingdom	01/04/2013	026-026			Peer reviewed	http://stacks.i?op.o.rg/1475-751?6/2013/i=0 4/a=0?26?key=crossref?.371545f2038e27?b9e8 3ecaed db854?24b	
64	THE PROPERTIES OF LOW REDSHIFT INTERGALACTIC O VI ABSORBERS DETERMINED FROM HIGH S/N OBSERVATIONS OF 14 QSOs WITH THE COSMIC ORIGINS SPECTROGRAPH ? ?10.1088/0067-0 049/212/1/8	B. D. Savage , T.-S. Kim , B. P. Wakker , B. Keeney , J. M. Shull , J. T. Stocke , J. C. Green	Astrophysical Journal, Supplement Series	Vol. 212/Issue 1	Institute of Physics Publishing	United Kingdom	01/05/2014	8	Yes	Yes	Peer reviewed	http://stacks.i?op.o.rg/0067-004?9/212/i=1/ a=8?k?ey=crossref.100?e2de93dfbf b840?5e49 05a3a9 8ca8	
65	ABSORPTION-LINE DETECTIONS OF 10 5 -10 6 K GAS IN SPIRAL-RICH GROUPS OF GALAXIES 10.1088/0004- 637X/791/2/128	John T. Stocke , Brian A. Keeney , Charles W. Danforth , David Syphers , H. Yamamoto , J. Michael Shull , James C. Green , Cynthia Froning , Blair D. Savage , Bart Wakker , Tae-Sun Kim	Astrophysical Journal	Vol. 791/Issue 2	Institute of Physics Publishing	United Kingdom	20/08/2014	128	Yes	Yes	Peer reviewed	http://stacks.i?op.o.rg/0004-637?X/791/i=2/ a=128??key=cr ossref.5?eb751749f71 71ca?80b1 81c95e 062b5?5	

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66	PROBING THE FERMI BUBBLES IN ULTRAVIOLET ABSORPTION: A SPECTROSCOPIC SIGNATURE OF THE MILKY WAY'S BICONICAL NUCLEAR OUTFLOW 10.1088/2041-8205/799/1/L7	Andrew J. Fox , Rongmon Bordoloi , Blair D. Savage , Felix J. Lockman , Edward B. Jenkins , Bart P. Wakker , Joss Bland-Hawthorn , Svea Hernandez , Tae-Sun Kim , Robert A. Benjamin , David V. Bowen , Jason Tumlinson	Astrophysical Journal Letters	Vol. 799/Issue 1	Institute of Physics Publishing	United Kingdom	20/01/2015	L7	Yes	Yes	Peer review	http://stacks.iop.org/2041-8205/799/i=1/a=L7?key=crossref.50734c0610ae736629787a86e9a23f9e36
67	Particle Dark Matter Searches Outside the Local Group 10.1103/PhysRevLett.114.241301	Regis, Marco; Xia, Jun-Qing; Cuoco, Alessandro; Branchini, Enzo; Fornengo, Nicolao; Viel, 1	Physical Review Letters	114	American Physical Society		19/06/2015	1-6	Yes	No	Peer review	http://adsabs.harvard.edu/abs/2015PhRvL.114x17301R
68	THE ELEVENTH AND TWELFTH DATA RELEASES OF THE SLOAN DIGITAL SKY SURVEY: FINAL DATA FROM SDSS-III 10.1088/0067-0049/219/1/12	Shadab Alam et. al	Astrophysical Journal, Supplement Series	Vol. 219/Issue 1	Institute of Physics Publishing	United Kingdom	20/07/2015	12	No	Yes	Peer review	http://stacks.iop.org/0067-0049/219/i=1/a=12?key=crossref.9b782c10044d9c570d778627932bca465
69	The effect of massive neutrinos on the BAO peak 10.1088/1475-7516/2015/07/001	Marco Peloso , Massimo Pietroni , Matteo Viel , Francisco	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 07	Institute of Physics Publishing	United Kingdom	01/07/2015	001-001	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2015/i=07/a=0701?key=crossref.87031f36394645f45c07c039

