



DiRAC Publications 2020

dp002: The COSMOS Consortium: Unveiling the Structure of the Universe

PI: Prof. Paul Shellard

Science Area: Astronomy & Astrophysics

Machines: Memory Intensive Durham, Data Intensive Cambridge, Data Intensive Leicester

Institute: University of Cambridge

Black hole formation in relativistic Oscillaton collisions
James Y. Widdicombe, Thomas Helfer, and Eugene A. Lim
2020, JCAP, [10.1088/1475-7516/2020/01/027](https://arxiv.org/abs/10.1088/1475-7516/2020/01/027)

The effects of potential shape on inhomogeneous inflation
Josu C. Aurrekoetxea, Katy Clough, Raphael Flauger, et al.
2020, JCAP, [10.1088/1475-7516/2020/05/030](https://arxiv.org/abs/10.1088/1475-7516/2020/05/030)

Planck 2018 results. IX. Constraints on primordial non-Gaussianity
Planck Collaboration, Y. Akrami, F. Arroja, et al.
2020, A&A, [10.1051/0004-6361/201935891](https://arxiv.org/abs/10.1051/0004-6361/201935891)

Scaling Density of Axion Strings
Mark Hindmarsh, Joanes Lizarraga, Asier Lopez-Eiguren, et al.
2020, PhRvL, [10.1103/PhysRevLett.124.021301](https://arxiv.org/abs/10.1103/PhysRevLett.124.021301)

Coherent gravitational waveforms and memory from cosmic string loops
Josu C. Aurrekoetxea, Thomas Helfer, and Eugene A. Lim
2020, CQGr, [10.1088/1361-6382/aba28b](https://arxiv.org/abs/10.1088/1361-6382/aba28b)

Plausible scenario for a generic violation of the weak cosmic censorship conjecture in asymptotically flat four dimensions
Felicity C. Eperon, Bogdan Ganchev, and Jorge E. Santos
2020, PhRvD, [10.1103/PhysRevD.101.041502](https://arxiv.org/abs/10.1103/PhysRevD.101.041502)

Astrophysical Limits on Very Light Axion-like Particles from Chandra Grating Spectroscopy of NGC 1275
Christopher S. Reynolds, M. C. David Marsh, Helen R. Russell, et al.
2020, ApJ, [10.3847/1538-4357/ab6a0c](https://arxiv.org/abs/10.3847/1538-4357/ab6a0c)

Planck 2018 results. X. Constraints on inflation
Planck Collaboration, Y. Akrami, F. Arroja, et al.
2020, A&A, [10.1051/0004-6361/201833887](https://arxiv.org/abs/10.1051/0004-6361/201833887)

Planck 2018 results. I. Overview and the cosmological legacy of Planck
Planck Collaboration, N. Aghanim, Y. Akrami, et al.

2020, A&A, [10.1051/0004-6361/201833880](https://doi.org/10.1051/0004-6361/201833880)

Planck 2018 results. VI. Cosmological parameters
Planck Collaboration, N. Aghanim, Y. Akrami, et al.
2020, A&A, [10.1051/0004-6361/201833910](https://doi.org/10.1051/0004-6361/201833910)

Understanding parameter differences between analyses employing nested data subsets
Steven Gratton and Anthony Challinor
2020, MNRAS, [10.1093/mnras/staa2996](https://doi.org/10.1093/mnras/staa2996)

Probing the thermal state of the intergalactic medium at $z > 5$ with the transmission spikes in high-resolution Ly α forest spectra
Prakash Gaikwad, Michael Rauch, Martin G. Haehnelt, et al.
2020, MNRAS, [10.1093/mnras/staa907](https://doi.org/10.1093/mnras/staa907)

dp004: VIRGO Consortium
PI: Prof. Carlos Frenk
Science Area: Astronomy & Astrophysics
Machines: Memory Intensive Durham
Institute: Durham University

Determining the primordial helium abundance and UV background using fluorescent emission in star-free dark matter haloes
Calvin Sykes, Michele Fumagalli, Ryan Cooke, et al.
2020, MNRAS, [10.1093/mnras/stz3573](https://doi.org/10.1093/mnras/stz3573)

The ACCELERATION programme: I. Cosmology with the redshift drift
Ryan Cooke
2020, MNRAS, [10.1093/mnras/stz3465](https://doi.org/10.1093/mnras/stz3465)

L-GALAXIES 2020: Spatially resolved cold gas phases, star formation, and chemical enrichment in galactic discs
Bruno M. B. Henriques, Robert M. Yates, Jian Fu, et al.
2020, MNRAS, [10.1093/mnras/stz3233](https://doi.org/10.1093/mnras/stz3233)

The Cloud Factory I: Generating resolved filamentary molecular clouds from galactic-scale forces
Rowan J. Smith, Robin G. Treß, Mattia C. Sormani, et al.
2020, MNRAS, [10.1093/mnras/stz3328](https://doi.org/10.1093/mnras/stz3328)

Azimuthal variations of oxygen abundance profiles in star-forming regions of disc galaxies in EAGLE simulations
Martín Solar, Patricia B. Tissera, and Jose A. Hernandez-Jimenez
2020, MNRAS, [10.1093/mnras/stz2853](https://doi.org/10.1093/mnras/stz2853)

Measuring the temperature and profiles of Ly α absorbers

Antonella Garzilli, Tom Theuns, and Joop Schaye

2020, MNRAS, [10.1093/mnras/stz3585](https://doi.org/10.1093/mnras/stz3585)

Cosmological baryon transfer in the SIMBA simulations

Josh Borrow, Daniel Anglés-Alcázar, and Romeel Davé

2020, MNRAS, [10.1093/mnras/stz3428](https://doi.org/10.1093/mnras/stz3428)

How feedback shapes galaxies: an analytic model

Jaime Salcido, Richard G. Bower, and Tom Theuns

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Determining whether the squashing factor, Q , would be a good indicator of reconnection in a resistive MHD experiment devoid of null points

J. Reid, C. E. Parnell, A. W. Hood, et al.

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EDGE: the mass-metallicity relation as a critical test of galaxy formation physics

Oscar Agertz, Andrew Pontzen, Justin I. Read, et al.

