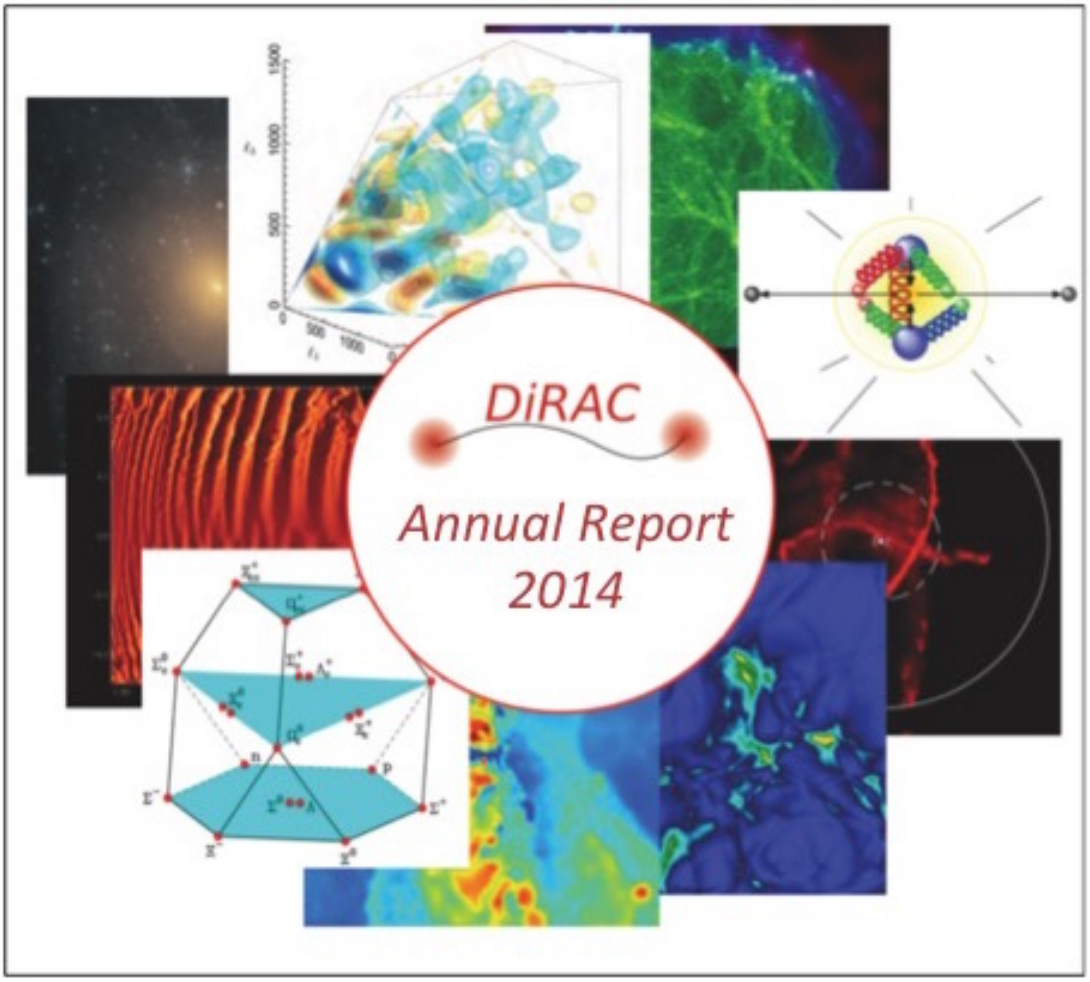
DiRAC
Annual Report
2014

DiRAC Publications 2014

dp001: Stellar coronae and winds
PI: Dr Aline Vidotto
Science Area: Astronomy & Astrophysics
Machines: Data Analytic
Institute: Trinity College Dublin

M-dwarf stellar winds: the effects of realistic magnetic geometry on rotational evolution and planets
Vidotto, A. A., Jardine, M., Morin, J., et al.
2014, MNRAS, 10.1093/mnras/stt2265

dp002: The COSMOS Consortium: Fundamental Cosmology and the Origin of Structure in the Universe
PI: Prof. Paul Shellard
Science Area: Astronomy & Astrophysics
Machines: Data Centric, SMP, Data Analytic, Complexity
Institute: University of Cambridge

Planck 2013 results. XVI. Cosmological parameters
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321591

Planck 2013 results. XXVI. Background geometry and topology of the Universe
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321546