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70	Warm dark matter signatures on the 21cm power spectrum: intensity mapping forecasts for SKA 10.1088/1475-7516/2015/07/047	Isabella P. Carucci , Francisco Villaescusa-Navarro , Matteo Viel , Andrea Lapi	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 07	Institute of Physics Publishing	United Kingdom	01/07/2015	047-047	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2015/i=07/a=0?47?key=crossref?.6bbe02d1d67132?35a385876193549?03d
71	Neutrino masses and cosmology with Lyman-alpha forest power spectrum 10.1088/1475-7516/2015/11/011	Nathalie Palanque-DeLabrouille , Christophe Yèche , Julien Baur , Christophe Magneville , Graziano Rossi , Julien Lesgourgues , Arnaud Borde , Etienne Burtin , Jean-Marc LeGoff , James Rich , Matteo Viel , David Weinberg	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 11	Institute of Physics Publishing	United Kingdom	01/11/2015	011-011	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2015/i=11/a=0?11?key=crossref?.0399cabe01b99a?665b6b6ee06ce76?9b9
72	Relativistic effects in Lyman-# forest 10.1088/1475-7516/2016/02/051	Vid Iršič , Enea Di Dio , Matteo Viel	Journal of Cosmology and Astroparticle Physics	Vol. 2016/Issue 02	Institute of Physics Publishing	United Kingdom	01/02/2016	051-051	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2016/i=02/a=0?51?key=crossref?.e8a64aa0fc3737?cbd752fcb40bf0d?1b3
73	Neutral hydrogen in galaxy clusters: impact of AGN feedback and implications for intensity mapping 10.1093/mnras/stv2904	Francisco Villaescusa-Navarro , Susana Planellas , Stefano Borgani , Matteo Viel , Elena Rasia , Giuseppe Murante , Klaus Dolag , Lisa K. Steinborn ,	Monthly Notices of the Royal Astronomical Society	Vol. 456/Issue 4	Blackwell Publishing	United Kingdom	11/03/2016	3553-3570	Yes	Yes	Peer review	https://academic.oup.com/mnras/article-lookup/doi/10.1093/mnras/stv2904

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74	Large-scale clustering of Lyman # emission intensity from SDSS/BOSS 10.1093/mnras/stw204	Rupert A. C. Croft et al.	Monthly Notices of the Royal Astronomical Society	Vol. 457/Issue 4	Blackwell Publishing	United Kingdom	21/04/2016	3541-3572	Yes	Yes	Peer reviewed	https://academic.oup.com/mnras/article-lookup/doi/10.1093/mnras/stw204
75	Lyman-alpha forests cool warm dark matter 10.1088/1475-7516/2016/08/012	Julien Baur , Nathalie Palanque-Delabrouille , Christophe Yèche , Christophe Magneville , Matteo Viel	Journal of Cosmology and Astroparticle Physics	Vol. 2016/Issue 08	Institute of Physics Publishing	United Kingdom	01/08/2016	012-012	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2016/i=08/a=0?12?key=crossref.6feac39b33e840?1b811bbe7ae41bc?867
76	The VIMOS Public Extragalactic Redshift Survey (VIPERS) 10.1051/0004-6361/201424448	C. Di Porto et al.	Astronomy and Astrophysics	Vol. 594	EDP Sciences	France	01/10/2016	A62			Peer reviewed	http://www.aandp.org/10.1051/0?004-6361/201424448
77	XQ-100: A legacy survey of one hundred 3.5 # z # 4.5 quasars observed with VLT/X-shooter 10.1051/0004-6361/201628161	S. López , V. D'Odorico , S. L. Ellison , G. D. Becker , L. Christensen , G. Cupani , K. D. Denney , I. Pâris , G. Worseck , T. A. M. Berg , S. Cristiani , M. Dessauges-Zavadsky , M. Haehnelt , F. Hamann , J. Hennawi , V. Iršič , T.-S. Kim , P. López , R. Lund Saust , B. Ménard , S. Perrotta , J. X. Prochaska , R. Sánchez-Ramírez	Astronomy and Astrophysics	Vol. 594	EDP Sciences	France	01/10/2016	A91	Yes	Yes	Peer reviewed	http://www.aandp.org/10.1051/0?004-6361/201628161

