Deepak Kar

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Research Interests

- Searches for signatures of beyond the standard model of physics, focussing currently on unusual topologies and strongly interacting dark sector (including the use of machine learning algorithms)
- Experimental measurements probing QCD; implementation, optimisation and use of jet substructure algorithms
- Monte Carlo Event Generator tuning and model improvement
- **Positions of responsibility:**
  - Nominated member of ATLAS Collaboration Board Chair Advisory Group (January 2018 - December 2019)
  - Coordinator of the ATLAS Monte Carlo Validation group of Physics Modelling Group (April 2017 - June 2020)
  - Co-convener of the ATLAS Soft-QCD subgroup of Standard Model Physics group (April 2015 - March 2016)
  - Co-convener of the ATLAS Monte-Carlo tuning forum (September 2011 - March 2015)
  - Founding member of the LPCC Minimum-bias and Underlying Event Working Group, and nominated as the ATLAS contact person
  - (Co-)Convener of the 2021/2022 ISMD workshop, Jets and QCD at high scales track; 2021, 2022 CEPC workshop, QCD session; 2019 QCD@LHC conference Jets/Substructure/Resummation working group; 2018, 2017, 2016, 2014 MPI@LHC workshop Minimum-bias and Underlying Event working group (also member of international advisory board), (2014 proceedings at arXiv:1506.05829 [hep-ph]); 2016 QCD@LHC conference Monte-Carlo working group; 2012 BOOST workshop Monte-Carlo working group
- Chair/member of several internal analysis review committees (editorial boards) in ATLAS.

Academic Appointments

- **University of Witwatersrand, South Africa**
  Professor — *December 2023 - present*

  Associate professor — *May 2019 - November 2023*
  Senior lecturer/researcher — *May 2016 - April 2019*
  Lecturer/researcher — *April 2015 - March 2015*
- **University of Glasgow, UK**
  Royal Society Wolfson Visiting Fellow — *February 2024 -January 2024*
- **University of Glasgow, UK**
  Postdoctoral Research Associate — *February 2012 - April 2015*
- **IKTP, TU Dresden, Germany**
  Postdoctoral Research Fellow — *April 2009 - February 2012*

Education

- **Department of Physics, University of Florida, Gainesville, FL, USA**
  Doctor of Philosophy in Physics (Adviser: Prof. Richard D Field) — *August 2003 - December 2008*
- **Jadavpur University, Kolkata, India**
  Master of Science in Physics with First Class — *July 2001 - June 2003*
  Bachelor of Science in Physics with Distinction — August 1998 - June 2001

Grants, Honours and Awards

- **Competitive Support for Rated Researchers**, awarded by NRF, South Africa. Grant title: Designing novel strongly interacting dark sector search strategies, value: R1.2M (2025-2027)
- **Wolfson Visiting Fellowship**, awarded by the Royal Society, UK. Grant title: Developing Approaches to Revolutionise Knowledge (DARK): designing novel strongly interacting dark sector search strategies, value: 95000 Pound (2024)