Planck 2013 results. XXV. Searches for cosmic strings and other topological defects
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321621

Planck 2013 results. XXIX. The Planck catalogue of Sunyaev-Zeldovich sources
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321523

Planck 2013 results. XXIV. Constraints on primordial non-Gaussianity
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321554

Planck 2013 results. XXIII. Isotropy and statistics of the CMB
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321534

Planck 2013 results. XXII. Constraints on inflation
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321569

Planck 2013 results. XX. Cosmology from Sunyaev-Zeldovich cluster counts
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321521

Planck 2013 results. XVII. Gravitational lensing by large-scale structure
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321543

Planck 2013 results. XIX. The integrated Sachs-Wolfe effect
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321526

Planck 2013 results. XII. Diffuse component separation
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321580

Planck 2013 results. I. Overview of products and scientific results
Ade, P. A. R., Aghanim, N., et al.
2014, A&A, 10.1051/0004-6361/201321529

Numerical relativity: the role of black holes in gravitational wave physics, astrophysics and high-energy physics
Sperhake, Ulrich
2014, GReGr, 10.1007/s10714-014-1689-z

Cosmology with massive neutrinos I: towards a realistic modeling of the relation between matter, haloes and galaxies
Villaescusa-Navarro, Francisco, Marulli, Federico, Viel, Matteo, et al.
2014, JCAP, 10.1088/1475-7516/2014/03/011

On the anisotropy of the gravitational wave background from massless preheating
Bethke, Laura, Figueroa, DanielG., Rajantie, Arttu
2014, JCAP, 10.1088/1475-7516/2014/06/047

Oscillon lifetime in the presence of quantum fluctuations
Saffin, PaulM., Tognarelli, Paul, Tranberg, Anders
2014, JHEP, 10.1007/JHEP08(2014)125

ExoMol line lists - IV. The rotation-vibration spectrum of methane up to 1500 K
Yurchenko, SergeiN., Tennyson, Jonathan
2014, MNRAS, 10.1093/mnras/stu326

The role of feedback in shaping the structure of the interstellar medium
Walker, A. P., Gibson, B. K., Pilkington, K., et al.
2014, MNRAS, 10.1093/mnras/stu419

The clustering of Galaxies in the SDSS-III Baryon Oscillation Spectroscopic Survey: including covariance matrix errors
Percival, WillJ., Ross, AshleyJ., Snchez, ArielG., et al.
2014, MNRAS, 10.1093/mnras/stu112

The main sequence and the fundamental metallicity relation in MaGICC Galaxies: evolution and scatter
Obreja, A., Brook, C. B., Stinson, G., et al.
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Probing the metallicity and ionization state of the circumgalactic medium at z $\sim$ 6 and beyond with O I absorption
Keating, LauraC., Haehnelt, MartinG., Becker, GeorgeD., et al.
2014, MNRAS, 10.1093/mnras/stt2324

Gas and stellar motions and observational signatures of corotating spiral arms
Kawata, Daisuke, Hunt, JasonA. S., Grand, RobertJ. J., et al.
2014, MNRAS, 10.1093/mnras/stu1292

M2M modelling of the Galactic disc via PRIMAL: fitting to Gaia error added data
Hunt, JasonA. S., Kawata, Daisuke
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MaGICC-WDM: the effects of warm dark matter in hydrodynamical simulations of disc galaxy formation
Herpich, Jakob, Stinson, GregoryS., Macci, AndreaV., et al.
2014, MNRAS, 10.1093/mnras/stt1883

Orbits of radial migrators and non-migrators around a spiral arm in N-body simulations
Grand, RobertJ. J., Kawata, Daisuke, Cropper, Mark
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SKYNET: an efficient and robust neural network training tool for machine learning in astronomy
Graff, Philip, Feroz, Farhan, Hobson, MichaelP., et al.
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Chemodynamics of a simulated disc galaxy: initial mass functions and Type Ia supernova progenitors
Few, C. G., Courty, S., Gibson, B. K., et al.
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Bayesian analysis of radial velocity data of GJ667C with correlated noise: evidence for only two planets
Feroz, F., Hobson, M. P.
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The dependence of dark matter profiles on the stellar-to-halo mass ratio: a prediction

for cusps versus cores
DiCintio, Arianna, Brook, ChrisB., Macci, AndreaV., et al.
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MaGICC baryon cycle: the enrichment history of simulated disc galaxies
Brook, C. B., Stinson, G., Gibson, B. K., et al.
2014, MNRAS, 10.1093/mnras/stu1406