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78	Metals in the z # 3 intergalactic medium: results from an ultra-high signal-to-noise ratio UVES quasar spectrum 10.1093/mnras/stw2161	V. D'Odorico , S. Cristiani , E. Pomante , R. F. Carswell , M. Viel , P. Barai , G. D. Becker , F. Calura , G. Cupani , F. Fontanot , M. G. Haehnelt , T-S. Kim , J. Miralda-Escudé , A. Rorai , E. Tescari , E. Vanzella	Monthly Notices of the Royal Astronomical Society	Vol. 463/Issue 3	Blackwell Publishing	United Kingdom	11/12/2016	2690-2707	Yes	Yes	Peer reviewed	https://academic.oup.com/mnras/article-lookup/doi/10.1093/mnras/stw2161
79	The Sherwood simulation suite: overview and data comparisons with the Lyman # forest at redshifts 2 # z # 5 10.1093/mnras/stw2397	James S. Bolton , Ewald Puchwein , Debora Sijacki , Martin G. Haehnelt , Tae-Sun Kim , Avery Meiksin , John A. Regan , Matteo Viel	Monthly Notices of the Royal Astronomical Society	Vol. 464/Issue 1	Blackwell Publishing	United Kingdom	01/01/2017	897-914	Yes	Yes	Peer reviewed	https://academic.oup.com/mnras/article-lookup/doi/10.1093/mnras/stw2397
80	The Sloan Digital Sky Survey Quasar Catalog: Twelfth data release 10.1051/0004-6361/201527999	Isabelle Paris et al.	Astronomy and Astrophysics	Vol. 597	EDP Sciences	France	01/01/2017	A79	No	Yes	Peer reviewed	http://www.aanda.org/article/10.1051/0004-6361/201527999
81	Cosmological implications of baryon acoustic oscillation measurements 10.1103/PhysRevD.92.123516	Éric Aubourg et al.	Physical Review D - Particles, Fields, Gravitation and Cosmology	Vol. 92/Issue 12	American Physical Society	United States	01/12/2015	1-30	No	Yes	Peer reviewed	http://link.aps.org/doi/10.1103/PhysRevD.92.123516
82	The contribution of light Majorana neutrinos to neutrinoless double beta decay and cosmology	S. Dell'Oro , S. Marcocci , M. Viel , F.	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 12	Institute of Physics Publishing	United Kingdom	01/12/2015	023-023	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2015/i=12/a=023?key=

