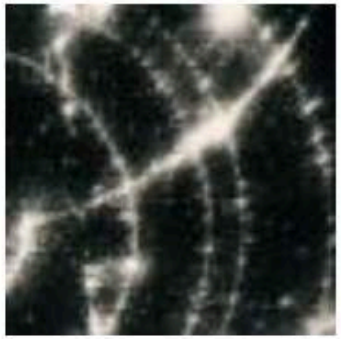
UNIVERSITY OF OXFORD

Michaelmas 2019



Particle Theory

We study the fundamental nature of matter and forces in the universe ... seeking to explain why the world is the way it is?

Academics John Wheater, Fabrizio Caola, Joseph Conlon, Lucian Harland-Lang, Andre Lukas, John March-Russell, Gavin Salam, Subir Sarkar, Andrei Starinets, Lorenzo Tancredi

http://www2.physics.ox.ac.uk/research/particle-theory

Information for prospective DPhil (PhD) students in Particle Theory

For full details, please see the University of Oxford Graduate Studies Prospectus, including the information specific to Theoretical Physics. If you would like to be considered by more than one research group please see in particular Graduate study in Theoretical Physics. A summary is provided below.

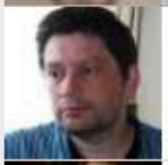
Postgraduate research students in Particle Theory normally enter at the beginning of Michaelmas Term (mid-October) and, after a probationary period of one year, can apply for 'transfer of status' to do a DPhil degree. In practice it takes a total of 3 to 4 years to complete a DPhil thesis. We do *not* consider applicants wishing to do a MSc rather than a DPhil degree.

You can see details of potential supervisors willing to take students to start in October 2020. It is not necessary to make a detailed proposal for your research project, or to nominate a supervisor, on the application form; but if you are interested in a particular area please say so.

A talk for prospective DPhil Students will be given on 9 Dec 2019 @ 11:30 in the Sciama Lecture Theatre (as part of the Particle Physics Open Day).

During their first year, students have **probationary status** and spend most of their time on course work and study. Several graduate lecture courses are provided (now assimilated into the Oxford Masters programme) and students are advised about reading by their Supervisors. Problems classes relating to lectures are held in the first two terms (Oct-Apr). All students entering their second year make a presentation to the Group in Michaelmas Term (see uploaded talks under 'Attachments' on right) and then have an oral examination by two staff members (nominated by the Supervisor). Students must perform satisfactorily in these assessments in order to be promoted to **DPhil status**. After completing the bulk of their research work they will have another oral examination (tyically towards the end of their third year) to determine if they are ready to submit their thesis. The supervisor, in discussion with the candidate, then selects one internal and one external examiner who subsequently carry out the thesis examination. Successful candidates will add to the illustrious list of Oxford Theoretical Physics theses.

People

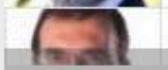


Andre Lukas
Professor of Theoretical Physics

John March-Russell
Professor of Theoretical Physics. Fellow, New College

Gavin Salam
Royal Society Professorial Research Fellow

Subir Sarkar
Head, Particle Theory Group



Andrei Starinets

Publications

Adding new branches to the "Christmas tree" of the quasinormal spectrum of black branes
Journal of High Energy Physics Springer Nature **2019** (2019) 80

Counting string theory standard models
PHYSICS LETTERS B **792** (2019) 258-262
A Constantin, Y-H He, A Lukas

2020 Studentships

Applications are invited for 2 DPhil (PhD) studentships for up to 3.5 years from 1st October 2020 in the Particle Theory group. These are funded by the UK Science and Technology Facilities Council and cover University & College fees for all EU nationals, and provide in addition a maintenance award for *UK residents only*. The detailed rules for eligibility are given here.

A full list of research interests and supervisor availability can be found here. Candidates may contact any staff member to discuss research interests and successful applicants will in general have a choice of supervisor from all those available to take on a student.

Our graduate training programme constitutes part of the Oxford Master Course in Mathematical and Theoretical Physics.

Candidates should have been awarded an undergraduate degree in physics by the start date of the post and have a *strong* background in theoretical physics.

To apply, please follow the standard procedure of applying for graduate study in Theoretical Physics, outlined here.

Only applications received by **noon on 24 January 2020** will be considered. You will have to fill in the application form (please write 'STFC' in the field "Title of research project" and 'supervisor name' as "proposed supervisor" if known on application), submit a CV, brief statement of research interests, and details of three academic referees.

People

John Wheater

Professor of Physics, Head of Particle Theory Group

Fabrizio Caola

Associate Professor

Joseph Conlon

Professor of Theoretical Physics

Lucian Harland-Lang

STFC Rutherford Fellow

Andre Lukas

Publications

Applicants resident in the UK will usually be called for interview in March; overseas applicants may be interviewed by phone/skype. Preliminary offers (subject to satisfactory examination results) are made at this time, both for places and for STFC studentships.

Supervisors and Research Topics

Candidates may contact any staff member to discuss research interests and successful applicants will in general have a choice of supervisor from all those available to take on a student (please check under individual names below). To learn some more about what the whole group and closely connected groups are currently working on, see our 3 minute presentations

Dr Fabrizio Caola click to close

I am mostly interested in Quantum Chromodynamics (QCD), the theory of strong interactions. My work focuses on deepening our understanding of QCD to be able to obtain accurate theoretical predictions for collider processes. This requires for example developing new ideas for computing QFT scattering amplitudes, or devising new ways for dealing with the intricate structure of QCD radiation. I am also interested in the phenomenological application of QCD to high-precision phenomenological studies at colliders, in particular for processes involving the Higgs boson.

Will take a new student in Oct 2020 (funded by ERC 'hipQCD' grant)

Current Graduate Student(s):
Piotr Bargiela (2019)

Prof Joseph Conlon click to close

I broadly work on string phenomenology and connecting high-scale physics to observations/experiments. My current work is focused on the study of string compactifications and possible swampland constraints on consistent low-energy Lagrangians from quantum gravity. I also have a broad interest in astroparticle physics and in particular astrophysical searches for axions.

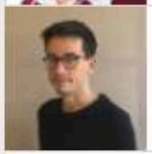
May take a student in Oct 2020

Current Graduate Student(s):
Sirui Ning (2019)
Filippo Revello (2018)

Recent Graduate Student(s):
Nicholas Jennings (2018) *Searches for Axion-Like Particles with X-ray*

People

Andrei Starinets
University Lecturer in Theoretical Physics



Lorenzo Tancredi
Royal Society University Research Fellow

Publications

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Counting string theory standard models
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A Constantin, Y-H He, A Lukas

Dark Matter benchmark models for early LHC Run-2 Searches: Report of the ATLAS/CMS Dark Matter Forum

Oxford Particle Theory Group

Founded in 1963 by **Richard (Dick) Dalitz**
Former members: **Jack Paton, Ian Aitchison, John Taylor, Chris Llewellyn-Smith, Frank Close, Graham Ross*, Mike Teper*, Giulia Zanderighi, Uli Haisch**

John Wheater 1986-

Conformal field theory & quantum gravity

Andrei Starinets 2008-

Gauge-string duality, holography, AdS-CFT

+ presently 6 postdocs & ~15 DPhil students

+ Visitors: Christopher Herzog (KCL)
Stephen West (RHUL)