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Long troughs in the Lyman- α forest below redshift 6 due to islands of neutral hydrogen

Laura C. Keating, Lewis H. Weinberger, Girish Kulkarni, et al.

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The BAHAMAS project: effects of a running scalar spectral index on large-scale structure

Sam G. Stafford, Ian G. McCarthy, Robert A. Crain, et al.

2020, MNRAS, [10.1093/mnras/staa129](https://doi.org/10.1093/mnras/staa129)

Hydrostatic mass estimates of massive galaxy clusters: a study with varying hydrodynamics flavours and non-thermal pressure support

Francesca A. Pearce, Scott T. Kay, David J. Barnes, et al.

2020, MNRAS, [10.1093/mnras/stz3003](https://doi.org/10.1093/mnras/stz3003)

Marked correlation functions in perturbation theory

Alejandro Aviles, Kazuya Koyama, Jorge L. Cervantes-Cota, et al.

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The $[\alpha/\text{Fe}]$ - $[\text{Fe}/\text{H}]$ relation in the E-MOSAICS simulations: its connection to the birth place of globular clusters and the fraction of globular cluster field stars in the bulge

Meghan E. Hughes, Joel L. Pfeffer, Marie Martig, et al.

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GRAMSES: a new route to general relativistic N-body simulations in cosmology. Part I. Methodology and code description

Cristian Barrera-Hinojosa and Baojiu Li

2020, JCAP, [10.1088/1475-7516/2020/01/007](https://arxiv.org/abs/10.1088/1475-7516/2020/01/007)

Sensitivity analysis of a galaxy formation model

Piotr Oleśkiewicz and Carlton M. Baugh

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Subhalo destruction in the APOSTLE and AURIGA simulations

Jack Richings, Carlos Frenk, Adrian Jenkins, et al.

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The $I_{\kappa \in \alpha}$ model of feedback-regulated galaxy formation

Mahavir Sharma and Tom Theuns

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Fast estimation of aperture mass statistics - I. Aperture mass variance and an application to the CFHTLenS data

Lucas Porth, Robert E. Smith, Patrick Simon, et al.

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MUSE Analysis of Gas around Galaxies (MAGG) - II: metal-enriched halo gas around $z \sim 1$ galaxies

Rajeshwari Dutta, Michele Fumagalli, Matteo Fossati, et al.

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The imprint of dark subhaloes on the circumgalactic medium

Ian G. McCarthy and Andreea S. Font

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Predicting accreted satellite galaxy masses and accretion redshifts based on globular cluster orbits in the E-MOSAICS simulations

Joel L. Pfeffer, Sebastian Trujillo-Gomez, J. M. D. Kruijssen, et al.

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The dependence of the galaxy stellar-to-halo mass relation on galaxy morphology

Camila A. Correa and Joop Schaye

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Informing dark matter direct detection limits with the ARTEMIS simulations

Robert Poole-McKenzie, Andreea S. Font, Billy Boxer, et al.

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Morphological and Rotation Structures of Circumgalactic Mg II Gas in the EAGLE Simulation and the Dependence on Galaxy Properties

Stephanie H. Ho, Crystal L. Martin, and Joop Schaye

2020, ApJ, [10.3847/1538-4357/abbe88](https://arxiv.org/abs/10.3847/1538-4357/abbe88)

The detailed structure and the onset of galaxy formation in low-mass gaseous dark matter haloes

Alejandro Benitez-Llambay and Carlos Frenk

2020, MNRAS, [10.1093/mnras/staa2698](https://doi.org/10.1093/mnras/staa2698)

Proca-stinated cosmology. Part I. A N-body code for the vector Galileon

Christopher Becker, Christian Arnold, Baojiu Li, et al.

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Galaxy properties in the cosmic web of EAGLE simulation

Wenxiao Xu, Qi Guo, Haonan Zheng, et al.

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Galactic inflow and wind recycling rates in the EAGLE simulations

Peter D. Mitchell, Joop Schaye, and Richard G. Bower

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How unusual is the Milky Way's assembly history?

Tilly A. Evans, Azadeh Fattahi, Alis J. Deason, et al.

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Kraken reveals itself - the merger history of the Milky Way reconstructed with the E-MOSAICS simulations

J. M. Diederik Kruijssen, Joel L. Pfeffer, Mélanie Chevance, et al.

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A tale of two populations: surviving and destroyed dwarf galaxies and the build-up of the Milky Way's stellar halo

Azadeh Fattahi, Alis J. Deason, Carlos S. Frenk, et al.

2020, MNRAS, [10.1093/mnras/staa2221](https://doi.org/10.1093/mnras/staa2221)

The ARTEMIS simulations: stellar haloes of Milky Way-mass galaxies

Andreea S. Font, Ian G. McCarthy, Robert Poole-Mckenzie, et al.

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Radiative cooling rates, ion fractions, molecule abundances, and line emissivities including self-shielding and both local and metagalactic radiation fields

Sylvia Ploeckinger and Joop Schaye

2020, MNRAS, [10.1093/mnras/staa2172](https://doi.org/10.1093/mnras/staa2172)

Towards a non-Gaussian model of redshift space distortions

Carolina Cuesta-Lazaro, Baojiu Li, Alexander Eggemeier, et al.