	10.1088/1475-7516/2015/12/023	Vissani										crossref?.b4099927366dbd?853b c118234d342?049
83	The non-linear power spectrum of the Lyman alpha forest 10.1088/1475-7516/2015/12/017	Andreu Arinyo-i-Prats , Jordi Miralda-Escudé , Matteo Viel , Renyue Cen	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 12	Institute of Physics Publishing	United Kingdom	01/12/2015	017-017	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2015/i=12/a=0?17?key=crossref?.f14e36eaa607c8?81b701c30ef84bc?49a
84	DARK MATTER SEARCHES IN THE GAMMA-RAY EXTRAGALACTIC BACKGROUND VIA CROSS-CORRELATIONS WITH GALAXY CATALOGS 10.1088/0067-0049/221/2/29	Alessandro Cuoco , Jun-Qing Xia , Marco Regis , Enzo Branchini , Nicolao Fornengo , Matteo Viel	Astrophysical Journal, Supplement Series	Vol. 221/Issue 2	Institute of Physics Publishing	United Kingdom	01/12/2015	29	Yes	Yes	Peer review	http://stacks.iop.org/0067-0049/221/i=2/a=29?key=crossref.1b?6b67a002afb9ac?2f92be447c9e1e3
85	WEIGHING NEUTRINOS WITH COSMIC NEUTRAL HYDROGEN 10.1088/0004-637X/814/2/146	Francisco Villaescusa-Navarro , Philip Bull , Matteo Viel	Astrophysical Journal	Vol. 814/Issue 2	Institute of Physics Publishing	United Kingdom	01/12/2015	146	Yes	Yes	Peer review	http://stacks.iop.org/0004-637X/814/i=2/a=146?key=crossref.5?24ae2191f8d6592?7f154de6ce777de?9
86	Voids in massive neutrino cosmologies http://dx.doi.org/10.1088/1475-7516/2015/11/018	Elena Massara , Francisco Villaescusa-Navarro , Matteo Viel , P.M. Sutter	Journal of Cosmology and Astroparticle Physics	Vol. 2015/Issue 11	Institute of Physics Publishing	United Kingdom	01/11/2015	018-018	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2015/i=11/a=0?18?key=crossref?.dd91358b2e5e0b?a0a062b58022975?a14
87	A White Paper on keV sterile neutrino Dark Matter 10.1088/1475-7516/2017/01/025	R. Adhikari et al.	Journal of Cosmology and Astroparticle Physics	Vol. 2017/Issue 01	Institute of Physics Publishing	United Kingdom	01/01/2017	025-025	Yes	Yes	Peer review	http://stacks.iop.org/1475-7516/2017/i=01/a=0?25?key=crossref?.bada2c09a5e036?91e66d8233961ff?157
88	Triple-ionized carbon associated with the low-density neutral hydrogen gas at $1.7 < z < 3.3$: the integrated N HI – N CIV relation 10.1093/mnras/stv2990	T.-S. Kim , R. F. Carswell , C. Mongardi , A. M. Partl , J. P. Mücke , P. Barai , S. Cristiani	Monthly Notices of the Royal Astronomical Society	Vol. 457/Issue 2	Blackwell Publishing	United Kingdom	01/04/2016	2005-2028	Yes	Yes	Peer review	https://academic.oup.com/mnras/article-lookup/doi/10.1093/mnras/stv2990

89	Evidence of bimodal physical properties of intervening, optically thin C iii absorbers at z # 2.5 10.1093/mnras /stv2847	T.-S. Kim , R. F. Carswell , D. Ranquist	Monthly Notices of the Royal Astronomical Society	Vol. 456/Issue 4	Blackwell Publishing	United Kingdom	11/03/2016	3509-3534	Yes	Yes	Peer reviewed	https://academic.oup.com/mnras/article-lookup/doi/10.1093/mnras/stv2847
90	MAPPING THE NUCLEAR OUTFLOW OF THE MILKY WAY: STUDYING THE KINEMATICS AND SPATIAL EXTENT OF THE NORTHERN FERMI BUBBLE ? 10.3847/1538-43 57/834/2/191	Rongmon Bordoloi , Andrew J. Fox , Felix J. Lockman , Bart P. Wakker , Edward B. Jenkins , Blair D. Savage , Svea Hernandez , Jason Tumlinson , Joss Bland-Hawthorn , Tae-Sun Kim	Astrophysical Journal	Vol. 834/Issue 2	Institute of Physics Publishing	United Kingdom	10/01/2017	191	Yes	Yes	Peer reviewed	http://stacks.iop.org/0004-637X/834/i=2/a=191?key=crossref.87708dc8c19b71d8?fa072ac5bdb5969?9
91	NEARBY GALAXY FILAMENTS AND THE Ly # FOREST: CONFRONTING SIMULATIONS AND THE UV BACKGROUND WITH OBSERVATIONS 10.1088/0004- 637X/814/1/40	Bart P. Wakker , Audra K. Hernandez , David M. French , Tae-Sun Kim , Benjamin D. Oppenheimer , Blair D. Savage	Astrophysical Journal	Vol. 814/Issue 1	Institute of Physics Publishing	United Kingdom	20/11/2015	40	Yes	Yes	Peer reviewed	http://stacks.iop.org/0004-637X/814/i=1/a=40?key=crossref.a7?9d6e7041122e7e9?093cf5e2149f6b3
92	THE PROPERTIES OF LOW REDSHIFT INTERGALACTIC O VI ABSORBERS DETERMINED FROM HIGH S/N OBSERVATIONS OF 14 QSOs WITH THE COSMIC ORIGINS SPECTROGRAPH ? 10.1088/0067-00 49/212/1/8	B. D. Savage , T.-S. Kim , B. P. Wakker , B. Keeney , J. M. Shull , J. T. Stocke , J. C. Green	Astrophysical Journal, Supplement Series	Vol. 212/Issue 1	Institute of Physics Publishing	United Kingdom	01/05/2014	8	Yes	Yes	Peer reviewed	http://stacks.iop.org/0067-0049/212/i=1/a=8?key=crossref.100?e2de93dfbfbb840?5e4905a3a98ca8
93	ABSORPTION-LINE DETECTIONS OF 10 5 -10 6 K GAS IN SPIRAL-RICH GROUPS OF GALAXIES	John T. Stocke , Brian A. Keeney , Charles W.	Astrophysical Journal	Vol. 791/Issue 2	Institute of Physics Publishing	United Kingdom	20/08/2014	128	Yes	Yes	Peer reviewed	http://stacks.iop.org/0004-637X/791/i=2/a=128?key=crossref.5?eb751749f71