A consistent determination of the temperature of the intergalactic medium at redshift z = 2.4
Bolton, JamesS., Becker, GeorgeD., Haehnelt, MartinG., et al.
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The thermal history of the intergalactic medium down to redshift z = 1.5: a new curvature measurement
Boera, Elisa, Murphy, MichaelT., Becker, GeorgeD., et al.
2014, MNRAS, 10.1093/mnras/stu660

A photodissociation region study of NGC 4038
Bisbas, T. G., Bell, T. A., Viti, S., et al.
2014, MNRAS, 10.1093/mnras/stu1143

Kinetic or thermal AGN feedback in simulations of isolated and merging disc galaxies calibrated by the M-sigma relation
Barai, Paramita, Viel, Matteo, Murante, Giuseppe, et al.
2014, MNRAS, 10.1093/mnras/stt1977

The clustering of galaxies in the SDSS-III Baryon Oscillation Spectroscopic Survey: baryon acoustic oscillations in the Data Releases 10 and 11 Galaxy samples
Anderson, Lauren, Aubourg, ric, Bailey, Stephen, et al.
2014, MNRAS, 10.1093/mnras/stu523

Testing quantum gravity effects with latest CMB observations
Cai, Yi-Fu, Wang, Yi
2014, PhLB, 10.1016/j.physletb.2014.06.019

Spectrum of hot methane in astronomical objects using a comprehensive computed line list
Yurchenko, SergeiN., Tennyson, Jonathan, Bailey, Jeremy, et al.
2014, PNAS, 10.1073/pnas.1324219111

Collisions of oppositely charged black holes
Zilho, Miguel, Cardoso, Vitor, Herdeiro, Carlos, et al.
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Higher dimensional numerical relativity: Code comparison
Witek, Helvi, Okawa, Hirotada, Cardoso, Vitor, et al.
2014, PhRvD, 10.1103/PhysRevD.90.084014

Cosmic microwave background bispectrum from nonlinear effects during recombination
Su, S. -C., Lim, EugeneA., Shellard, E. P. S.
2014, PhRvD, 10.1103/PhysRevD.90.023004

Formulating weak lensing from the Boltzmann equation and application to lens-lens couplings
Su, S. -C., Lim, EugeneA.
2014, PhRvD, 10.1103/PhysRevD.89.123006

Black holes and fundamental fields in numerical relativity: Initial data construction and evolution of bound states
Okawa, Hirotada, Witek, Helvi, Cardoso, Vitor
2014, PhRvD, 10.1103/PhysRevD.89.104032

An alternative accurate tracer of molecular clouds: the 'XCI-factor'
Offner, StellaS. R., Bisbas, ThomasG., Bell, TomA., et al.
2014, MNRAS, 10.1093/mnrasl/slu013

Towards efficient and optimal analysis of CMB anisotropies on a masked sky
Gruetjen, H. F., Shellard, E. P. S.
2014, PhRvD, 10.1103/PhysRevD.89.063008

Distinguishing black-hole spin-orbit resonances by their gravitational-wave signatures
Gerosa, Davide, O'Shaughnessy, Richard, Kesden, Michael, et al.
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Computing general-relativistic effects from Newtonian N-body simulations: Frame dragging in the post-Friedmann approach
Bruni, Marco, Thomas, DanielB., Wands, David
2014, PhRvD, 10.1103/PhysRevD.89.044010

Classically isospinning Skyrmion solutions
Battye, RichardA., Haberichter, Mareike, Krusch, Steffen
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Testing the nonlinear stability of Kerr-Newman black holes
Zilho, Miguel, Cardoso, Vitor, Herdeiro, Carlos, et al.
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Evolution of semilocal string networks: Large-scale properties
Achcarro, A., Avgoustidis, A., Leite, A. M. M., et al.
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Gravitational Waves from the Sound of a First Order Phase Transition
Hindmarsh, Mark, Huber, StephanJ., Rummukainen, Kari, et al.
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Precision of future experiments measuring primordial tensor fluctuation
Wang, Yi, Ma, YinZhe
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Inflation and alternatives with blue tensor spectra
Wang, Yi, Xue, Wei
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Black rings in global anti-de Sitter space
Figueras, Pau, Tunyasuvunakool, Saran
2014, arXiv, 10.1007/JHEP03(2015)149

Constraining topological defects with temperature and polarization anisotropies
Lizarraga, Joanes, Urrestilla, Jon, Daverio, David, et al.
2014, PhRvD, 10.1103/PhysRevD.90.103504