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To β or not to β : can higher order Jeans analysis break the mass-anisotropy degeneracy in simulated dwarfs?

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2020, MNRAS, [10.1093/mnras/staa2352](https://doi.org/10.1093/mnras/staa2352)

Atmospheric Erosion by Giant Impacts onto Terrestrial Planets: A Scaling Law for any Speed, Angle, Mass, and Density

J. A. Kegerreis, V. R. Eke, D. C. Catling, et al.

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The globular cluster system mass-halo mass relation in the E-MOSAICS simulations
Nate Bastian, Joel Pfeffer, J. M. Diederik Kruijssen, et al.

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The warm-hot circumgalactic medium around EAGLE-simulation galaxies and its
detection prospects with X-ray and UV line absorption

Nastasha A. Wijers, Joop Schaye, and Benjamin D. Oppenheimer

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The star formation properties of the observed and simulated AGN Universe: BAT
versus EAGLE

Thomas M. Jackson, D. J. Rosario, D. M. Alexander, et al.

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Do model emission line galaxies live in filaments at $z \sim 1$?

V. Gonzalez-Perez, W. Cui, S. Contreras, et al.

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The BAHAMAS project: effects of dynamical dark energy on large-scale structure

Simon Pfeifer, Ian G. McCarthy, Sam G. Stafford, et al.

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Detecting neutral hydrogen at $z \gtrsim 3$ in large spectroscopic surveys of quasars

Michele Fumagalli, Sotiria Fotopoulou, and Laura Thomson

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Local group star formation in warm and self-interacting dark matter cosmologies

Mark R. Lovell, Wojciech Hellwing, Aaron Ludlow, et al.

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Exploring extensions to the standard cosmological model and the impact of baryons
on small scales

Sam G. Stafford, Shaun T. Brown, Ian G. McCarthy, et al.

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Iterative removal of redshift-space distortions from galaxy clustering

Yuchan Wang, Baojiu Li, and Marius Cautun

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Universal structure of dark matter haloes over a mass range of 20 orders of magnitude

J. Wang, S. Bose, C. S. Frenk, et al.

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CMACIONIZE 2.0: a novel task-based approach to Monte Carlo radiation transfer

B. Vandenbroucke and P. Camps

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The distribution of dark matter and gas spanning 6 Mpc around the post-merger galaxy cluster MS 0451-03

Sut-Ieng Tam, Mathilde Jauzac, Richard Massey, et al.
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Environment from cross-correlations: connecting hot gas and the quenching of galaxies

Egidijus Kukstas, Ian G. McCarthy, Ivan K. Baldry, et al.
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The edge of the Galaxy

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Mapping dark matter and finding filaments: calibration of lensing analysis techniques on simulated data

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Numerical solutions to Einstein's equations in a shearing-dust universe: a code comparison

Julian Adamek, Cristian Barrera-Hinojosa, Marco Bruni, et al.
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Massive low-surface-brightness galaxies in the EAGLE simulation

Andrea Kulier, Gaspar Galaz, Nelson D. Padilla, et al.
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Constraining the inner density slope of massive galaxy clusters

Qiuhan He, Hongyu Li, Ran Li, et al.
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The globular cluster system of the Auriga simulations

Timo L. R. Halbesma, Robert J. J. Grand, Facundo A. Gómez, et al.
2020, MNRAS, [10.1093/mnras/staa1380](https://doi.org/10.1093/mnras/staa1380)

Correlations between mass, stellar kinematics, and gas metallicity in EAGLE galaxies

L. J. Zenocratti, M. E. De Rossi, M. A. Lara-López, et al.
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Weak lensing minima and peaks: Cosmological constraints and the impact of baryons

William R. Coulton, Jia Liu, Ian G. McCarthy, et al.

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Atmospheric Erosion by Giant Impacts onto Terrestrial Planets

J. A. Kegerreis, V. R. Eke, R. J. Massey, et al.
2020, ApJ, [10.3847/1538-4357/ab9810](https://doi.org/10.3847/1538-4357/ab9810)

Toward a General Parameterization of the Warm Dark Matter Halo Mass Function

Mark R. Lovell

2020, ApJ, [10.3847/1538-4357/ab982a](https://doi.org/10.3847/1538-4357/ab982a)

The dark matter component of the Gaia radially anisotropic substructure

Nassim Bozorgnia, Azadeh Fattahi, Carlos S. Frenk, et al.

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Connecting the structure of dark matter haloes to the primordial power spectrum

Shaun T. Brown, Ian G. McCarthy, Benedikt Diemer, et al.

2020, MNRAS, [10.1093/mnras/staa1491](https://doi.org/10.1093/mnras/staa1491)

What does strong gravitational lensing? The mass and redshift distribution of high-magnification lenses

Andrew Robertson, Graham P. Smith, Richard Massey, et al.

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Understanding the large inferred Einstein radii of observed low-mass galaxy clusters

Andrew Robertson, Richard Massey, and Vincent Eke

2020, MNRAS, [10.1093/mnras/staa1076](https://doi.org/10.1093/mnras/staa1076)

Q wind code release: a non-hydrodynamical approach to modelling line-driven winds in active galactic nuclei

Arnau Quera-Bofarull, Chris Done, Cedric Lacey, et al.

2020, MNRAS, [10.1093/mnras/staa1117](https://doi.org/10.1093/mnras/staa1117)

The little things matter: relating the abundance of ultrafaint satellites to the hosts' assembly history

Sownak Bose, Alis J. Deason, Vasily Belokurov, et al.