- **CNRS-Africa Residential Research Schools**, awarded by CNRS, France, with Dr. Louie Corpe (Université Clermont Auvergne). School theme: Computing in HEP and Applications, value: 30000 Euro (2023/2024)
- **Initiation Grants for Internationalisation**, awarded by STINT Sweden, with Dr. Caterina Doglioni (Lund University). Grant title: New collaborative dark matter search strategies for the Large Hadron Collider, value: 149500 SEK (2021)
- **Wits-UCL Seed Fund**, with Prof. Jon Butterworth (UCL). Grant title: Jet substructure measurements for new physics, value: R100000 (2021)
- **Our team was the joint winner of ATLAS Idea day 2020 for proposing a new search strategy for Instantons**, internally in the ATLAS collaboration
- **Competitive Support for Rated Researchers**, awarded by NRF, South Africa. Grant title: Intelligent Machines, Hidden Signatures: New Ways to Look for Undiscovered Physics at the LHC, value: R2.3M (2019-2021)
- **Friedel Sellschop award**, which is *to recognise and encourage young researchers* from University of Witwatersrand for 2018, value R145k yearly for three years
- The most**highly cited researcher** in the Faculty of Science in 2016, awarded by Wits Research Office (2017)
- **NRF/ICTP Mobility Grant and Student Practice** 2016, awarded by National Research Foundation (NRF), South Africa, value: R16k (2017)
- **Knowledge, Interchange and Collaboration (KIC) 2016 grant**, awarded by National Research Foundation (NRF), South Africa, value: R18k (2016)
- Rated as an **internationally acclaimed researcher** by National Research Foundation (NRF), South Africa (2015, 2021)
- **Competitive Support for Unrated Researchers**, awarded by NRF, South Africa. Grant title: Boosting the discovery prospects at the LHC, value: R1.4M (2016-2018)
- South Africa-Joint Institute for Nuclear Research (SA-JINR) **Mobility Grants for Researchers**, awarded by NRF, South Africa, value: R38k (2015)
- **Start-up grant** from the Faculty Research Committee, University of Witwatersrand, value: R90k (2015-2017)
- **Fermilab Result of the Week**
  Fermilab Today *August 7th, 2008*
- **Charles F. Hooper Jr. Memorial Award**
  From the department of Physics for distinction in research and teaching *December 2007*
- **Gold Medal in National Graduate Physics Examination**
  Organised by Indian Association of Physics Teachers *2001*

Achievements by the supervised students/group members

- Hannah Van der Schyf was selected for 2024 European School of High-Energy Physics at Peebles, UK, 2024.
- Clarisse Prat received the **School of Physics Prize** for outstanding performance in the Honours year of study and **Jan Loubser Memorial Prize** for the best Honours project, 2024.
- Wandile Nzuza was selected for DESY Summer Student Program 2024.
- Clarisse Prat was selected out of over 8000 applicants to **CERN summer student programme** 2024.
- Bralyne Vanessa Matoukam was awarded a **Quantum Leap Africa, PhD in Data Science bursary** for the period 2024 - 2027, value R600k over three years.
- Wandile Nzuza received the **School of Physics Prize** for outstanding performance in the Honours year of study and **Jan Loubser Memorial Prize** for the best Honours project, 2023.
- Wandile Nzuza was selected out of over 6000 applicants to **CERN summer student programme** 2023.
- Hannah Van der Schyf was awarded a **SA-CERN Excellence doctoral Scholarship** for the period 2023 - 2025, value R600k over three years, also was awarded NRF doctoral scholarship (declined).
- Wandile Nzuza was awarded a **SA-CERN Excellence Masters Scholarship** for the period 2023 - 2024, value R320k over two years, also was awarded NRF masters scholarship (declined).
- Clarisse Prat secured **NRF honours scholarship** for 2023, value R150k.
- Sukanya Sinha was placed first at the **Wits PhD Seminar** in 2022.
- Sukanya Sinha won a **presentation prize** at South African Institute of Physics meeting in 2022.
- Hannah Van der Schyf was selected for DESY Summer Student Program 2022.
- Clarisse Prat was selected for IFJ PAN Particle Physics Summer Student Programme (PPSS) in Krakow, Poland, 2022.