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dp003: ISM
PI: Dr Jeremy Yates
Science Area: Astronomy & Astrophysics
Machines: SMP, Complexity
Institute: University College London

An alternative accurate tracer of molecular clouds: the 'XCI-factor'
Offner, StellaS. R., Bisbas, ThomasG., Bell, TomA., et al.
2014, MNRAS, 10.1093/mnrasl/slu013

A photodissociation region study of NGC 4038
Bisbas, T. G., Bell, T. A., Viti, S., et al.
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Pressure-driven fragmentation of multiphase clouds at high redshift
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dp004: VIRGO Consortium
PI: Prof. Carlos Frenk
Science Area: Astronomy & Astrophysics
Machines: Data Centric
Institute: Durham University

Pan-STARRS1: Galaxy clustering in the Small Area Survey 2
Farrow, DanielJ., Cole, Shaun, Metcalfe, N., et al.
2014, MNRAS, 10.1093/mnras/stt1933

The effect of recombination radiation on the temperature and ionization state of partially ionized gas
Raicevic, Milan, Pawlik, AndreasH., Schaye, Joop, et al.
2014, MNRAS, 10.1093/mnras/stt2099

Predictions for the relation between strong HI absorbers and galaxies at redshift 3
Rahmati, Alireza, Schaye, Joop
2014, MNRAS, 10.1093/mnras/stt2235

An improved model of charge transfer inefficiency and correction algorithm for the Hubble Space Telescope
Massey, Richard, Schrabback, Tim, Cordes, Oliver, et al.
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Halo modelling in chameleon theories
Lombriser, Lucas, Koyama, Kazuya, Li, Baojiu
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How sensitive are predicted galaxy luminosities to the choice of stellar population synthesis model?
Gonzalez-Perez, V., Lacey, C. G., Baugh, C. M., et al.
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Massive Gravity Wrapped in the Cosmic Web
Shim, Junsup, Lee, Jounghun, Li, Baojiu
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Subhaloes gone Notts: the clustering properties of subhaloes
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The cross-power spectrum between 21 cm emission and galaxies in hierarchical galaxy formation models
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The origin of the young pulsar PSR J0826+2637 and its possible former companion HIP 13962
Tetzlaff, N., Dinel, B., Neuhuser, R., et al.
2014, MNRAS, 10.1093/mnras/stt2478

The properties of warm dark matter haloes
Lovell, MarkR., Frenk, CarlosS., Eke, VincentR., et al.
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Halo model and halo properties in Galileon gravity cosmologies
Barreira, Alexandre, Li, Baojiu, Hellwing, WojciechA., et al.
2014, JCAP, 10.1088/1475-7516/2014/04/029

Impact of baryons on the cluster mass function and cosmological parameter determination
Cusworth, SamJ., Kay, ScottT., Battye, RichardA., et al.
2014, MNRAS, 10.1093/mnras/stu105

The integrated Sachs-Wolfe effect in f(R) gravity
Cai, Yan-Chuan, Li, Baojiu, Cole, Shaun, et al.
2014, MNRAS, 10.1093/mnras/stu154

A Possible Cold Imprint of Voids on the Microwave Background Radiation
Cai, Yan-Chuan, Neyrinck, MarkC., Szapudi, Istvn, et al.
2014, ApJ, 10.1088/0004-637X/786/2/110

N-body dark matter haloes with simple hierarchical histories
Jiang, Lilian, Helly, JohnC., Cole, Shaun, et al.
2014, MNRAS, 10.1093/mnras/stu390

Which galaxies dominate the neutral gas content of the Universe?
Lagos, C. D. P., Baugh, C. M., Zwaan, M. A., et al.
2014, MNRAS, 10.1093/mnras/stu266

A compact, metal-rich, kpc-scale outflow in FBQS J0209-0438: detailed diagnostics from HST/COS extreme UV observations
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Hellwing, WojciechA., Barreira, Alexandre, Frenk, CarlosS., et al.
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The ALHAMBRA survey: evolution of galaxy clustering since z $\sim$ 1
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vanDaalen, MarcelP., Schaye, Joop, McCarthy, IanG., et al.
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The thermal Sunyaev-Zel'dovich effect power spectrum in light of Planck
McCarthy, I. G., LeBrun, A. M. C., Schaye, J., et al.
2014, MNRAS, 10.1093/mnras/stu543

Towards a realistic population of simulated galaxy groups and clusters
LeBrun, AmandineM. C., McCarthy, IanG., Schaye, Joop, et al.
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Evolution of the cosmic web
Cautun, Marius, vandeWeygaert, Rien, Jones, BernardJ. T., et al.