Andre Lukas 2004-

String theory and phenomenology

Lorenzo Tancredi RSURF 2019-

+ Many associates in Astro, PP & Maths Inst

Supported by: UKRI, EU, Royal Society …

Lucian Harland-Lang ERF 2017-

Subir Sarkar 1990/98-

Joe Conlon 2008/14-

John March-Russell 2002-

Gavin Salam 2018-

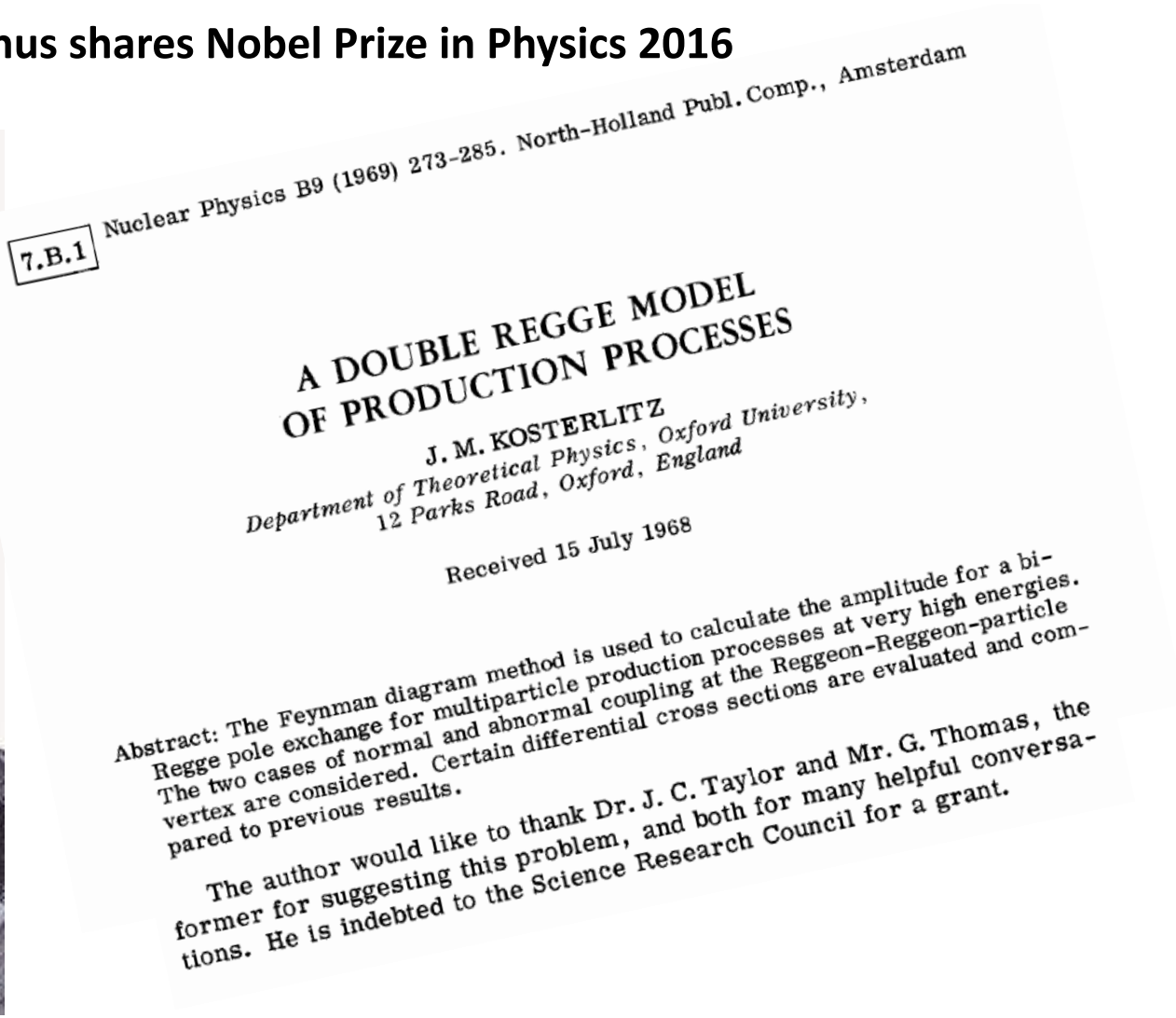
Fabrizio Caola 2019-

Particle astrophysics and cosmology

Physics beyond the Standard Model

Phenomenology of EW & strong interactions

Oxford alumnus shares Nobel Prize in Physics 2016



7.B.1 Nuclear Physics B9 (1969) 273–285. North-Holland Publ. Comp., Amsterdam

A DOUBLE REGGE MODEL OF PRODUCTION PROCESSES

J. M. KOSTERLITZ

Department of Theoretical Physics, Oxford University, 12 Parks Road, Oxford, England

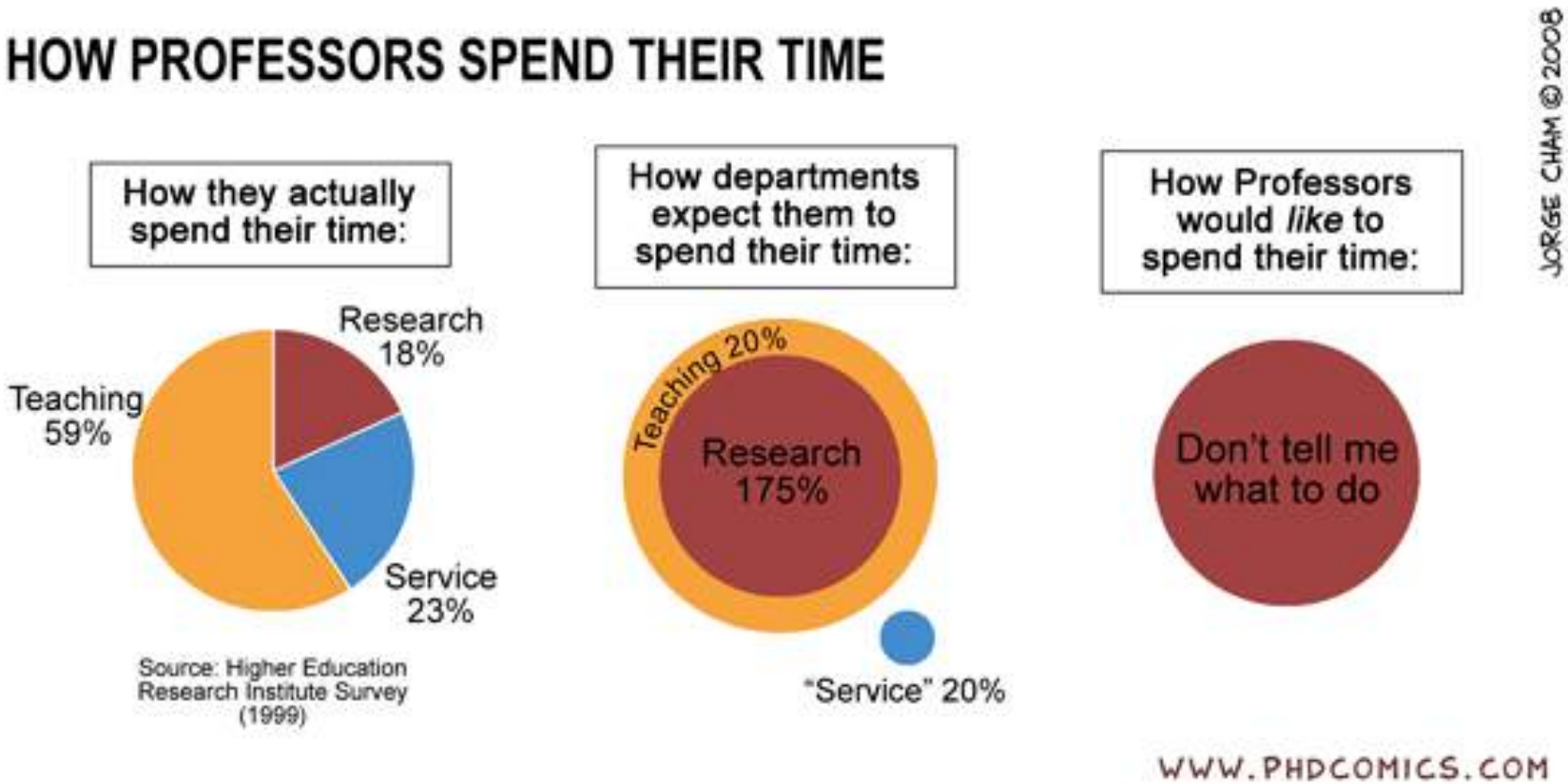
Received 15 July 1968

Abstract: The Feynman diagram method is used to calculate the amplitude for a bi-Regge pole exchange for multiparticle production processes at very high energies. The two cases of normal and abnormal coupling at the Reggeon-Reggeon-particle vertex are considered. Certain differential cross sections are evaluated and compared to previous results.

The author would like to thank Dr. J. C. Taylor and Mr. G. Thomas, the former for suggesting this problem, and both for many helpful conversations. He is indebted to the Science Research Council for a grant.