- Sukanya Sinha secured **NRF doctoral extension funding** for 2022, value R120k.
- Karien du Plessis and Sukanya Sinha won **presentation prizes** at South African Institute of Physics meeting in 2021.
- Sukanya Sinha was placed **runner-up** in International Symposium on Multiparticle Dynamics poster session in 2021
- Hannah Van der Schyf was awarded a **SA-CERN Excellence Masters Scholarship** for the period 2021 - 2022, value R300k over two years.
- Sukanya Sinha was selected for a six-month **MCnet short term studentship at University of Glasgow** in 2021.
- Danielle Wilson was selected out of over 4000 applicants to **CERN summer student programme** 2020, unfortunately the programme had to be cancelled.
- Sukanya Sinha chosen as one of the **ATLAS Early Career Scientist Board (ECSB)** member through a collaboration-wide selection process for 2020 - 2021.
- Kokotla Rapetsoa won a **presentation prize** at South African Institute of Physics meeting in 2019.
- Thokozile Manaka secured a **Organization for Women in Science for the Developing World (OWSD) doctoral fellowship** for 2019-2022.
- Marvin Flores secured a **NRF-TWAS post-doctoral fellowship** for 2018-2019, value R610k over two years.
- Lawrence D. Christopher secured a **NRF-TWAS doctoral fellowship** for 2018-2020, value R450k over three years.

Teaching and Mentoring

Invited lecturer at *Machine Learning in Particle Theory - MITP Summer School*, Germany July , 2023). **Invited lecturer** at *African School of Physics*, South Africa (November, 2022). **Invited lecturer** at *Introduction to Big Data and Machine Learning for Particle Physics*, a mini-school organised by National Institute for Theoretical Physics, South Africa (August 2021). Recording available. **Invited lecturer** at *An Introduction to LHC Physics*, organised by the Department of Physics North Eastern Regional Institute of Science and Technology, India (January, 2019); at Collider Physics in Mexico (2017); at 1st CERN Bangladesh school (2014); presented tutorial on *Monte Carlo generators and data analysis* at HEPP2016 Workshop in Johannesburg and on *Rivet analysis framework* at CERN in July 2016, at ICN, UNAM, Mexico in November 2016, and at MPI@LHC Workshop in December 2017.

Chosen as a mentor in LHC Early Career Mentorship Scheme (2021/2022).

Invited panellist at *Personal statement and research proposal writing* workshop organised by The LHC Early Career Scientists Fora in June 2021.

Teaching:

- **At the University of Witwatersrand:** Introduced and taught a new honours course (PHYS4029A, 2017-): introduction to experimental particle physics. Lecturer in undergraduates courses: Physics for Construction Economics and Management Engineers (PHYS1025, 2020-, *recognised as an outstanding lecturer in 2021*), Applied Mechanics (PHYS1015, 2015 -2018, PHYS1001, 2019 and PHYS1034, 2019-2020), Mechanics for Engineers (PHYS1032, 2019), Properties of matter (PHYS1001, 2016).
  Co-ordinator of large lecture class (PHYS1015) with $\sim$ 1000 students (2017, 2018), (PHYS1025) with $\sim$ 200 students (2020, 2021, 2022).
- **At the University of Glasgow (2012 - 2014):** Lecturer at Scottish Universities Physics Alliance graduate school experimental QCD course, undergraduate physics laboratory
- **At TU Dresden (2009 - 2010):** Exercises for the postgraduate Higgs physics course and for the standard model of particle physics course
- **Teaching Assistant at the University of Florida (2003 - 2008):** undergraduate mechanics and electricity-magnetism laboratory

Mentoring:

- **Post-doctoral researcher(s):** Tasnuva Chowdhury (2020-2021, now an applied physicist at Brookhaven National Laboratory), Marvin Mira Flores (Witwatersrand, 2018-2021, now a faculty in National Institute of Physics University of the Philippines), Debarati Roy (Witwatersrand, 2016-2018, now a faculty in Amity University, India).

- **Postgraduate students:**

  Doctoral: Bralyne Vanessa Matoukam (Witwatersrand, 2024-) Hannah Van der Schyf (Witwatersrand, 2023-), Thokozile Manaka (Witwatersrand, 2019 - 2024), Sukanya Sinha (Witwatersrand, 2019-2023, now a post-doctoral research associate at the University of Manchester), Lawrence D. Christopher (Witwatersrand, 2018-2021, now an academic at University of Jos, Nigeria), Nicolas Gutierrez Ortiz (Glasgow, 2012-2014, now a quantitative analyst at Nordea).