	10.1088/0004- 637X/791/2/128	Danforth , David Syphers , H. Yamamoto , J. Michael Shull , James C. Green , Cynthia Froning , Blair D. Savage , Bart Wakker , Tae-Sun Kim , Emma V. Ryan-Weber , Glenn G. Kacprzak										71ca?80b1 81c95e 062b5?5
94	PROBING THE FERMI BUBBLES IN ULTRAVIOLET ABSORPTION: A SPECTROSCOPIC SIGNATURE OF THE MILKY WAY'S BICONICAL NUCLEAR OUTFLOW http://dx.doi.org/10.1088/2041-8205/799/1/L7	Andrew J. Fox , Rongmon Bordoloi , Blair D. Savage , Felix J. Lockman , Edward B. Jenkins , Bart P. Wakker , Joss Bland-Hawthorn , Svea Hernandez , Tae-Sun Kim , Robert A. Benjamin , David V. Bowen , Jason Tumlinson	Astrophysical Journal Letters	Vol. 799/Issue 1	Institute of Physics Publishing	United Kingdom	20/01/2015	L7	Yes	Yes	Peer reviewed	http://stacks.iop.org/2041-8205/799/i=1/a=L7?key=crossref.50?34c0610ae736629?87a8 6e9a23f9e36
95	Simulating cosmologies beyond #CDM with PINOCCHIO 10.1088/1475-75 16/2017/01/008	Luca A. Rizzo , Francisco Villaescusa-Navarro , Pierluigi Monaco , Emiliano Munari , Stefano Borgani ,	Journal of Cosmology and Astroparticle Physics	Vol. 2017/Issue 01	Institute of Physics Publishing	United Kingdom	01/01/2017	008-008	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2017/i=01/a=0?08?key=crossref?.7d809b4effefb9?2197 0fcdf8cd625?f19