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2014, JCAP, 10.1088/1475-7516/2014/07/058

Constraining the warm dark matter particle mass with Milky Way satellites
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Extending the halo mass resolution of N-body simulations
Angulo, RaulE., Baugh, CarltonM., Frenk, CarlosS., et al.
2014, MNRAS, 10.1093/mnras/stu1084

Herschel-ATLAS/GAMA: How does the far-IR luminosity function depend on galaxy group properties?
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The observational status of Galileon gravity after Planck
Barreira, Alexandre, Li, Baojiu, Baugh, CarltonM., et al.
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Nonlinear structure formation in nonlocal gravity
Barreira, Alexandre, Li, Baojiu, Hellwing, WojciechA., et al.
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Dwarf galaxies in CDM and SIDM with baryons: observational probes of the nature of dark matter
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Using the Milky Way satellites to study interactions between cold dark matter and radiation
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2014, MNRAS, 10.1093/mnrasl/slu115

Milky Way mass constraints from the Galactic satellite gap
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Subhalo statistics of galactic haloes: beyond the resolution limit
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2014, MNRAS, 10.1093/mnras/stu1829

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dp005: Theoretical Astrophysics at Leicester
PI: Dr Mark Wilkinson
Science Area: Astronomy & Astrophysics
Machines: Data Analytic, Complexity
Institute: University of Leicester

Two-phase model for black hole feeding and feedback
Nayakshin, Sergei
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Energy- and momentum-conserving AGN feedback outflows
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Black hole feedback in a multiphase interstellar medium
Bourne, MartinA., Nayakshin, Sergei, Hobbs, Alexander
2014, MNRAS, 10.1093/mnras/stu747

Dark matter in disc galaxies - II. Density profiles as constraints on feedback scenarios
Hague, P. R., Wilkinson, M. I.
2014, MNRAS, 10.1093/mnras/stu1376

Understanding the assembly of Kepler's compact planetary systems
Hands, T. O., Alexander, R. D., Dehnen, W.
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Misaligned accretion on to supermassive black hole binaries
Dunhill, A. C., Alexander, R. D., Nixon, C. J., et al.
2014, MNRAS, 10.1093/mnras/stu1914

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dp006: Extreme QCD
PI: Prof. Chris Allton
Science Area: Particle Physics
Machines: BG/Q
Institute: Swansea University

The bottomonium spectrum at finite temperature from N f = 2 + 1 lattice QCD
Aarts, G., Allton, C., Harris, T., et al.
2014, JHEP, 10.1007/JHEP07(2014)097

2+1 flavour thermal studies on an anisotropic lattice
Allton, Chris, Aarts, Gert, Amato, Alessandro, et al.
2014, PoS Lattice, arXiv:1401.2116

Electrical conductivity and charge diffusion in thermal QCD from the lattice
Aarts, Gert, Allton, Chris, Amato, Alessandro, et al.
2014, JHEP, 10.1007/JHEP02(2015)186

Exploring the phase diagram of QCD with complex Langevin simulations
Aarts, Gert, Attanasio, Felipe, Jger, Benjamin, et al.
2014, PoS Lattice, arXiv:1411.2632

Complex Langevin dynamics for SU(3) gauge theory in the presence of a theta term
Bongiovanni, Lorenzo, Aarts, Gert, Seiler, Erhard, et al.
2014, PoS Lattice, arXiv:1411.0949

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dp007: Hadron physics of up, down and strange quarks
PI: Dr Roger Horsley
Science Area: Particle Physics
Machines: BG/Q
Institute: University of Edinburgh

Electric form factors of the octet baryons from lattice QCD and chiral extrapolation
Shanahan, P. E., Horsley, R., Nakamura, Y., et al.
2014, PhRvD, 10.1103/PhysRevD.90.034502

Feynman-Hellmann approach to the spin structure of hadrons
Chambers, A. J., Horsley, R., Nakamura, Y., et al.
2014, PhRvD, 10.1103/PhysRevD.90.014510

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dp008: UKQCD DWF: physics with dynamical chiral quarks
PI: Dr Andreas Juettner
Science Area: Particle Physics
Machines: BG/Q
Institute: University of Southampton