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The orbital phase space of contracted dark matter haloes

Thomas M. Callingham, Marius Cautun, Alis J. Deason, et al.

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Baryonic clues to the puzzling diversity of dwarf galaxy rotation curves

Isabel M. E. Santos-Santos, Julio F. Navarro, Andrew Robertson, et al.

2020, MNRAS, [10.1093/mnras/staa1072](https://doi.org/10.1093/mnras/staa1072)

Galaxy mergers in EAGLE do not induce a significant amount of black hole growth yet do increase the rate of luminous AGN

Stuart McAlpine, Chris M. Harrison, David J. Rosario, et al.

2020, MNRAS, [10.1093/mnras/staa1123](https://doi.org/10.1093/mnras/staa1123)

Measuring the baryon acoustic oscillation peak position with different galaxy selections

César Hernández-Aguayo, Marius Cautun, Alex Smith, et al.

2020, MNRAS, [10.1093/mnras/staa973](https://doi.org/10.1093/mnras/staa973)

The biggest splash

Vasily Belokurov, Jason L. Sanders, Azadeh Fattahi, et al.
2020, MNRAS, [10.1093/mnras/staa876](https://doi.org/10.1093/mnras/staa876)

The milky way total mass profile as inferred from Gaia DR2

Marius Cautun, Alejandro Benítez-Llambay, Alis J. Deason, et al.
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Galactic outflow rates in the EAGLE simulations

Peter D. Mitchell, Joop Schaye, Richard G. Bower, et al.
2020, MNRAS, [10.1093/mnras/staa938](https://doi.org/10.1093/mnras/staa938)

MEGA: Merger graphs of structure formation

William J. Roper, Peter A. Thomas, and Chaichalit Srisawat
2020, MNRAS, [10.1093/mnras/staa982](https://doi.org/10.1093/mnras/staa982)

A bound on the $^{12}\text{C}/^{13}\text{C}$ ratio in near-pristine gas with ESPRESSO

Louise Welsh, Ryan Cooke, Michele Fumagalli, et al.
2020, MNRAS, [10.1093/mnras/staa807](https://doi.org/10.1093/mnras/staa807)

The intracluster light as a tracer of the total matter density distribution: a view from simulations

Isaac Alonso Asensio, Claudio Dalla Vecchia, Yannick M. Bahé, et al.
2020, MNRAS, [10.1093/mnras/staa861](https://doi.org/10.1093/mnras/staa861)

Infrared luminosity functions and dust mass functions in the EAGLE simulation

Maarten Baes, Ana Trčka, Peter Camps, et al.
2020, MNRAS, [10.1093/mnras/staa990](https://doi.org/10.1093/mnras/staa990)

An ALMA survey of the SCUBA-2 CLS UDS field: physical properties of 707 sub-millimetre galaxies

U. Dudzevičiūtė, Ian Smail, A. M. Swinbank, et al.
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Constraining structure formation using EDGES

Matteo Leo, Tom Theuns, Carlton M. Baugh, et al.
2020, JCAP, [10.1088/1475-7516/2020/04/004](https://doi.org/10.1088/1475-7516/2020/04/004)

The mass fraction of halo stars contributed by the disruption of globular clusters in the E-MOSAICS simulations

Marta Reina-Campos, Meghan E. Hughes, J. M. Diederik Kruijssen, et al.
2020, MNRAS, [10.1093/mnras/staa483](https://doi.org/10.1093/mnras/staa483)

GRAMSES: a new route to general relativistic N-body simulations in cosmology. Part II. Initial conditions

Cristian Barrera-Hinojosa and Baojiu Li
2020, JCAP, [10.1088/1475-7516/2020/04/056](https://doi.org/10.1088/1475-7516/2020/04/056)

Numerical convergence of hydrodynamical simulations of galaxy formation: the

abundance and internal structure of galaxies and their cold dark matter haloes

Aaron D. Ludlow, Joop Schaye, Matthieu Schaller, et al.

2020, MNRAS, [10.1093/mnras/staa316](https://doi.org/10.1093/mnras/staa316)

The missing dwarf galaxies of the Local Group

Azadeh Fattahi, Julio F. Navarro, and Carlos S. Frenk

2020, MNRAS, [10.1093/mnras/staa375](https://doi.org/10.1093/mnras/staa375)

Modelling the tightest relation between galaxy properties and dark matter halo properties from hydrodynamical simulations of galaxy formation

Jian-hua He

2020, MNRAS, [10.1093/mnras/staa620](https://doi.org/10.1093/mnras/staa620)

The accuracy of weak lensing simulations

Stefan Hilbert, Alexandre Barreira, Giulio Fabbian, et al.