Theoretical Physics Theses					
PARRY, David Emsley.	Nucleon Resonance Production at High Energies: A Quark-Model Calculation.	DPhil	1971	Dalitz, R H	PT
MOTLEY, C. J.	Matrix Elements of the Nucleon-Nucleon Interaction.	DPhil	1970	Brink, D M	PT
KOSTERLITZ, J M	Problems in strong interaction physics	DPhil	1969	Taylor, J C	PT
HOLDSWORTH, D.	Numerical Calculations of Quark-Antiquark Bound State Masses, Using the Bethe-Salpeter Equation.	DPhil	1968	Dalitz, R H	PT
KEAM, R. F.	Some Properties of the Ladder Approximation Bethe-Saltpeter Equation	DPhil	1968	Not stated	PT
PEREZ, S. M.	Inelastic Scattering and the Nuclear Shell Model.	DPhil	1968	Hodgson, P E	PT
BARNETT, A. R.	Research in Nuclear Structure.	DPhil	1965	Tanner, N W	PT
FRAMPTON, Paul Howard.	Strong Interactions of Elementary Particles: Regge Theory and Sum Rules.	DPhil		Taylor, J C	PT
LONDERGAN, J. Timothy.	Hypernuclear Decay Spectra.	DPhil		Dalitz, R H	PT

Staff

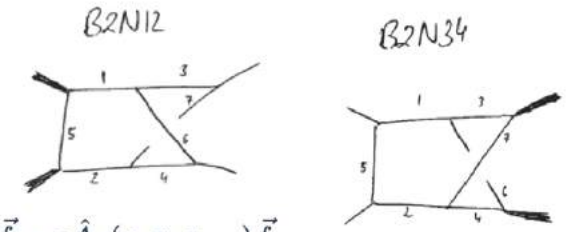

HOW PROFESSORS SPEND THEIR TIME
How they actually spend their time:
Research 18%
Teaching 59%
Service 23%
Source: Higher Education Research Institute Survey (1999)
How departments expect them to spend their time:
Teaching 20%
Research 175%
"Service" 20%
How Professors would *like* to spend their time:
Don't tell me what to do
JORGE CHAM © 2008
WWW.PHDCOMICS.COM

Fabrizio Caola

Higher order QCD calculations and precision collider phenomenology

Theoretical aspects:

- soft/collinear structure of QCD, NNLO and higher order subtractions
- new ideas for amplitude computations

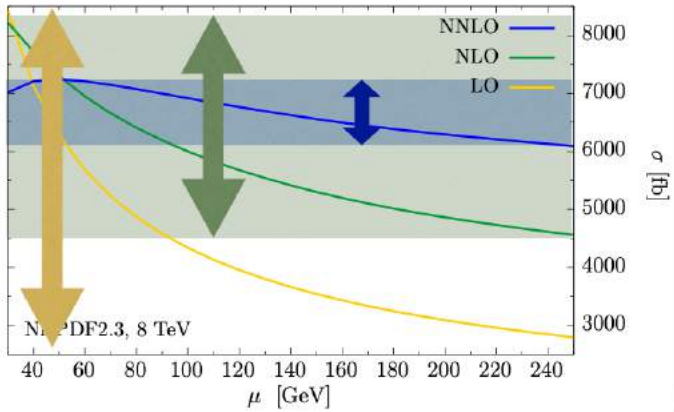


$$\partial_x \vec{f} = \epsilon \hat{A}_x(x, y, z, ...)\vec{f}$$

$$G(a_n, a_{n-1}, ..., a_1, t) = \int_0^t \frac{\mathrm{d}t}{t_n - a_n} G(a_{n-1}, ..., a_1, t_n)$$

Phenomenological implications:

- Higgs studies at the LHC (and future colliders)
- ``Extreme kinematics region''
  (e.g. off-shell, boosted)
- Interplay of QCD/EW at higher orders



Current student: P. Bargiela

JOSEPH CONLON

String theory and compactifications

String phenomenology

Also interested in astroparticle physics, cosmology and BSM

Current interest: the swampland – how does ultraviolet consistency constrain low-energy effective Lagrangians?

Students: Filippo Revello (2nd year), Sirui Ning (1st year)

Lucian Harland-Lang

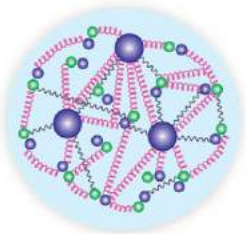
STFC Rutherford Fellow

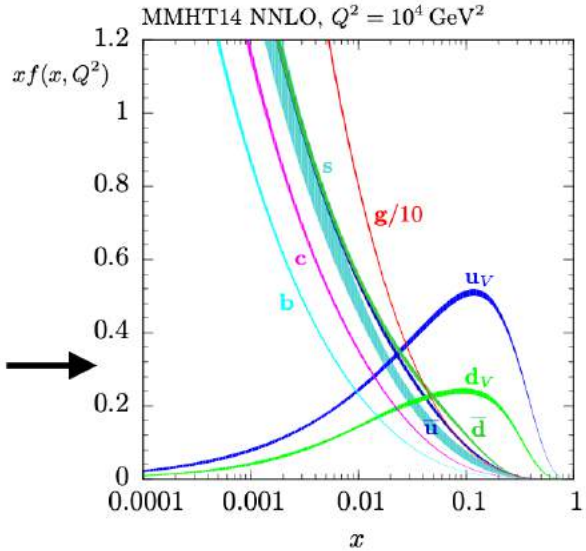
I am a **QCD phenomenologist**. Two main topics of research:

- **P**arton **D**istribution **F**unctions:

★ Precise extraction of proton structure. Essential to all LHC physics- member of **MMHT** collaboration.

★ **Ongoing/recent work**: 'MMHT19', theory errors, HL-LHC/LHeC projections, challenges of precision LHC fits (w. Shaun Bailey).



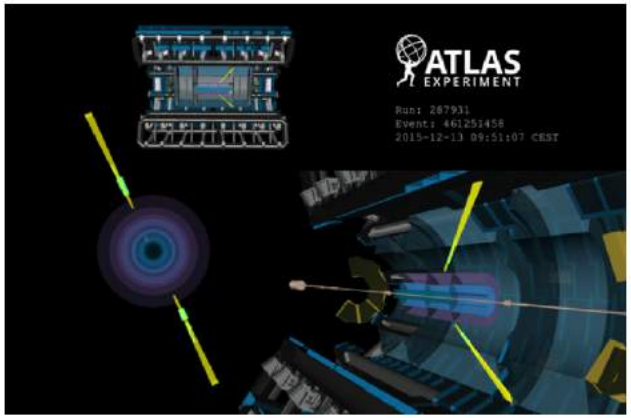


- **C**entral **E**xclusive **P**roduction:

$$pp \to p + X + p$$

★ Unique 'elastic' class of event. Different avenue of exploration vs. standard 'inclusive' channels.

★ **Ongoing/recent work**: generalising **SuperChic** MC for (semi)-inclusive photon-initiated production, glueballs at the LHC.



Andre Lukas

Main interest: string theory, with emphasis on compactifications, model building and phenomenology.

More specifically:

- Calabi-Yau manifolds, vector bundles and heterotic model building
- Flux compactifications and non-CY manifolds
- Machine learning and string theory
- M-theory compactifications and F-theory
- String cosmology

Major theme: "Getting the standard model from string theory"

For example arXiv:1906.08730:

Machine Learning Line Bundle Cohomology

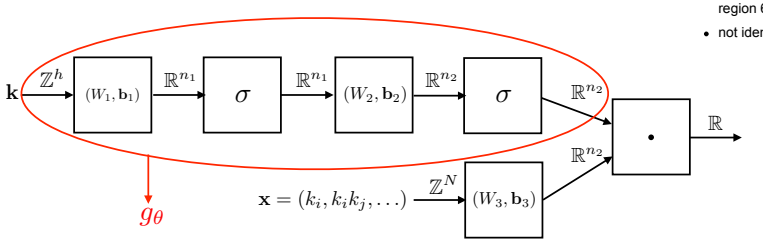
Callum R. Brodie[1], Andrei Constantin[2], Rehan Deen[1], Andre Lukas[1]

