

## CURRICULUM VITAE – EDOARDO CARLESI

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### PERSONAL INFORMATION

**Birth** 23/09/1983, Pisa, Italy.  
**Citizenship** Italian  
**Contact data** ecarlesi83@gmail.com

### EDUCATION

**2014** Ph.D. (Cum Laude) in Theoretical Physics, Universidad Autonoma de Madrid (Spain)  
**2009** MSc (Cum Laude) in Theoretical Physics, Università degli Studi Roma Tre (Italy)  
**2005** BS (Cum Laude) in Physics, Università degli Studi Roma Tre (Italy)

### PROFESSIONAL EXPERIENCE

**07/2020 – Today** Postdoctoral fellow (Machine Learning and Data Science for Astrophysics) at the Racah Institute Of Physics, Hebrew University (HU), Jerusalem, Israel  
**01/2018 – 02/2020** Postdoctoral fellow at the Astrophysikalisches Institut Potsdam (AIP), Potsdam, Germany  
**10/2014 – 10/2017** Postdoctoral fellow at the Racah Institute Of Physics, Hebrew University (HU), Jerusalem, Israel  
**11/2010 – 09/2014** Assistant Professor and Ph.D. student at the Universidad Autonoma de Madrid (UAM), Madrid, Spain  
**03/2012 – 06/2012** Visiting student at the Institute of Astronomy, School of Physics, University of Sydney, Sydney, Australia  
**05/2008 – 10/2009** Java developer, Sinologische Institut Heidelberg, Heidelberg, Germany  
**05/2008 – 11/2008** Visting student at the Heidelberg Institut für Theoretische Physik, Ruprecht Karls Universität Heidelberg, Heidelberg, Germany

### ACADEMIA

Author and co-author of 19 publications in peer-reviewed journals

Awarded over 45k\$ in grants for research projects and conference attendance (HPC Workshop Boulder, Colorado, Pacific 2013, CosKASI S.Korea ...)

30+ Invited and contributed talks in international conferences (Galaxy Flows Vietnam, Dark Energy Workshop Ringberg, Near Field Cosmology Innsbruck ...)

20+ Seminars in international Universities and research centers (UPenn Philadelphia, IAC Tenerife, AIP Potsdam, U. Sydney ...)

10+ International schools and workshops (Cosmology SS Azores, EUCLID workshop Oxford, ISAAP SS Heidelberg ...)

## IT SKILLS

**OS** Linux, Android, Windows

**Programming languages** Very good knowledge of C, C++, Python and bash scripting, good knowledge of Java, IDL and matlab/octave, basic knowledge of Android Java/XML app development, basics of Fortran

**Parallel APIs** Very good programming knowledge of MPI and OpenMP, Spark (PySpark) and SparkML, basics of OpenACC and CUDA for GPU

**Machine Learning** Hands-on knowledge of standard algorithms with Python (scikit-learn, Keras/Tensorflow, PyTorch). Supervised learning: linear regression, SVM, Decision Trees, Random Forest, Gradient Boosted Trees. Unsupervised learning: k-means, Self-Organizing-Maps. Deep Neural Networks: ANNs, CNNs, RNN, AutoEncoders, Boltzmann Machines

**Other languages/packages known** TeX, HTML/CSS, gnuplot, OpenOffice, GIT version control

## SCIENTIFIC SOFTWARE AND NUMERICAL PACKAGES

**METRO-C++** A scalable C++11/14, MPI code for MergerTree calculation. Main developer.

**PyRCODIO** Python Routines for COsmology and Data I/O, a Python package (with external C bindings for computationally intensive operations) for analysis and post-processing of cosmological simulations. Main developer.

**P-MergerTree** Adaptation of the MergerTree AHF tool for MPI. Main developer.

**IceCore** Generator of constrained Gaussian white noise fields for Initial Conditions, C++. I MPI-parallelized the code and I am maintaining it.

**AHF** Halo Finder for cosmological simulations. Written in C, MPI+OpenMP parallel, I designed and implemented a version suited for non-standard dark energy models.

**Gadget-2.0** Cosmological N-Body/hydro SPH code written in C, MPI parallel. I designed and implemented a version suited for non-standard and interacting dark energy models.

**CMBEasy** Boltzmann code for cosmological parameter estimation. Written in C++, MPI parallel, I designed and implemented a version suited for neutrino-interacting dark energy models.

## MOOC COURSES AND CERTIFICATES

**Udemy** Deep Learning A-Z: Hands-On Artificial Neural Networks

**Udemy** Spark and Python for Big Data with PySpark

**Udemy** Python for Data Science and Machine Learning Bootcamp

**Udemy** Python and Machine Learning for Financial Analysis

**Coursera** Machine Learning

**Coursera** Bayesian Statistics: from Concept to Data Analysis

**Coursera** Python and Statistics for Financial Analysis

TEACHING  
EXPERIENCE

220 hours of teaching (Physics/Electronics lab.) at the Universidad Autonoma de Madrid, 2011–2014