2020, MNRAS, [10.1093/mnras/staa281](https://doi.org/10.1093/mnras/staa281)

Nonlinear structure formation in Bound Dark Energy

Erick Almaraz, Baojiu Li, and Axel de la Macorra

2020, JCAP, [10.1088/1475-7516/2020/03/016](https://doi.org/10.1088/1475-7516/2020/03/016)

The clustering of the SDSS-IV extended Baryon Oscillation Spectroscopic Survey DR14 LRG sample: structure growth rate measurement from the anisotropic LRG correlation function in the redshift range $0.6 < z < 1.0$

M. Icaza-Lizaola, M. Vargas-Magaña, S. Fromenteau, et al.

2020, MNRAS, [10.1093/mnras/stz3602](https://doi.org/10.1093/mnras/stz3602)

The high-redshift SFR- M^* relation is sensitive to the employed star formation rate and stellar mass indicators: towards addressing the tension between observations and simulations

A. Katsianis, V. Gonzalez, D. Barrientos, et al.

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Marcel P. van Daalen, Ian G. McCarthy, and Joop Schaye

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The quenching and morphological evolution of central galaxies is facilitated by the

feedback-driven expulsion of circumgalactic gas

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Feedback from supermassive black holes transforms centrals into passive galaxies by ejecting circumgalactic gas

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The lensing properties of subhaloes in massive elliptical galaxies in sterile neutrino cosmologies

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dp005: Theoretical Astrophysics at Leicester

PI: Prof. Walter Dehnen

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Leicester

Institute: University of Leicester

TW Hya: an old protoplanetary disc revived by its planet

Sergei Nayakshin, Takashi Tsukagoshi, Cassandra Hall, et al.
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C. Hall, R. Dong, R. Teague, et al.
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dp006: Extreme QCD: Quantifying the QCD Phase Diagram lib
PI: Prof. Chris Allton
Science Area: Particle Physics
Machines: Data Intensive Leicester, Extreme Scaling Edinburgh
Institute: Swansea University

Mesonic correlators at non-zero baryon chemical potential
G. Aarts, C. Allton, D. De Boni, et al.
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dp007: Strong dynamics in the structure of matter
PI: Dr Roger Horsley
Science Area: Particle Physics
Machines: Data Intensive Cambridge, Extreme Scaling Edinburgh
Institute: University of Edinburgh

Lattice QCD evaluation of the Compton amplitude employing the Feynman-Hellmann theorem
K. U. Can, A. Hannaford-Gunn, R. Horsley, et al.
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dp008: UKQCD-DWF: physics with dynamical chiral quarks
PI: Dr Andreas Juettner
Science Area: Particle Physics
Machines: Data Intensive Cambridge, Extreme Scaling Edinburgh
Institute: University of Southampton

The anomalous magnetic moment of the muon in the Standard Model

T. Aoyama, N. Asmussen, M. Benayoun, et al.

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X. Feng

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dp010: UKMHD Consortium: 2) Solar Atmosphere

PI: Prof. Alan Hood

Science Area: Astronomy & Astrophysics

Machines: Memory Intensive Durham, Data Intensive Cambridge

Institute: University of St Andrews

Coronal energy release by MHD avalanches: Heating mechanisms

J. Reid, P. J. Cargill, A. W. Hood, et al.

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P. Pagano, A. Bemporad, and D. H. Mackay

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Effect of coronal loop structure on wave heating through phase mixing

P. Pagano, I. De Moortel, and R. J. Morton

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How Is Helicity (and Twist) Partitioned in Magnetohydrodynamic Simulations of Reconnecting Magnetic Flux Tubes?

James Threlfall, Andrew N. Wright, and Alan W. Hood

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dp012: Hydrodynamical Simulations of Cosmic Structure Formation at KICC

PI: Dr Debora Sijacki

Science Area: Astronomy & Astrophysics

Machines: Memory Intensive Durham, Data Intensive Cambridge

Institute: University of Cambridge

Cosmological simulations of massive black hole seeds: predictions for next-generation electromagnetic and gravitational wave observations

C. DeGraf and D. Sijacki

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Long troughs in the Lyman- α forest below redshift 6 due to islands of neutral hydrogen

Laura C. Keating, Lewis H. Weinberger, Girish Kulkarni, et al.

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Constraining the second half of reionization with the Ly β forest

Laura C. Keating, Girish Kulkarni, Martin G. Haehnelt, et al.

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Nicholas A. Henden, Ewald Puchwein, and Debora Sijacki

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New methods for identifying Lyman continuum leakers and reionization-epoch analogues

Harley Katz, Dominika Ďurovčiková, Taysun Kimm, et al.

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Resolving shocks and filaments in galaxy formation simulations: effects on gas properties and star formation in the circumgalactic medium

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How to quench a dwarf galaxy: The impact of inhomogeneous reionization on dwarf galaxies and cosmic filaments

Harley Katz, Marius Ramsøy, Joakim Rosdahl, et al.

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Probing delayed-end reionization histories with the 21-cm LAE cross-power spectrum

Lewis H. Weinberger, Girish Kulkarni, and Martin G. Haehnelt

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Probing the thermal state of the intergalactic medium at $z > 5$ with the transmission spikes in high-resolution Ly α forest spectra

Prakash Gaikwad, Michael Rauch, Martin G. Haehnelt, et al.

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dp015: High Performance Computing Support for Exeter Astrophysics

PI: Prof. Matthew Bate

Science Area: Astronomy & Astrophysics

Machines: Memory Intensive Durham, Data Intensive Cambridge, Data Intensive Leicester

Institute: University of Exeter

Acceleration of superrotation in simulated hot Jupiter atmospheres

F. Debras, N. Mayne, I. Baraffe, et al.

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Convection with misaligned gravity and rotation: simulations and rotating mixing length theory

Laura K. Currie, Adrian J. Barker, Yoram Lithwick, et al.

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Comparison of 2D and 3D compressible convection in a pre-main sequence star

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Implications of three-dimensional chemical transport in hot Jupiter atmospheres: Results from a consistently coupled chemistry-radiation-hydrodynamics model

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A new set of atmosphere and evolution models for cool T-Y brown dwarfs and giant exoplanets

M. W. Phillips, P. Tremblin, I. Baraffe, et al.
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Implications of different stellar spectra for the climate of tidally locked Earth-like exoplanets

Jake K. Eager, David J. Reichelt, Nathan J. Mayne, et al.
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Thomas J. R. Bending, Clare L. Dobbs, and Matthew R. Bate
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Non-ideal magnetohydrodynamics versus turbulence - I. Which is the dominant process in protostellar disc formation?