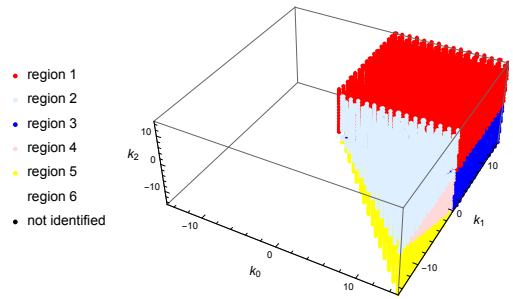
[1] *Rudolf Peierls Centre for Theoretical Physics, University of Oxford, Parks Road, Oxford OX1 3PU, UK*

[2] *Pembroke College, University of Oxford, OX1 1DW, UK*
Mansfield College, University of Oxford, OX1 3TF, UK

Abstract

We investigate different approaches to machine learning of line bundle cohomology on complex surfaces as well as on Calabi-Yau three-folds. Standard function learning based on simple fully connected networks with logistic sigmoids is reviewed and its main features and shortcomings are discussed. It has been observed recently that line bundle cohomology can be described by dividing the Picard lattice into certain regions in each of which the cohomology dimension is described by a polynomial formula. Based on this structure, we set up a network capable of identifying the regions and their associated polynomials, thereby effectively generating a conjecture for the correct cohomology formula. For complex surfaces, we also set up a network which learns certain rigid divisors which appear in a recently discovered master formula for cohomology dimensions.





$$h^0(\mathcal{O}_{\mathrm{dP}_2}(\mathbf{k})) = \begin{cases} 1 + \frac{3}{2}k_0 + \frac{1}{2}k_0^2 + \frac{1}{2}k_1 - \frac{1}{2}k_1^2 + \frac{1}{2}k_2 - \frac{1}{2}k_2^2 & \text{in region } 1\,, \\ 1 + 2k_0 + k_0^2 + k_1 + k_0 k_1 + k_2 + k_0 k_2 + k_1 k_2 & \text{in region } 2\,, \\ 1 + \frac{3}{2}k_0 + \frac{1}{2}k_0^2 + \frac{1}{2}k_2 - \frac{1}{2}k_2^2 & \text{in region } 3\,, \\ 1 + \frac{3}{2}k_0 + \frac{1}{2}k_0^2 + \frac{1}{2}k_1 - \frac{1}{2}k_1^2 & \text{in region } 4\,, \\ 1 + \frac{3}{2}k_0 + \frac{1}{2}k_0^2 & \text{in region } 5\,. \\ 0 & \text{in region } 6\,. \end{cases}$$

Current students: Stefan Blasneag, Callum Brodie, Pandora Dominiak

John March-Russell

- Mystery of the Higgs & the Weak Scale:

  Approaches to the "Hierarchy Problem" — (non-minimal) supersymmetry? — unusual strong-coupling dynamics? —new symmetries? — extra dimensions? — physical naturalness?

- Dark matter:

  What is it? How does it interact with SM sector? Unusual/ new observational signals? New production mechanisms?

- Strong CP problem:

  Is the Peccei-Quinn axion the solution or something new? Are there other super-light weakly coupled bosons like axion? How to discover them?

- Gauge unification? String Theory pheno? Family replication? CP-violation? Hidden Sectors? Gravity Waves? Inflation? Baryogenesis? Why 4D? Cosmo constant?…

Gavin P. Salam

funded by Royal Society Research Professorship, ERC & All Souls College

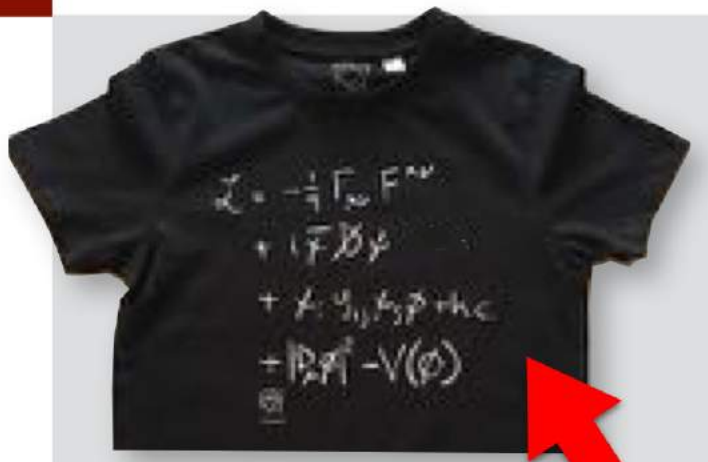
[on leave from CERN & CNRS]

Current main project:

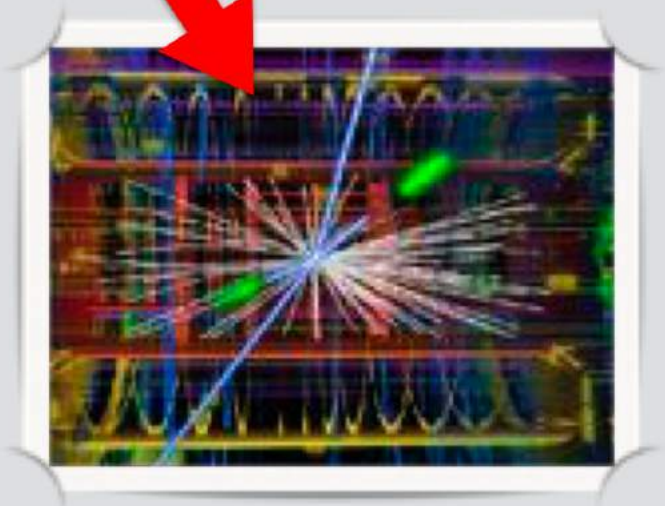
Attempting to reformulate the foundations of “parton showers”, which are used in almost every measurement at the LHC

Main interest: LHC physics
mostly from a QCD point of view

- Jet-physics
  (anti-kt algorithm, FastJet)
- Higgs studies
  (e.g. VBF @ NNLO, jet vetoes)
- Parton Distribution Functions
  (e.g. hoppet, LUXqed photons)
- BSM searches
  (jet substructure, ColliderReach)
- heavy-ion collisions
- future colliders



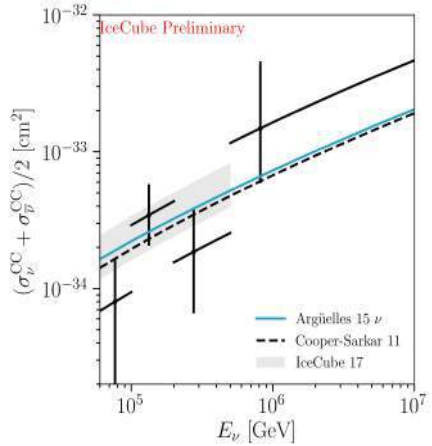
how faithfully can we relate fundamental theory and collider data?



Subir Sarkar — Astroparticle physics & Cosmology

Students: Giacommo Marocco (with J Wheater), Konstantin Beyer (with G Gregori, ALP)

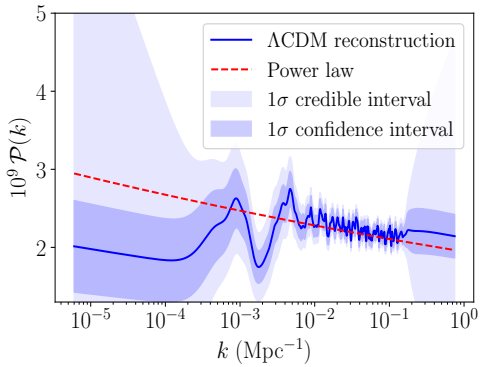
Neutrinos: I am a member (since 2004) of the IceCube experiment which discovered cosmic high energy neutrinos … my interest is in studying deep inelastic scattering at energies beyond the reach of the LHC (e.g. our prediction using HERAPDF has been confirmed upto $E_\nu \sim 10^7$ GeV ➤ ruling out new physics up to ~10 TeV scale). Also studying effects of QG-induced decoherence on ν oscillations.



arXiv:1908.07027

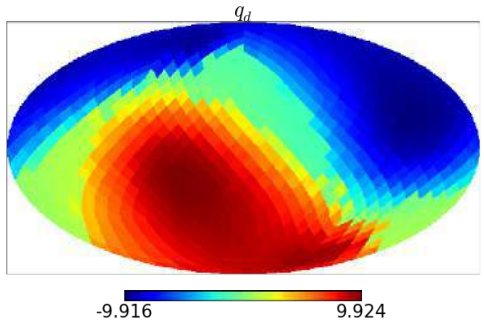
Dark matter: Currently interested in axions (contribution to relic abundance from axion domain walls and strings) … also new laboratory detection techniques (in QTFP programme).