		Emanuele Castorina , Emiliano Sefusatti										
96	Curvature constraints from large scale structure 10.1088/1475-7516/2016/06/013	Enea Di Dio , Francesco Montanari , Alvise Raccanelli , Ruth Durrer , Marc Kamionkowski , Julien Lesgourgues	Journal of Cosmology and Astroparticle Physics	Vol. 2016/Issue 06	Institute of Physics Publishing	United Kingdom	01/06/2016	013-013	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2016/i=06/a=0?13?key=crossref?.4000da7cb26013?ceb6cf31168db66?703
97	The bispectrum of relativistic galaxy number counts 10.1088/1475-7516/2016/01/016	Enea Di Dio , Ruth Durrer , Giovanni Marozzi , Francesco Montanari	Journal of Cosmology and Astroparticle Physics	Vol. 2016/Issue 01	Institute of Physics Publishing	United Kingdom	01/01/2016	016-016	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2016/i=01/a=0?16?key=crossref?.b5c6205ad20d0e?2a3e5158336af8?a70
98	CMB-lensing beyond the Born approximation 10.1088/1475-7516/2016/09/028	Giovanni Marozzi , Giuseppe Fanizza , Enea Di Dio , Ruth Durrer	Journal of Cosmology and Astroparticle Physics	Vol. 2016/Issue 09	Institute of Physics Publishing	United Kingdom	01/09/2016	028-028	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2016/i=09/a=0?28?key=crossref?.d34d152769c0ce?c1b242cb9f6ed35?aba
99	Constraints on primordial non-Gaussianity from large scale structure probes 10.1088/1475-7516/2011/08/033	Jun-Qing Xia , Carlo Baccigalupi , Sabino Matarrese , Licia Verde , Matteo Viel	Journal of Cosmology and Astroparticle Physics	Vol. 2011/Issue 08	Institute of Physics Publishing	United Kingdom	01/08/2011	033-033	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2011/i=08/a=0?33?key=crossref?.6bc704338e49a6?01ad8534aa4f84b?c55
100	Exploring the thermal state of the low-density intergalactic medium at $z = 3$ with an ultrahigh signal-to-noise QSO spectrum 10.1093/mnras/stw2917	A. Rorai , G. D. Becker , M. G. Haehnelt , R. F. Carswell , J. S. Bolton , S. Cristiani , V. D'Odorico , G. Cupani , P. Barai , F. Calura , T.-S.	Monthly Notices of the Royal Astronomical Society	Vol. 466/Issue 3	Blackwell Publishing	United Kingdom	21/04/2017	2690- 2709	Yes	Yes	Peer reviewed	http://mnras.oxfordjournals.org/lookup/doi/10.1093/mnras/stw2917

		Kim , E. Pomante , E. Tescari , M. Viel										
101	Suite of hydrodynamical simulations for the Lyman- α forest with massive neutrinos 10.1051/0004-6361/201423507	Graziano Rossi , Nathalie Palanque-Delabrouille , Arnaud Borde , Matteo Viel , Christophe Yèche , James S. Bolton , James Rich , Jean-Marc Le Goff	Astronomy and Astrophysics	Vol. 567	EDP Sciences	France	01/07/2014	A79	Yes	Yes	Peer reviewed	http://www.aandp.org/10.1051/0004-6361/201423507
102	MAPPING THE NUCLEAR OUTFLOW OF THE MILKY WAY: STUDYING THE KINEMATICS AND SPATIAL EXTENT OF THE NORTHERN FERMI BUBBLE 10.3847/1538-4357/834/2/191	Rongmon Bordoloi , Andrew J. Fox , Felix J. Lockman , Bart P. Wakker , Edward B. Jenkins , Blair D. Savage , Svea Hernandez , Jason Tumlinson , Joss Bland-Hawthorn , Tae-Sun Kim	Astrophysical Journal	Vol. 834/Issue 2	Institute of Physics Publishing	United Kingdom	10/01/2017	191	Yes	Yes	Peer reviewed	http://stacks.iop.org/0004-637X/834/i=2/a=191?key=crossref.77708dc8c19b71d8?fa072ac5bd6b5969?9
103	Simulating cosmologies beyond Λ CDM with PINOCCHIO 10.1088/1475-7516/2017/01/008	Luca A. Rizzato , Francisco Villaescusa-Navarro , Pierluigi Monaco , Emiliano Munari , Stefano Borgani , Emanuele Castorina ,	Journal of Cosmology and Astroparticle Physics	Vol. 2017/Issue 01	Institute of Physics Publishing	United Kingdom	01/01/2017	008-008	Yes	Yes	Peer reviewed	http://stacks.iop.org/1475-7516/2017/i=01/a=0?08?key=crossref.7d809b4effefb9?21970fc8cd625?f19