James Wurster and Benjamin T. Lewis
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James Wurster and Benjamin T. Lewis
2020, MNRAS, [10.1093/mnras/staa1340](https://doi.org/10.1093/mnras/staa1340)

A library of self-consistent simulated exoplanet atmospheres

Jayesh M. Goyal, Nathan Mayne, Benjamin Drummond, et al.
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The role of collision speed, cloud density, and turbulence in the formation of young massive clusters via cloud-cloud collisions

Kong You Liow and Clare L. Dobbs
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The formation of young massive clusters by colliding flows

C. L. Dobbs, K. Y. Liow, and S. Rieder
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Generation of shear flows and vortices in rotating anelastic convection

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Denis E. Sergeev, F. Hugo Lambert, Nathan J. Mayne, et al.
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dp016: Modelling galaxy baryon physics: from cosmological to sub-galactic scales**PI: Prof. Adrienne Slyz****Science Area: Astronomy & Astrophysics****Machines: Memory Intensive Durham, Data Intensive Leicester****Institute: University of Oxford**

KiDS+VIKING-450: Cosmic shear tomography with optical and infrared data
H. Hildebrandt, F. Köhlinger, J. L. van den Busch, et al.
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The impact of AGN feedback on galaxy intrinsic alignments in the Horizon simulations
Adam Soussana, Nora Elisa Chisari, Sandrine Codis, et al.
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KiDS+VIKING-450 and DES-Y1 combined: Cosmology with cosmic shear
S. Joudaki, H. Hildebrandt, D. Traykova, et al.
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On the origin of low escape fractions of ionizing radiation from massive star-forming galaxies at high redshift
Taehwa Yoo, Taysun Kimm, and Joakim Rosdahl
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How primordial magnetic fields shrink galaxies
Sergio Martin-Alvarez, Adrienne Slyz, Julien Devriendt, et al.
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Simulating gas kinematic studies of high-redshift galaxies with the HARMONI integral field spectrograph
Mark L. A. Richardson, Laurence Routledge, Niranjan Thatte, et al.
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New methods for identifying Lyman continuum leakers and reionization-epoch analogues
Harley Katz, Dominika Ďurovčíková, Taysun Kimm, et al.
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Why do extremely massive disc galaxies exist today?
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2020, MNRAS, [10.1093/mnras/staa970](https://doi.org/10.1093/mnras/staa970)

Dual Effects of Ram Pressure on Star Formation in Multiphase Disk Galaxies with Strong Stellar Feedback
Jaehyun Lee, Taysun Kimm, Harley Katz, et al.
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dp019: High Precision B physics from Lattice QCD (HPQCD)**PI: Prof. Christine Davies****Science Area: Particle Physics****Machines: Data Intensive Cambridge****Institute: University of Glasgow** $B_c \rightarrow B_{s(d)}$ form factors from lattice QCD

Laurence J. Cooper, Christine T. H. Davies, Judd Harrison, et al.

2020, PhRvD, [10.1103/PhysRevD.102.014513](https://doi.org/10.1103/PhysRevD.102.014513)Charmonium properties from lattice QCD +QED : Hyperfine splitting, J/ψ leptonic width, charm quark mass, and a_μ^c

D. Hatton, C. T. H. Davies, B. Galloway, et al.

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D. Hatton, C. T. H. Davies, G. P. Lepage, et al.

2020, PhRvD, [10.1103/PhysRevD.102.094509](https://doi.org/10.1103/PhysRevD.102.094509)

QED interaction effects on heavy meson masses from lattice QCD +QED

D. Hatton, C. T. H. Davies, G. P. Lepage, et al.

2020, PhRvD, [10.1103/PhysRevD.102.094514](https://doi.org/10.1103/PhysRevD.102.094514) $B_c \rightarrow J/\psi$ form factors for the full q^2 range from lattice QCD

Judd Harrison, Christine T. H. Davies, Andrew Lytle, et al.

2020, PhRvD, [10.1103/PhysRevD.102.094518](https://doi.org/10.1103/PhysRevD.102.094518) $R(J/\psi)$ and $B_c^- \rightarrow J/\psi \ell^- \bar{\nu}_\ell$ Lepton Flavor Universality Violating Observables from Lattice QCD

Judd Harrison, Christine T. H. Davies, and Andrew Lytle

2020, PhRvL, [10.1103/PhysRevLett.125.222003](https://doi.org/10.1103/PhysRevLett.125.222003)

dp031: Turbulence, Shocks and Dissipation in Space Plasmas**PI: Prof. David Burgess****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Leicester****Institute: Queen Mary University of London**

Magnetic field turbulence in the solar wind at sub-ion scales: in situ observations and numerical simulations

L. Matteini, L. Franci, O. Alexandrova, et al.

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Fast Acceleration of Transrelativistic Electrons in Astrophysical Turbulence

Domenico Trotta, Luca Franci, David Burgess, et al.
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Modeling MMS Observations at the Earth's Magnetopause with Hybrid Simulations of Alfvénic Turbulence

Luca Franci, Julia E. Stawarz, Emanuele Papini, et al.
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dp033: Simulating Radiative Transfer in Supernovae

PI: Dr Stuart Sim

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge

Institute: Queen's University Belfast

Monte Carlo radiative transfer for the nebular phase of Type Ia supernovae

L. J. Shingles, S. A. Sim, M. Kromer, et al.
2020, MNRAS, [10.1093/mnras/stz3412](https://doi.org/10.1093/mnras/stz3412)

White dwarf deflagrations for Type Iax supernovae: polarisation signatures from the explosion and companion interaction