Early universe: Reconstruction of the spectrum of primordial scalar fluctuations from CMB and other datasets shows spectral features which may be evidence for multiple episodes of inflation … we provide a dictionary to map on to (time-dependence of) the relevant parameters in the Effective Field Theory of inflation.

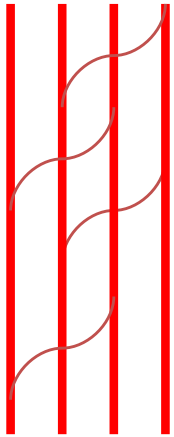


SciPost 7:049,2019

Late universe: The acceleration of the Hubble expansion rate deduced from Type Ia Supernovae is *very* anisotropic - being mainly along the direction of our local 'bulk flow' … the evidence for an isotropic component (⇒ 'dark energy') is only 1.4σ!
(All will be revealed at next Saturday's Morning of Theoretical Physics)



A&A, in press [1808.04597]



conjectured
exact equivalence

Open strings picture: dynamics of strings & branes at low energy is desribed by a quantum field theory without gravity

STRONG COUPLING

Closed strings picture: dynamics of strings & branes at low energy is described by string theory in curved space in higher dim.

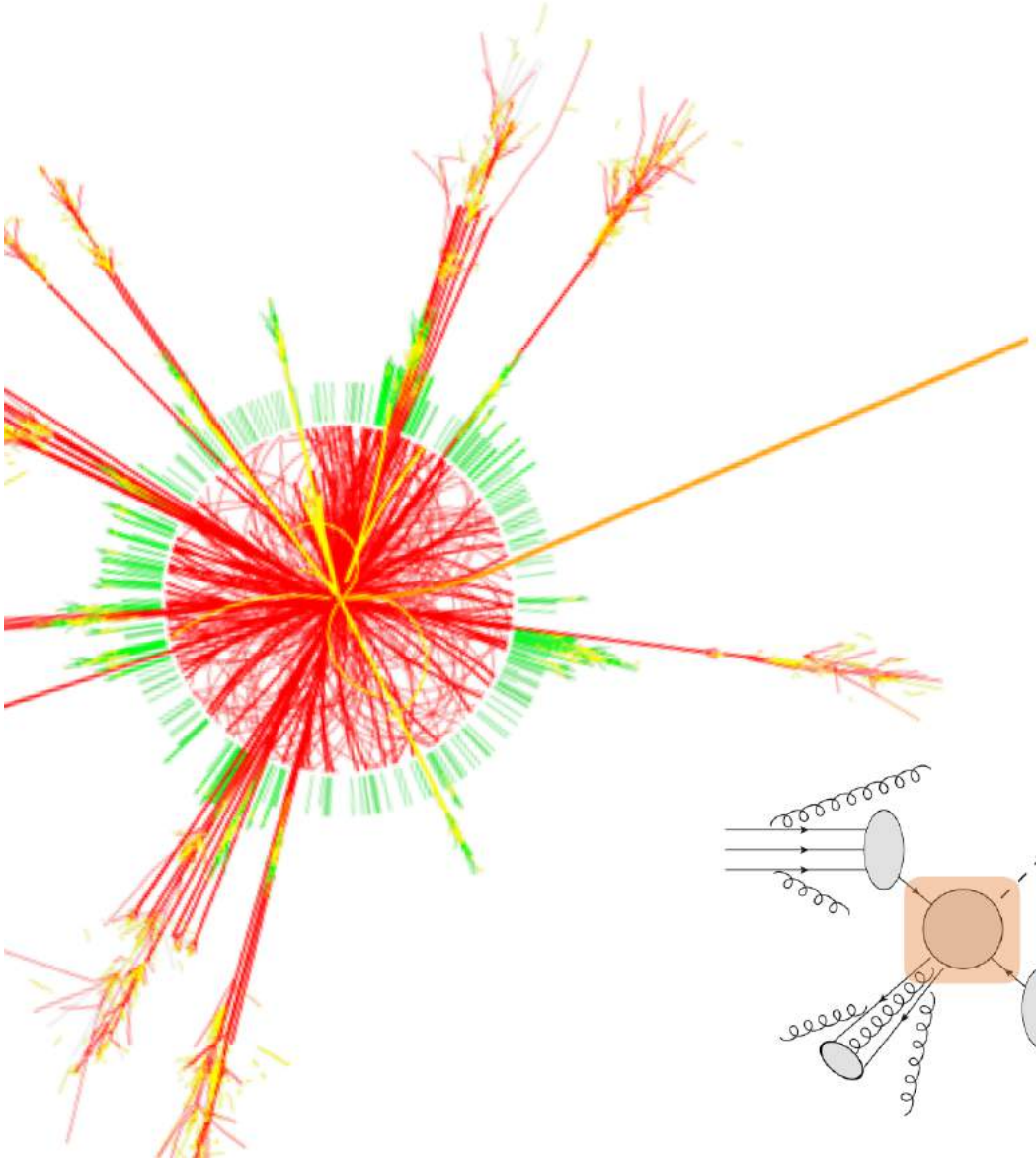
WEAK COUPLING

Allows study of correlation functions, Wilson loops, thermodynamics, transport, non-equilibrium behavior, turbulence, quantum quenches etc in STRONGLY interacting systems (of some class) by using their DUAL weak gravity description

Oxford Holography Group: B.Meiring, C.Herzog (long-term visitor), A.Starinets

Lorenzo Tancredi

Royal Society University Research Fellow (RSURF)
01/10/2019 - 30/09/2024

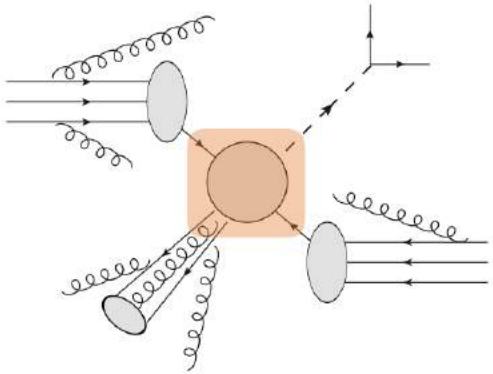


Short CV

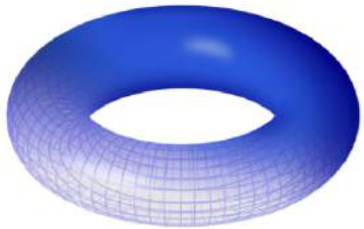
- Undergraduates @ University of Bologna (IT)
- PhD @ University of Zurich (CH)
- Post-Doc @ KIT Karlsruhe (DE)
- Fellow @ CERN TH department (CH)

Main Research Interests

- QCD and collider physics
- Higher-order calculations in the Standard Model
- Mathematical methods in perturbative QFT



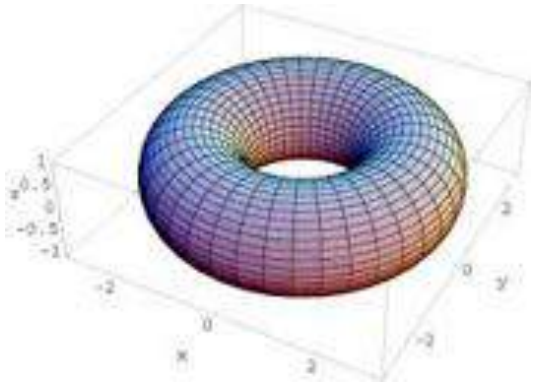
$$\pi^2\,,\ \zeta_n\,,\ \mathrm{Li}_n(x)\,,\ G(a_n,\ldots,a_1;x)\,,\ldots$$



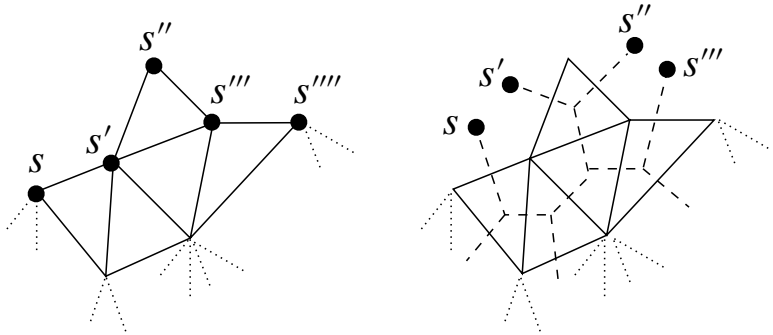
John Wheater

Discretised models of Quantum Gravity and Quantum Geometry

Metrics on Manifolds ⟷ Random Graph Ensembles



$$\int Dg_{\mu\nu} \sim \sum_{\text{graphs}}$$



Global geometrical properties; Phases; Allowed boundary states

Students: Aravinth Kulantaivelu, “Dennis” Xavier Parveen,
Collaborators: Bergfinnur Durhuus, Copenhagen, and Thordur Jonsson, Reykjavik

Use of Quantum Detectors as probes of fundamental interactions

Use the extraordinary precision capability of quantum device technology to measure tiny deviations from expected behaviour and thus probe BSM physics in regimes inaccessible to usual methods such as LHC.