		Emiliano Sefusatti										
104	CROSS-CORRELATING THE # -RAY SKY WITH CATALOGS OF GALAXY CLUSTERS 10.3847/1538-43 65/228/1/8	Enzo Branchini , Stefano Camera , Alessandro Cuoco , Nicolao Fornengo , Marco Regis , Matteo Viel , Jun-Qing Xia	Astrophysical Journal, Supplement Series	Vol. 228/Issue 1	Institute of Physics Publishing	United Kingdom	01/01/2017	8	Yes	Yes	Peer reviewed	<a href="http://stacks.i?op.o
rg/0067-004?9/228/i=
1/ a=8?k?ey=crossref.
0a7?cf8a133e361
ed1e?dfe3 1e4546
5010">http://stacks.i?op.o rg/0067-004?9/228/i= 1/ a=8?k?ey=crossref. 0a7?cf8a133e361 ed1e?dfe3 1e4546 5010
105	Initial conditions for accurate N -body simulations of massive neutrino cosmologies ? 10.1093/mnras/s tw3340	M. Zennaro , J. Bel , F. Villaescusa-Navarro , C. Carbone , E. Sefusatti , L. Guzzo	Monthly Notices of the Royal Astronomical Society	Vol. 466/Issue 3	Blackwell Publishing	United Kingdom	21/04/2017	3244- 3258			Peer reviewed	<a href="http://mnras.ox?ford
journals.or?g/lookup
/d oi/10?.1093/mnras/
stw?3340">http://mnras.ox?ford journals.or?g/lookup /d oi/10?.1093/mnras/ stw?3340
106	Diagnosing galactic feedback with line broadening in the low redshift Lyman-# forest <a href="https://doi.org /10.1093/mnrasl
/slx004">https://doi.org /10.1093/mnrasl /slx004	Matteo Viel , Martin G. Haehnelt , James S. Bolton , Tae-Sun Kim , Ewald Puchwein , Fahad Nasir , Bart P. Wakker	Monthly Notices Letters of the Royal Astronomical Society	in press	Blackwell Publishing	United Kingdom	11/01/2017	slx004	Yes	Yes	Peer reviewed	<a href="https://academi?c.ou
p.com/mnras?l/articl
e- looku?p/doi/10.109
3/m?nrasl/slx004">https://academi?c.ou p.com/mnras?l/articl e- looku?p/doi/10.109 3/m?nrasl/slx004
107	The Lyman-alpha forest power spectrum from the XQ-100 Legacy Survey 10.1093/mnras/s tw3372	Vid Irši# , Matteo Viel , Trystyn A. M. Berg , Valentina D'Odorico , Martin G. Haehnelt , Stefano Cristiani , Guido Cupani , Tae-Sun Kim , Sebastian López , Sara	Monthly Notices of the Royal Astronomical Society	in press	Blackwell Publishing	United Kingdom	01/02/2017	stw3372	Yes	Yes	Peer reviewed	<a href="https://academi?c.ou
p.com/mnras?/articl
-l ookup?/doi/10.1093
/mn?ras/stw3372">https://academi?c.ou p.com/mnras?/articl -l ookup?/doi/10.1093 /mn?ras/stw3372

		Ellison , George D. Becker , Lise Christensen , Kelly D. Denney , Gábor Worseck , James S. Bolton										
108	Constraining f(R) gravity with Sunyaev-Zel'dovich clusters detected by the Planck satellite https://doi.org/10.1103/PhysRevD.95.023521	Simone Peirone , Marco Raveri , Matteo Viel , Stefano Borgani , Stefano Ansoldi	Physical Review D - Particles, Fields, Gravitation and Cosmology	Vol. 95/Issue 2	American Physical Society		01/01/2017	50	Yes	Yes	Peer review	http://link.aps.org/doi/10.1103/PhysRevD.95.023521
	High-z cosmography at a glance	V. Vitagliano, J.-Q. Xia, S. Liberati, M. Viel	Proceedings of the 13th Marcel Grossman Meeting		Marcel Grossman Meeting		28/02/2013		Yes	No	Conference	

A2. Research expeditions

List of expeditions		
Period (start-end)	Place	Purpose

A3. Awards and recognitions

List of awards and recognitions					
Award type	Title of the award	Person to whom the award was made	Year	Short description of the reason the award was made (if applicable)	Any further information / clarification

A4. Patents, licensing, intellectual property

List of patents, licensing, intellectual property					
Type of IP Rights	Confidential	Foreseen embargo date dd/mm/yyyy	Application reference(s) (e.g. EP123456)	Subject or title of application	Applicant(s) (as on the application)