M. Bulla, Z. -W. Liu, F. K. Röpkke, et al.
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SNe Ia from double detonations: Impact of core-shell mixing on the carbon ignition mechanism

Sabrina Gronow, Christine Collins, Sebastian T. Ohlmann, et al.
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dp034: Modelling Gravitational Waves from Precessing Black Hole Binaries

PI: Dr Mark Hannam

Science Area: Astronomy & Astrophysics

Machines: Memory Intensive Durham

Institute: University of Cardiff

Investigating the effect of in-plane spin directions for precessing binary black hole systems

Chinmay Kalaghatgi and Mark Hannam
2020, PhRvD, [10.1103/PhysRevD.103.024024](https://doi.org/10.1103/PhysRevD.103.024024)

dp036: Chemodynamical Simulations of Galaxies II**PI: Dr Chiaki Kobayashi****Science Area: Astronomy & Astrophysics****Machines: Memory Intensive Durham****Institute: University of Hertfordshire**

Cosmic rates of black hole mergers and pair-instability supernovae from chemically homogeneous binary evolution

L. du Buisson, P. Marchant, Ph Podsiadlowski, et al.

2020, MNRAS, [10.1093/mnras/staa3225](https://doi.org/10.1093/mnras/staa3225)

The Origin of Elements from Carbon to Uranium

Chiaki Kobayashi, Amanda I. Karakas, and Maria Lugaro

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Oxygen loss from simulated galaxies and the metal flow main sequence: predicting the dependence on mass and environment

Philip Taylor, Chiaki Kobayashi, and Lisa J. Kewley

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Stellar migrations and metal flows - Chemical evolution of the thin disc of a simulated Milky Way analogous galaxy

Fiorenzo Vincenzo and Chiaki Kobayashi

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New Type Ia Supernova Yields and the Manganese and Nickel Problems in the Milky Way and Dwarf Spheroidal Galaxies

Chiaki Kobayashi, Shing-Chi Leung, and Ken'ichi Nomoto

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dp047: DISCSIM: The Formation and Evolution of Planets in the Era of ALMA**PI: Prof. Cathy Clarke****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Cambridge, Data Intensive Leicester****Institute: University of Southampton**

Spiral arms in the protoplanetary disc HD100453 detected with ALMA: evidence for binary-disc interaction and a vertical temperature gradient

G. P. Rosotti, M. Benisty, A. Juhász, et al.

2020, MNRAS, [10.1093/mnras/stz3090](https://doi.org/10.1093/mnras/stz3090)

dp050: Simulating Gravitational Instabilities that Drive Vertical Structure Formation in Quiescent Prominences

PI: Dr Andrew Hillier

Science Area: Astronomy & Astrophysics

Machines:

Institute: University of Exeter

Self-similar solutions of asymmetric Rayleigh-Taylor mixing

A. Hillier

2020, PhFl, [10.1063/1.5130893](https://doi.org/10.1063/1.5130893)

dp051: Hadron Resonances from Lattice QCD

PI: Dr Christopher Thomas

Science Area: Particle Physics

Machines: Data Intensive Cambridge

Institute: University of Cambridge

DK $I = 0, \bar{D}K I = 0, 1$ scattering and the $D_s^{0*}(2317)$ from lattice QCD

Gavin K. C. Cheung, Christopher E. Thomas, David J. Wilson, et al.

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Efficient solution of the multichannel Lüscher determinant condition through eigenvalue decomposition

Antoni J. Woss, David J. Wilson, Jozef J. Dudek, et al.

2020, PhRvD, [10.1103/PhysRevD.101.114505](https://doi.org/10.1103/PhysRevD.101.114505)

dp058: Galaxy-scale Simulations of Star Formation

PI: Dr Rowan Smith

Science Area: Astronomy & Astrophysics

Machines: Memory Intensive Durham

Institute: University of Manchester

Simulations of the star-forming molecular gas in an interacting M51-like galaxy

Robin G. Tress, Rowan J. Smith, Mattia C. Sormani, et al.

2020, MNRAS, [10.1093/mnras/stz3600](https://doi.org/10.1093/mnras/stz3600)

The Cloud Factory I: Generating resolved filamentary molecular clouds from galactic-scale forces

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Mattia C. Sormani, Robin G. Tress, Simon C. O. Glover, et al.

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dp060: Spectroscopy of Hot Exoplanets

PI: Dr Sergey Yurchenko

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge, Data Intensive Leicester

Institute: University College London

ExoMol molecular line lists - XXXVII. Spectra of acetylene

Katy L. Chubb, Jonathan Tennyson, and Sergei N. Yurchenko

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dp064: First Principle Predictions of Large Nuclei and Nucleonic Matter
PI: Dr Carlo Barbieri
Science Area: Particle Physics
Machines: Data Intensive Leicester
Institute: University of Surrey

Restoration of the natural E(1/2₁⁺) - E(3/2₁⁺) energy splitting in odd-K isotopes towards N = 40
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dp065: UKMHD Consortium: 1) Solar and Planetary Interiors
PI: Prof. David Hughes
Science Area: Astronomy & Astrophysics
Machines: Memory Intensive Durham, Data Intensive Leicester
Institute: University of Sheffield

Turbulent Viscosity Acting on the Equilibrium Tidal Flow in Convective Stars
J r mie Vidal and Adrian J. Barker
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Convective turbulent viscosity acting on equilibrium tidal flows: new frequency scaling of the effective viscosity

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dp066: UKMHD Consortium: 3) Astrophysical MHD and Kinetic Simulations.