Student: Giacomo Marocco (with Subir Sarkar)

Emeriti & Visitors

Graham Ross - USS research fellow

Current interests:

- Scale invariance and the Standard Model plus Gravity

$M_{Planck}, H_{Inflation}, M_W, \Lambda_{C.C.}$

Pedro Ferreira, Chris Hill, Johannes Noller

Asymptotic safety … perhaps gravity cures all ills:

Landau pole, ghosts, cosmological constant, SM parameters

- Fermion masses and mixings

Complete description of quark, charged lepton and neutrinos based on

$SO(10) \otimes \Delta(27) \otimes U(1)$: $M_{Dirac}^{u,d,l,\nu}$ ~universal

Ivo Medeira Varzielas, Jim Talbert

(we plan to extend this to a particular orbifold model with 3 families and $\Delta(54)$ family symmetry)

Michael Teper

Research: non-perturbative properties of field theories

important tool - lattice field theory

Publications (last year) :

- Glueball Spins in D=3 Yang-Mills

(arXiv:1909.07430, JHEP: P. Conkey, S. Dubovsky, MT)

- On the spectrum and string tension of U(1) lattice gauge theory in 2+1 dimensions

(arXiv:1811.06280, JHEP: A. Athenodorou, MT)

- Pfaffian particles and strings in SO(2N) gauge theories

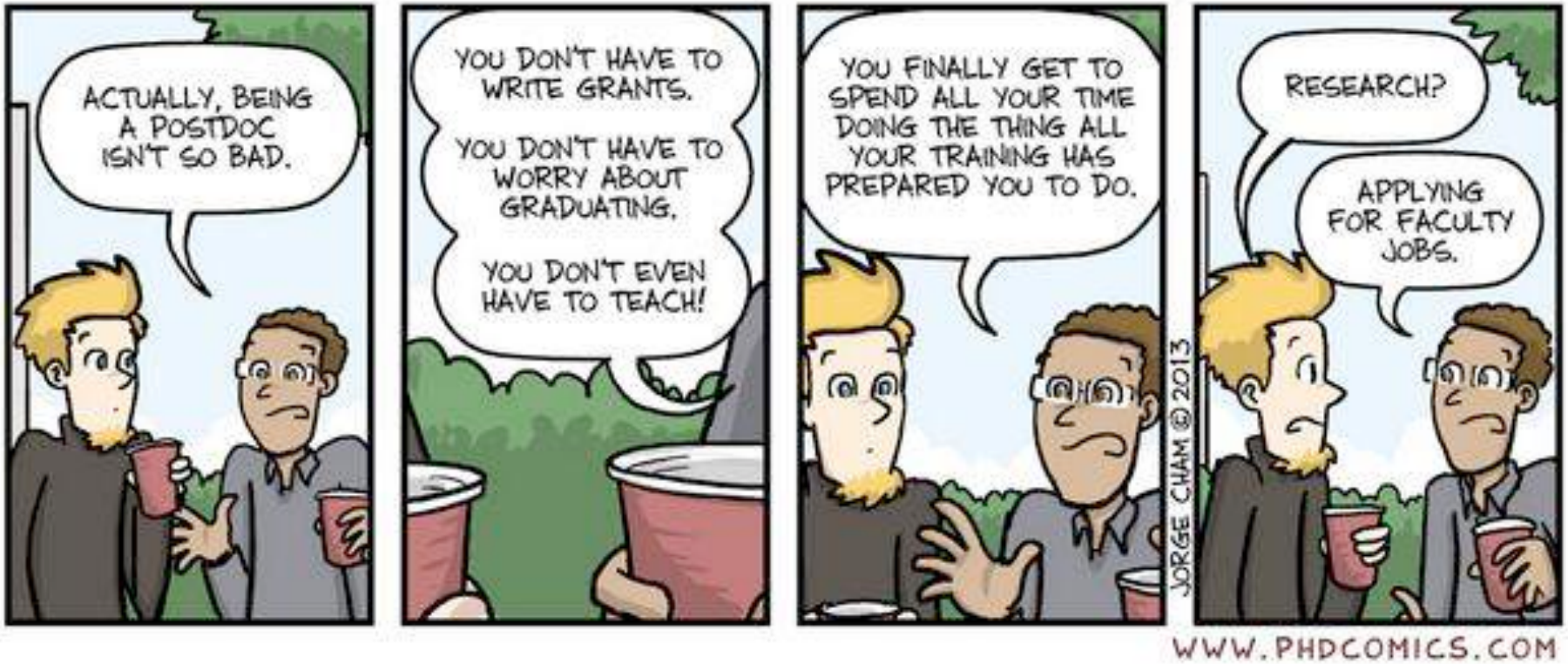
(arXiv:1810.04546, JHEP: MT)

Main current project :

Precise calculation of glueball spectrum (all cubic irreps) and spectrum of winding confining flux tubes in D=3+1 SU(N) gauge theories (with θ)

(with A. Athenodorou)

Postdocs


ACTUALLY, BEING A POSTDOC ISN'T SO BAD.
YOU DON'T HAVE TO WRITE GRANTS.
YOU DON'T HAVE TO WORRY ABOUT GRADUATING.
YOU DON'T EVEN HAVE TO TEACH!
YOU FINALLY GET TO SPEND ALL YOUR TIME DOING THE THING ALL YOUR TRAINING HAS PREPARED YOU TO DO.
RESEARCH?
APPLYING FOR FACULTY JOBS.
JORGE CHAM © 2013
WWW.PHDCOMICS.COM

Rehan Deen

Bio:
Henry Skynner Research Fellow at Balliol

Ph.D. at University of Pennsylvania

Interests:

- String model building: Constructing standard models from smooth heterotic compactifications – Moduli stabilization
- Cosmology from string theory: Dynamics of moduli in quintessence and inflation – Bouncing cosmologies – Hidden sector dynamics + dark matter in het. M-theory

Past + current projects:

- SUSY phenomenology: R-parity violating $B - L$ MSSM - arXiv:1604.08588
- Cosmology: Sneutrino-higgs inflaton model, reheating – arXiv:1606.00431, arXiv:1804.07848
- Higher derivative SUSY/SUGRA: Analogues of galileons, dynamical auxiliary fields – arXiv:1705.06729, arXiv:1707.05305
- Machine Learning applications in String Theory: Cohomologies of surfaces –arXiv:1906.08730, Micro-landscape of heterotic line bundle models on CICYs