  Masters: Clarisse Prat (Witwatersrand, 2024-), Ofentse Matlhakola (Witwatersrand, 2024-, co-supervisor), Wandile Nzuza (Witwatersrand, 2023-), Hannah Van der Schyf (Witwatersrand, 2021-2022, **with distinction**, now a Ph.D student), Danielle Wilson (Witwatersrand, 2021-2022, now a Ph.D student at the University of Manchester), Pratixan Sarmah (Masters dissertation, BITS Pilani, India, 2020, now a Ph.D student at Krakow School of Interdisciplinary PhD Studies at Polish Academy of Sciences (IFJ PAN)), Mvelo Dhlamini (Witwatersrand, 2020-2022, now a consultant at Standard bank, Johannesburg, South Africa), Roy Gusinow (Masters, Witwatersrand, 2020-2021, **with distinction**, now a Ph.D student at University of Bonn, Germany), Thokozile Manaka (Witwatersrand, 2018-2019, continuing as a PhD student), Kokotla Rapetsoa (Witwatersrand, 2018-2020, now a Ph.D student in data science), Fortune Mhlanga (Witwatersrand, 2018-2020, now a quantitative analysts trainee at FirstRand group), Dimbiniaina Soanasolo Rafanoharana (Witwatersrand, 2018-2019, **with distinction**, now a P.D student in University of Freiburg, Germany), Chuene Mosomane (Witwatersrand, 2016-2017, now a consultant data scientist at Melio.ai), Tshidiso Molupe (Witwatersrand, 2016-2018, now a software developer at Isazi Consulting), Sebastian Wahrmund Dresden, 2009-2011, now a system analysts of Deep Learning Platform at Robert Bosch GmbH).

- **Undergraduate students:** Numerous over the years at Witwatersrand and Glasgow, including CERN summer students in 2024, 2023, 2022, 2021, and 2011, Glasgow summer students in 2024 and 2014, and NITheCS internship programme student in 2022-23.

Selected Conference, Workshop and Seminar Presentations

Over 80 talks in national/international conferences and seminar presentations. Also presented plenary talks at collaboration weeks.

Plenary/Invited talks:

- ***Searches for Dark Sector in ATLAS***
  Invited talk at **CERN@70: Recent Advances in Particle Physics at ATLAS and the Philippines**, at National Institute of Physics, Manila, Philippines; November 6th, 2024.
- ***A New Paradigm in Collider Dark Matter Searches***
  Invited talk at **68th Annual conference of the South African Institute of Physics (SAIP2024)**, at Rhodes University, Grahamstown, South Africa; July 1-5th, 2024.
- ***Novel probes of dark matter at the LHC***
  Invited talk at **International Conference on High Energy Particle and Astroparticle Physics (ICHEPAP2023)**, at Saha Institute of Nuclear Physics, Kolkata; December 11-15th, 2023.
- ***Novel probes of dark matter at the LHC***
  Invited talk at **The 3rd African Conference on Fundamental and Applied Physics, 2023**, at George; September 25-30th, 2023.
- ***Status and Prospect of Search for Dark Matter***
  Invited talk at **Collider, Dark Matter, and Neutrino Physics 2023**, at Texas A& M University; May 16-19th, 2023.
- ***Novel ways to probe the dark sectors at colliders***
  Invited talk at **4th World Summit on Exploring the Dark Side of the Universe**, at La Reunion Island; November 7-11th, 2022.
- ***Search for non-resonant production of semi-visible jets in ATLAS***
  Invited talk at **Semivisible Jets Workshop** with Sukanya Sinha, Zurich, Switzerland; 5-7th July, 2022.
- ***Recent results using jet substructure from the LHC***
  Invited talk at **International Meeting on High Energy Physics - 2019**, Bhubaneswar, India; 17-22nd January, 2019.
- ***Where is the next discovery at the LHC?***
  Invited keynote talk at **The 36th Samahang Pisika ng Pilipinas (SPP) International Physics Conference**, Puerto Princesa City, Palawan, Philippines; 6-9th June, 2018.