PI: Prof. Sam Falle

Science Area: Astronomy & Astrophysics

Machines: Memory Intensive Durham

Institute: University of Leeds

Thermal instability revisited

S. A. E. G. Falle, C. J. Wareing, and J. M. Pittard

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dp080: The Early Phases of Protostellar Disc Evolution (E-DISCS)

PI: Dr Dimitris Stamatellos

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge, Data Intensive Leicester

Institute: University of Central Lancashire

Planet formation around M dwarfs via disc instability. Fragmentation conditions and protoplanet properties

Anthony Mercer and Dimitris Stamatellos

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dp100: Photoevaporation and Properties of the Circumstellar Environment

PI: Dr James Owen

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Leicester

Institute: Imperial College London

The observational anatomy of externally photoevaporating planet-forming discs - I. Atomic carbon

Thomas J. Haworth and James E. Owen

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dp101: Engineering Dwarfs at Galaxy Formations Edge**PI: Prof. Justin Read****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Leicester****Institute: University of Surrey**

EDGE: the mass-metallicity relation as a critical test of galaxy formation physics
Oscar Agertz, Andrew Pontzen, Justin I. Read, et al.
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dp104: Simba: New Cosmological Simulations to Study Galaxy-Black Hole Co-evolution**PI: Prof. Romeel Davé****Science Area: Astronomy & Astrophysics****Machines: Memory Intensive Durham****Institute: University of Edinburgh**

The impact of the connectivity of the cosmic web on the physical properties of galaxies at its nodes

Katarina Kraljic, Christophe Pichon, Sandrine Codis, et al.
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are determined primarily by stellar feedback
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dp119: Signposts of Planets

PI: Prof. Richard Alexander

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge, Data Intensive Leicester

Institute: University of Leicester

Flyby-induced misalignments in planet-hosting discs
Rebecca Nealon, Nicolás Cuello, and Richard Alexander
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The evolution of large cavities and disc eccentricity in circumbinary discs
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dp120: Impact Crater Scaling and Inner solar System Bombardment**PI: Gareth Collins****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Leicester****Institute: Imperial College**

A steeply-inclined trajectory for the Chicxulub impact
G. S. Collins, N. Patel, T. M. Davison, et al.
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dp121: Dynamic Accretion in Astrophysics**PI: Dr Chris Nixon****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Leicester****Institute: University of Leicester**

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dp124: Three-Dimensional Models of Variability in Astrophysical Masers**PI: Dr Malcolm Gray****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Leicester****Institute: University of Manchester**

Maser flares driven by variations in pumping and background radiation

M. D. Gray, S. Etoaka, A. Travis, et al.

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M. D. Gray, S. Etoaka, and B. Pimpanuwat

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dp126: Identifying and Quantifying the Role of Magnetic Reconnection in Space Plasma Turbulence - MSSL**PI: Daniel Verscharen****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Leicester****Institute: University College London**

Spiral arms in the protoplanetary disc HD100453 detected with ALMA: evidence for binary-disc interaction and a vertical temperature gradient

G. P. Rosotti, M. Benisty, A. Juhász, et al.

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dp127: Galactic Dynamics in the Era of Gaia**PI: Prof. Victor Debattista****Science Area: Astronomy & Astrophysics****Machines: Data Intensive Cambridge****Institute: University of Central Lancashire**

Geometric properties of galactic discs with clumpy episodes

Leandro Beraldo e Silva, Victor P. Debattista, Tigran Khachatryan, et al.

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The Splash without a Merger

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dp128: Extreme Gravity and Gravitational Waves

PI: Dr Ulrich Sperhake

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge

Institute: University of Cambridge

Prospects for fundamental physics with LISA
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Structure of Neutron Stars in Massive Scalar-Tensor Gravity
Roxana Rosca-Mead, Christopher J. Moore, Ulrich Sperhake, et al.
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dp129: Wave-Particle Diffusion in the Inhomogeneous Magnetic Fields of the Earth's Outer Radiation Belt

PI: Dr Oliver Allanson

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge

Institute: University of Reading

Particle-in-Cell Experiments Examine Electron Diffusion by Whistler-Mode Waves:
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dp130: SNDUST: Dust Survival Rates in Supernova Remnants

PI: Prof. Mike Barlow

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge

Institute: University College London

Silicate Grain Growth due to Ion Trapping in Oxygen-rich Supernova Remnants like Cassiopeia A

Florian Kirchschlager, M. J. Barlow, and Franziska D. Schmidt

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dp131: Exploring Fundamental Fields With Strong Gravity

PI: Dr Katy Clough

Science Area: Astronomy & Astrophysics

Machines: Data Intensive Cambridge

Institute: University of Oxford

Coherent gravitational waveforms and memory from cosmic string loops

Josu C. Aurrekoetxea, Thomas Helfer, and Eugene A. Lim

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dp137: Spontaneous Symmetry Breaking in the 3d Thirring Model

PI: Simon Hands

Science Area: Particle Physics

Machines: Data Intensive Cambridge

Institute: Swansea University

Critical behavior in the single flavor Thirring model in 2 +1 D

Simon Hands, Michele Mesiti, and Jude Worthy
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dp146: Composite Dynamics Signatures at the LHC

PI: Vincent Drach

Science Area: Particle Physics

Machines: Data Intensive Leicester

Institute: University of Plymouth

Color dependence of tensor and scalar glueball masses in Yang-Mills theories
Ed Bennett, Jack Holligan, Deog Ki Hong, et al.
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V. Drach
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