Federico Buccioni

Postdoctoral Research Assistant, Theoretical Physics

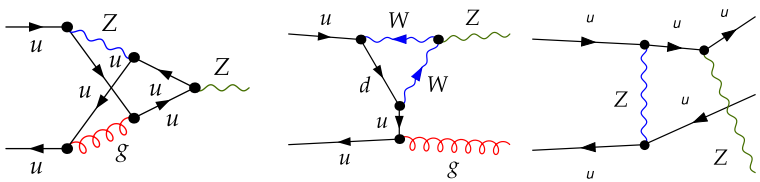
Group: Prof. Fabrizio Caola

Area of research: Precision Collider Phenomenology

PhD in Sep 2019 at the University of Zurich

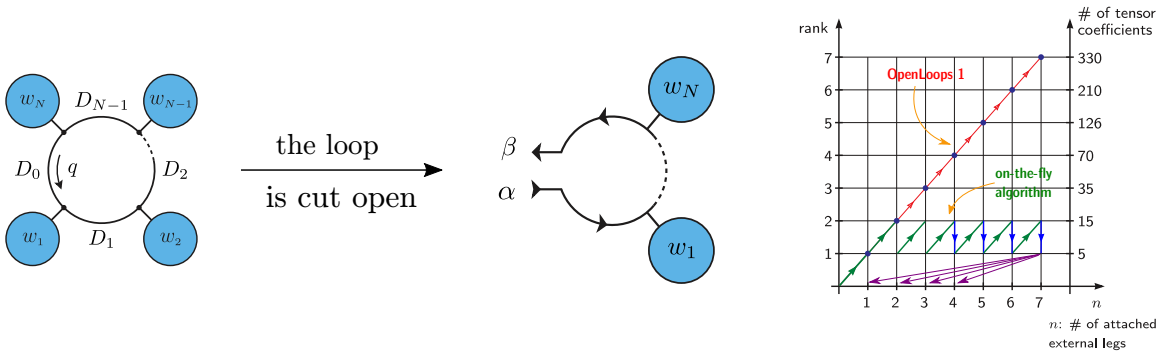
"A novel One-Loop Algorithm for Precision Phenomenology at High-Energy Colliders"

Mixed QCD⊗EW corrections to vector boson production



One-loop automation

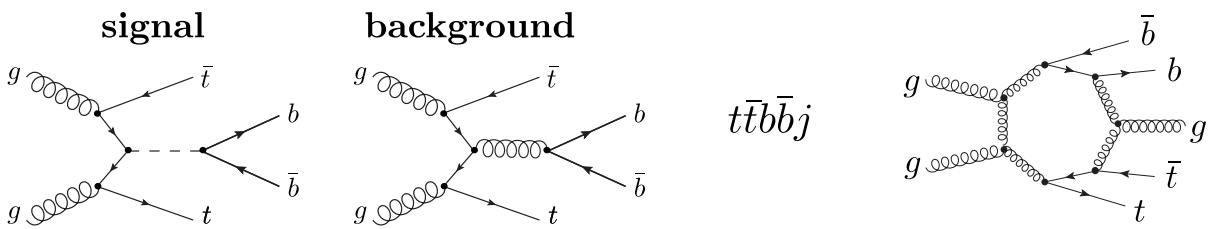
OpenLoops 2



Multiparticle processes at the LHC

Heavy quark phenomenology

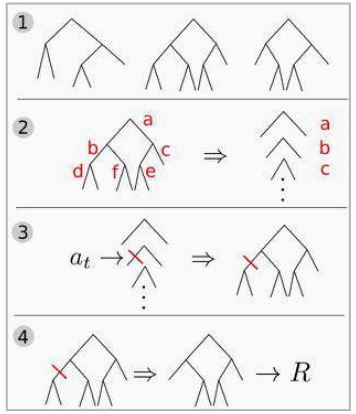
$t\bar{t}H(b\bar{b})$

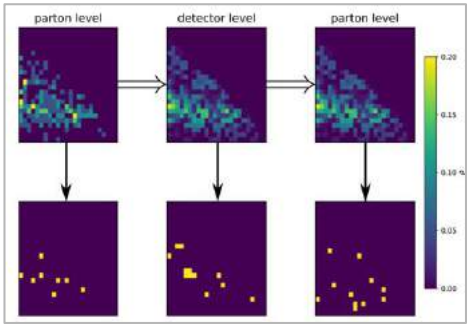


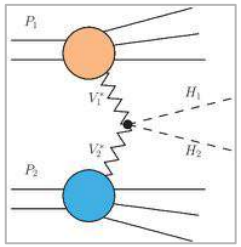
Frédéric Dreyer

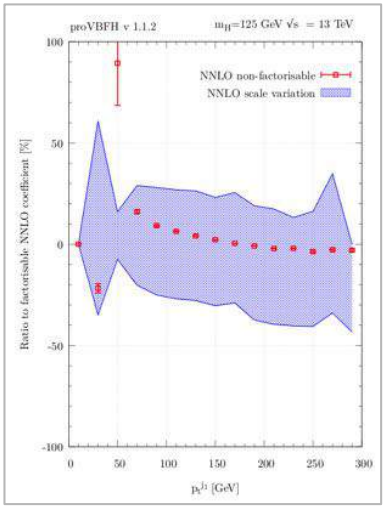
LHC Phenomenology

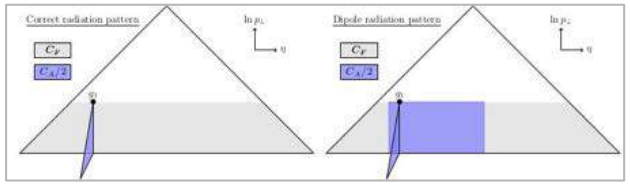
- Jet substructure and boosted object tagging at the LHC.
- Applications of machine learning in jet physics.
- Accuracy of parton showers and connection with resummation.
- Higgs physics and fixed order QCD corrections.











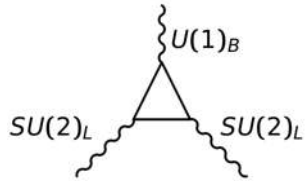
Michael Duerr: STFC PDRA

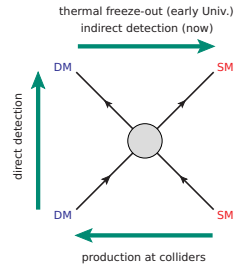
Beyond the Standard Model / Dark Matter phenomenology

> Gauge extensions of the SM

Model building, e.g., $G_{\mathrm{SM}} \otimes U(1)_B \otimes U(1)_L$

Low-scale breaking of $U(1)_B$: testable

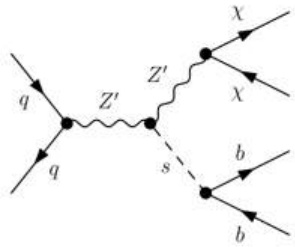


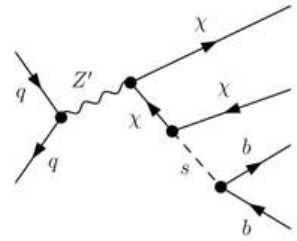


> Consistent simple DM models

Add the minimal amount of structure to the SM that is necessary to explain DM

How simple can these setups be?

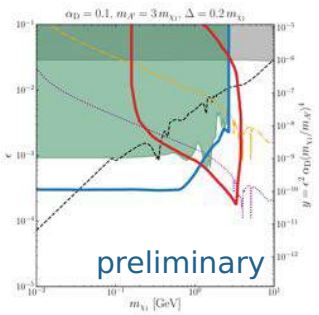


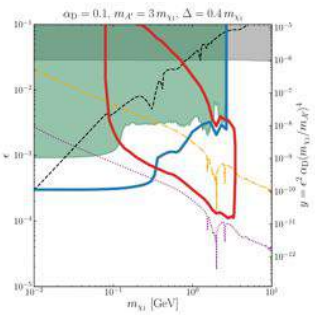


> Extended dark sectors

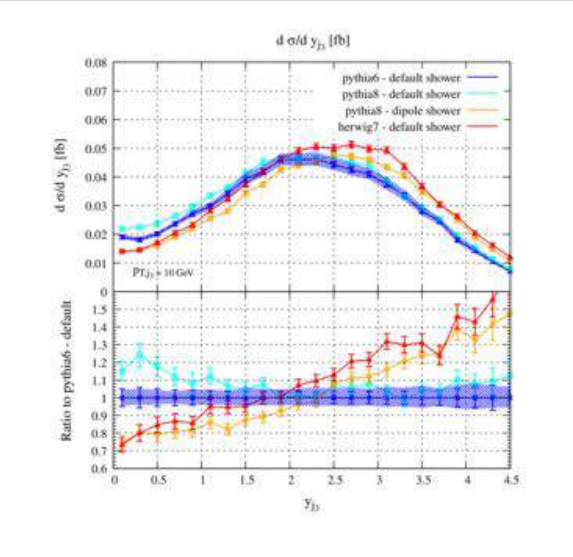
Interesting experimental signatures

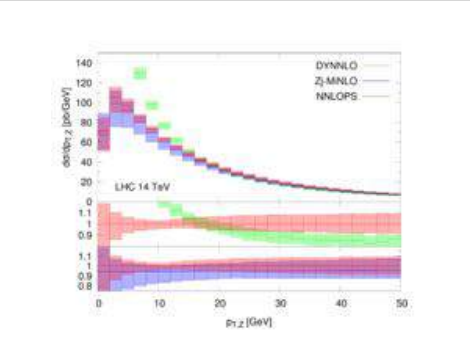
How to test them at colliders?