A5. Dissemination to non-academic audience

List of disseminations								
No.	Type of activities	Main Leader	Title	Date	Place	Type of audience	Size of audience	Countries addressed
1	Other forms of dissemination	ISTITUTO NAZIONALE DI ASTROFISICA	COSMOLOGIA MODERNA TRA LUCE ED OMBRA	08/05/2012	Collegio Universitario Gregorianum - Padova - Italy	Scientific community (higher education, Research)	80	Italy
2	Presentations	ISTITUTO NAZIONALE DI ASTROFISICA	Cosmologia a Trieste	05/09/2013	Dipartimento di Astronomia e Osservatorio Astronomico di Trieste	Scientific community (higher education, Research)	40	Italy
3	Media briefings	ISTITUTO NAZIONALE DI ASTROFISICA	Il mezzo intergalattico - La scienza del futuro	27/09/2013	Trieste Next - Teatro Verdi	Scientific community (higher education, Research) - Civil society - Medias	200	Italy
4	Presentations	ISTITUTO NAZIONALE DI ASTROFISICA	Tre cose assolutamente da sapere sull'Universo in cui viviamo	07/07/2015	Sexten Center for Astrophysics	Civil society	50	Italy-Austria
5	Presentations	ISTITUTO NAZIONALE DI ASTROFISICA	Un viaggio nello spazio intergalattico	04/04/2016	Scuola Media M. Gortani di Comeglians Udine, Italy)	Civil society	40	Italy
6	Press releases	ISTITUTO NAZIONALE DI ASTROFISICA	"Quella luce gamma dagli ammassi di galassie"	18/01/2017	http://www.media.inaf.it/2017/01/18/quella-luce-gamma-dagli-ammassi-di-galassie/	Scientific community (higher education, Research) - Medias		Italy
7	Press releases	ISTITUTO	"Finanziamento	23/11/2010	http://www.media.inaf.it/	Medias		Italy

		NAZIONALE DI ASTROFISICA	intergalattico"		f.it/2010/11/23/fina nziamento-intergalat tico/			
8	Press releases	ISTITUTO NAZIONALE DI ASTROFISICA	"Tutti i quasar del boss"	13/11/2012	http://www.media.inaf.it/2012/11/13/tutti-i-quasar-del-boss/	Scientific community (higher education, Research) - Medias		Italy
9	Press releases	ISTITUTO NAZIONALE DI ASTROFISICA	"La banca dati della via Lattea"	31/07/2013	http://www.media.inaf.it/2013/07/31/la-banca-dati-della-via-lattea/	Scientific community (higher education, Research) - Medias		Italy
10	Press releases	ISTITUTO NAZIONALE DI ASTROFISICA	"Codice a barre dell'Universo primordiale	05/12/2016	http://www.media.inaf.it/2016/12/05/spetro-quasar-he0940-1050/	Scientific community (higher education, Research) - Medias		Italy
11	Media briefings	ISTITUTO NAZIONALE DI ASTROFISICA	Intervista a Radio 24 su ricerca in Europa - grant cosmoIGM	30/09/2013	http://www.radio24.it/sole24ore.com/programma/altra-europa/partecipazione-democratica-europa-101933-g	Civil society		Italy
12	Presentations	ISTITUTO NAZIONALE DI ASTROFISICA	Cosmologia moderna	10/02/2012	Conferenza presso Liceo Scientifico G. Marinelli Udine	Scientific community (higher education, Research)	100	Italy

A6. Other significant outputs / information

Information on other important outputs which have arisen - wholly or partly - from this project.

(Only for ERC projects selected from the 2012 and 2013 calls for proposals)

This grant agreement includes special clause 39, requiring you to make best efforts towards open access to publications resulting from this project. Should, despite your best efforts, not all publications be available in open access, please give reasons why this is the case.

Attachments	
Project No.:	257670
Project acronym:	cosmoIGM
Project title:	The Intergalactic Medium as a Cosmological Tool
Project starting date:	01/12/2010
Project duration:	72
Principal Investigator name:	Dr. Matteo Viel
Report submitted by:	ISTITUTO NAZIONALE DI ASTROFISICA
Date:	