Kaon semileptonic decay from the SU(3)-symmetric point down to physical quark masses
A. Jttner, J. M. Flynn, C. Sachrajda, P. A. Boyle, R. Mawhinney, H. Yin, N. Garron, K. Sivalingam
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Weak Decay Measurements from 2+1 flavor DWF Ensembles

Blum, T., Boyle, P. A., Christ, N. H., et al.
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Tadeusz Janowski, Peter A. Boyle, Andreas Jttner, Christopher Sachrajda
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Domain wall QCD with physical quark masses
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dp009: Non perturbative BSM dynamics
PI: Dr Antonio Rago
Science Area: Particle Physics
Machines: BG/Q
Institute: Plymouth University

Infrared regime of SU(2) with one adjoint Dirac flavor
Athenodorou, Andreas, Bennett, Ed, Bergner, Georg, et al.
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Non-perturbative results for large-N gauge theories
Lucini, Biagio
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dp010: UKMHD Consortium: 2) Solar Atmosphere
PI: Prof. Alan Hood
Science Area: Astronomy & Astrophysics
Machines: BG/Q, Data Analytic, Wilkes GPU
Institute: University of St Andrews

The effect of guide-field and boundary conditions on collisionless magnetic reconnection in a stressed X-point collapse
GrafvonderPahlen, J., Tsiklauri, D.
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Coronal Magnetic Field Evolution from 1996 to 2012: Continuous Non-potential Simulations
Yeates, A. R.
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Mesogranulation and small-scale dynamo action in the quiet Sun
Bushby, P. J., Favier, B.

2014, A&A, 10.1051/0004-6361/201322993

On magnetic reconnection and flux rope topology in solar flux emergence
MacTaggart, D., Haynes, A. L.
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Skender, M., Tsiklauri, D.
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Archontis, V., Hood, A. W., Tsinganos, K.
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Octupolar out-of-plane magnetic field structure generation during collisionless magnetic reconnection in a stressed X-point collapse
vonderPahlen, J. Graf, Tsiklauri, D.
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On Large-scale Dynamo Action at High Magnetic Reynolds Number
Cattaneo, F., Tobias, S. M.
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Non-linear tearing of 3D null point current sheets
Wyper, P. F., Pontin, D. I.
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Simulating AIA observations of a flux rope ejection
Pagano, P., Mackay, D. H., Poedts, S.
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A dynamo model of Jupiter's magnetic field
Jones, C. A.
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Dynamic topology and flux rope evolution during non-linear tearing of 3D null point current sheets
Wyper, P. F., Pontin, D. I.
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Stellar differential rotation and coronal time-scales
Gibb, G. P. S., Jardine, M. M., Mackay, D. H.
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dp014: Galactic scale studies of star formation
PI: Prof. Ian Bonnell
Science Area: Astronomy & Astrophysics
Machines: Complexity
Institute: University of St Andrews

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dp015: High Performance Computing Support for Exeter Astrophysics
PI: Prof. Matthew Bate
Science Area: Astronomy & Astrophysics
Machines: BG/Q, Data Centric, Complexity
Institute: Universiry of Exeter

The unified model, a fully-compressible, non-hydrostatic, deep atmosphere global circulation model, applied to hot Jupiters. ENDGame for a HD 209458b test case
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dp016: Nephthys: A New Generation of Galaxy Zooms
PI: Dr Adrianne Slyz
Science Area: Astronomy & Astrophysics
Machines: Complexity
Institute: University of Oxford

Black hole evolution - III. Statistical properties of mass growth and spin evolution using large-scale hydrodynamical cosmological simulations
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dp018: Meiksin
PI: Prof. Avery Meiksin
Science Area: Astronomy & Astrophysics
Machines: Data Analytic
Institute: University of Edinburgh

Gas around galaxy haloes: methodology comparisons using hydrodynamical simulations of the intergalactic medium
Meiksin, Avery, Bolton, JamesS., Tittley, EricR.
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dp019: HPQCD High Precision QCD Collaboration
PI: Prof. Christine Davies
Science Area: Particle Physics
Machines: Data Analytic
Institute: University of Glasgow

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dp020: EXOMOL
PI: Prof. Jonathon Tennyson
Science Area: Astronomy & Astrophysics
Machines: SMP, Data Analytic
Institute: University College London

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dp034: Numerical simulations of black hole binaries
PI: Dr Mark Hannam
Science Area: Astronomy & Astrophysics
Machines: Data Centric
Institute: University of Cardiff

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