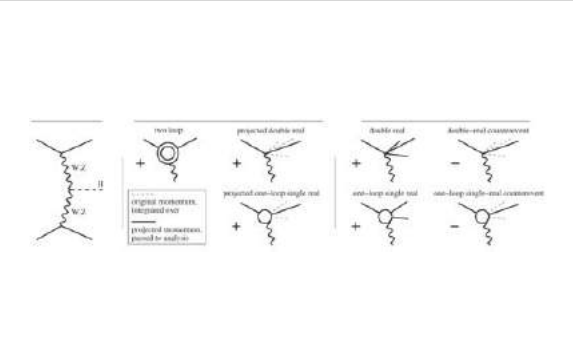


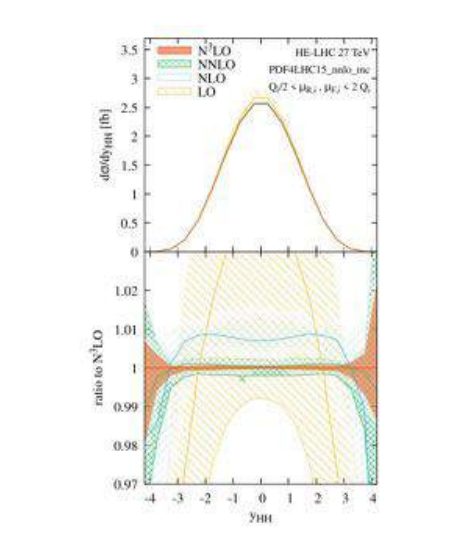


Interested in many other things: axions, neutrinos, . . .









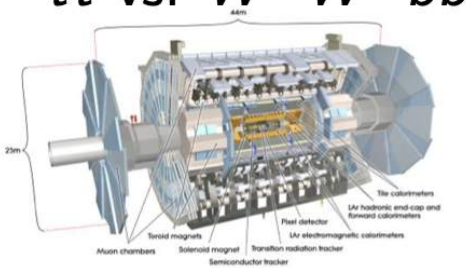
Alexander Karlberg

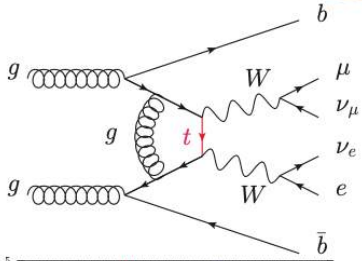
QCD Phenomenology

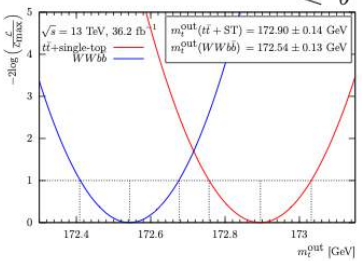
- Fixed order N(N)NLO calculations for LHC and future colliders
- Matching of N(N)LO and Parton Showers
- Understanding of infrared QCD through resummation (MiNLO)
- Higgs/EWSB (VBF/VBS and boosted Higgs)
- Back in Oxford to work on Parton Shower accuracy within the ERC funded PanScales project

Ludo Scyboz

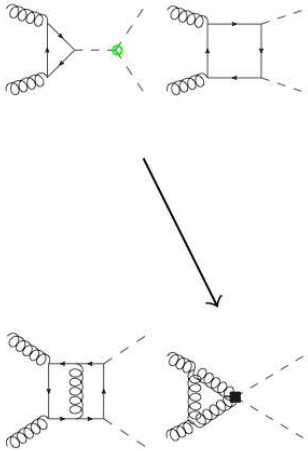
$t\bar{t}$ vs. $W^+W^-b\bar{b}$

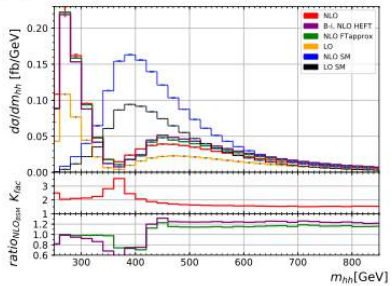






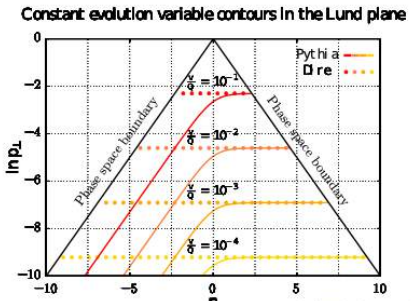
$pp \to hh$: EFT and λ

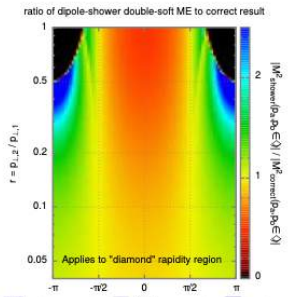




Now: parton-shower accuracy

PanScales project





Associates

Particle physics

Research themes

High-energy frontier physics

Exploring fundamental physics with high-energy colliders

ATLAS Oxford Group
LHCb Neville Harnew, Guy Wilkinson, Malcolm John

Neutrinos

The group studies the properties of neutrinos, one of the most abundant particles in the Universe.

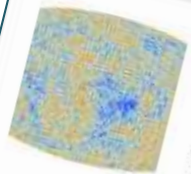
Group Leaders Giles Barr, Steve Biller, Alfons Weber

Liquid Argon Neutrino Experiments
MINOS / MINOS+ Alfons Weber
SNO+ Steve Biller
SoLid Antonin Vacheret
T2K Giles Barr, Alfons Weber

Dark matter and Precision measurements

Particle physics is not just huge detectors and collaborations. We study fundamental particles from a different perspective, with small high precision experiments.

Group Leaders Samuel Henry, Hans Kraus



Cosmology

We lead observational and theoretical work to determine what the dark matter is, what is the dark energy, why they behave the way they do and how did the Universe start off this way.

C-Band All Sky Survey
Cosmic Microwave Background
Cosmological Gravity
Dark Matter & Dark Energy
Euclid Lance Miller, Matt Jarvis
Large-Scale Structure
Supernova Cosmology
Weak Lensing

Mathematical Physics Group

Welcome to the web pages of the Mathematical Physics Group. We are part of the Mathematical Institute at the University of Oxford, and are located on the first floor of the north wing of the Andrew Wiles Building on Woodstock Road: click here for a map.

The group's research is centred around gauge and gravity theories with an emphasis on their quantum field theories. There is also a subgroup working on quantum computation and cryptography. Much of our research is connected in one way or another with string theory; see the string theory pages for a unified view of this group, which includes people in the Theoretical Physics Group in the Department of Physics in addition to the Mathematical Institute. This includes Calabi–Yau manifolds and related heterotic geometry, AdS/CFT and twistor theory & scattering amplitudes. Much of the work of the group impacts on mathematics as well as physics, and we enjoy close relations with the Geometry Group in the Mathematical Institute. More detailed descriptions of our Research Areas may be found by exploring the panel on the left. The specific research interests of individual members are contained in their department profiles, which can be accessed from our Members page.

String Theory Group (Maths Branch)

- James Sparks ; AdS/CFT
- Chris Beem ; N=4 SYM, conformal field theories
- Fernando Alday ; integrability, strong coupling limit of N=4 SYM
- Lionel Mason and Andrew Hodges ; twistor string theory, amplitudes of N=4 SYM
- Sakura Schafer-Nameki ; F-theory, heterotic string theory
- Xenia de la Ossa and PC ; CY manifolds and heterotic string theory, non-Kähler manifolds