40 hours of teaching (Electromagnetism) at Universita' Roma 3, 2007–2008

LANGUAGES

**Italian** Mother tongue

**English** Fluent (C2)

**Spanish** Fluent (C2)

**German** Fluent (C1)

**French** Fluent (C1)

**Serbo-Croatian** Fluent (C1)

**Russian** Conversational (B2)

**Hebrew** Conversational (B2)

**Arabic (Levantine Dialect and MSA)** Conversational (B2)

**Portuguese** Basic (B1)

**Mandarin Chinese** Beginner (A2)

21. A parameter-free classification of the Cosmic Web based on unsupervised learning and the  $k$ -means algorithm.  
**E. Carlesi**, Y. Hoffman  
In prep. (2021)
20. Machine Learning and the dynamics of the Local Group  
**E. Carlesi**, Y. Hoffman, N. I. Libeskind, S. Gottloeber.  
In prep. (2021)
19. How common is the Local Group?  
**E. Carlesi**, Y. Hoffman, N. I. Libeskind, S. Gottloeber.  
In prep. (2021)
18. The HESTIA project: simulations of the Local Group.  
Noam I. Libeskind, **Edoardo Carlesi**, Rob J. J. Grand, Arman Khalatyan, Alexander Knebe, Ruediger Pakmor, Sergey Pilipenko, Marcel S. Pawlowski, Martin Sparre, Elmo Tempel, Peng Wang, Helene M. Courtois, Stefan Gottloeber, Yehuda Hoffman, Ivan Minchev, Christoph Pfrommer, Jenny G. Sorce, Volker Springel, Matthias Steinmetz, R. Brent Tully, Mark Vogelsberger, Gustavo Yepes.  
MNRAS, 2509, 2020
17. The Mass Assembly History of the Local Group from Constrained Simulations.  
**E. Carlesi**, Y. Hoffman, S. Gottlöber, Noam I. Libeskind, Alexander Knebe, Gustavo Yepes, Sergey V. Pilipenko.  
MNRAS 491, 1531, 2020
16. The orientation of planes of dwarf galaxies in the quasi-linear universe.  
N. Libeskind, **E. Carlesi**, O. Müller, M. Pawlowski, Y. Hoffman, H. Courtois, R. B. Tully, S. Gottlöber, M. Steinmetz, A. Knebe, J. Sorce.  
MNRAS 490, 3786, 2019
15. Partitioning the Universe into gravitational basins using the cosmic velocity field.  
D. Alexandra, H. Courtois, F. Dupont, F. Denis, R. Graziani, Y. Copick, D. Pomarede, N. Libeskind, **E. Carlesi** B. Tully, D. Guinet.  
MNRAS 489, L1-L6, 2019
14. Cosmic-Ray Anisotropy from Large Scale Structure and the effect of magnetic horizons.  
N. Globus, T. Piran, Y. Hoffman, **E. Carlesi**, D. Pomarède.  
MNRAS 484, 4167, 2019
13. Dark Matter halo simulations: verifying the Entropy approach to the Core-Cusp problem.  
M.V. Tkachev, S.V. Pilipenko, **E. Carlesi**.  
Astronomy Reports, 2019, Vol. 63, No. 5, pp. 372-377 (Astronomičeskij Žurnal 96, N.5, 1-7, 2019)
12. The quasi-linear nearby Universe.  
Y. Hoffman, **E. Carlesi**, D. Pomarède, B. Tully, H. Courtois, S. Gottlöber, N. Libeskind, J. Sorce, G. Yepes.  
Nature Astronomy 2, 680, 2018
11. The dynamics of the Local Group as a probe of Dark Energy and Modified Gravity.

- E. Carlesi**, D.F. Mota, H.A. Winther.  
MNRAS 466, 4813, 2017
10. Constraining the mass of the Local Group.  
**E. Carlesi**, Y. Hoffman, J. Sorce, S. Gottlöber.  
MNRAS 465, 4886, 2017
  9. The tangential velocity of M31: CLUES from constrained simulations.  
**E. Carlesi**, Y. Hoffman, J. Sorce, S. Gottlöber, G. Yepes, H. Courtois, B. Tully.  
MNRAS Letters, 460-1, 5, 2016
  8. Constrained Local Universe Simulations: A Local Group Factory.  
**E. Carlesi**, J. Sorce, Y. Hoffman, S. Gottlöber, G. Yepes, N. Libeskind, S. Pilipenko, A. Knebe, H. Courtois, B. Tully, M. Steinmetz.  
MNRAS 458, 900, 2016
  7. Cosmicflows constrained local universe simulations.  
J. Sorce, S. Gottloeber, M. Steinmetz, Y. Hoffman, B. Tully, H. Courtois, D. Pomarede, **E. Carlesi**.  
MNRAS 455, 2078, 2016
  6. Hidden from view: Coupled dark sector physics and small scales.  
P. Elahi, G. F. Lewis, C. Power, **E. Carlesi**, A. Knebe.  
MNRAS 452, 1341, 2015
  5. On the observability of coupled dark energy with cosmic voids.  
P. Sutter, **E. Carlesi**, A. Knebe, B. Wandelt.  
MNRAS 446, 1, 2015
  4. Hydrodynamical simulations of coupled and uncoupled Quintessence models - II. Galaxy clusters.  
**E. Carlesi**, A. Knebe, G.F. Lewis, G. Yepes.  
MNRAS 439, 2958, 2014
  3. Hydrodynamical simulations of coupled and uncoupled Quintessence models - I. Halo properties and the cosmic web.  
**E. Carlesi**, A. Knebe, G.F. Lewis, S. Wales, G. Yepes.  
MNRAS 439, 2943, 2014
  2. *N*-body simulations of a Vector Dark Energy model.  
**E. Carlesi**, A. Knebe, G. Yepes, S. Gottlöber, A. Maroto, J. Beltran.  
MNRAS 425, 669, 2012
  1. High-*z* massive clusters and Vector Dark Energy.  
**E. Carlesi**, A. Knebe, G. Yepes, S. Gottlöber, A. Maroto, J. Beltran.  
MNRAS 418, 2715, 2011