- ***Successes and issues with jet substructure techniques in experiments***
  Invited talk at **LHC Chapter II: The Run for New Physics**, Natal, Brazil; 6-7th November, 2017.
- ***ATLAS Jets Overview***
  Invited talk at **Discussion Meetings on JETS@LHC**, ICTS, Bangalore, India; 21-27 January, 2017.
- ***Underlying Event Studies at the Tevatron and the LHC***
  Invited talk at **XLIII International Symposium on Multiparticle Dynamics**, Chicago, USA; 16-20 September 2013.
- ***Underlying Event Studies at ATLAS and CDF***
  Invited talk at 5th **Workshop on High p_T Physics at LHC** , Mexico City, Mexico; September 27 - October 1, 2010. Proceedings at AIP Conference Proceedings **1348** (2011) no. 1, 35–44.
- ***Underlying Event Measurements at ATLAS***
  Invited talk given at **Workshop on Multi-Parton Interactions at the LHC**, DESY, Hamburg, Germany; 13 September 2010. Proceedings at `arXiv/1111.0469 [hep-ph]`.
- ***Underlying Event studies at Tevatron***
  Invited talk at **London workshop on Standard Model discoveries with early LHC data**, University College, London, UK; April 2009. Proceedings at `arXiv:1001.1287 [hep-ph]`.
- ***Multiplicities and Underlying Event***
  Invited talk at **International Symposium on Multiparticle Dynamics 2008** DESY, Hamburg, Germany; September 17 2008. Proceedings at `arXiv:0902.0377 [hep-ph]`.

Seminars and Colloquia:

- **ATLAS Searches Using Unusual Topologies/Novel Dark Matter Searches at Colliders:** Physics colloquium at the University of Glasgow (30th October, 2024), Physics Colloquium and Particle physics seminar at the Oklahoma State University (5th September, 2024), Particle physics seminar at Universidad Técnica Federico Santa María, Chile (25th July, 2024), Particle physics seminar at University at Buffalo (23rd May, 2023), Particle physics seminar at University of Edinburgh (17th February, 2023), SAIP Webinar Series (October 23rd October 2020), Virtual seminar at Queen Mary University, London (November 19th, 2020), Calcutta University High Energy seminar (10th January, 2020), IITB Physics seminar, India (16th December, 2019).
- **First Run 2 Results from ATLAS:** University of Zululand, Kwadlangezwa, South Africa (May 22nd, 2017), University of Johannesburg, Johannesburg, South Africa (April 15th, 2016), IISER, Pune, India (December 14th, 2015), iThemba Labs, Cape Town, RSA (28th October, 2015), University of Witwatersrand, Johannesburg, SA (September 29th, 2015).
- **Jet Substructure:** PPE seminar at University of Glasgow, UK (31st May, 2019), Cavendish HEP seminar at Cambridge University, UK (21st May, 2019), The (TE)HEP science coffee at Lund Univesity, Sweden (4th April, 2019), Saha Institute of Nuclear Physics, Kolkata, India (15th January, 2019), Institute of Physics, Bhubaneswar, India (11th January, 2018), Indian Association for the Cultivation of Sciences, Kolkata, India (5th January, 2017), Universite Blaise Pascal, Clermont-Ferrand, France (23rd May, 2016), JINR, Dubna, Russia (23rd March, 2016), University College London, UK (March 18th, 2015), Institute of Physics of the Academy of Sciences, Prague, Czech Republic (February 20th, 2015). University of Florida, Gainesville, USA (September 30th, 2014), Indiana University, Bloomington, Indiana, USA (September 26th, 2013), University of Northern Illinois, Dekalb, USA (November 20th, 2013).
- **Soft QCD Results:** ICN, UNAM, Mexico City, Mexico (November 24th, 2016), CEADEN, Havana, Cuba (November 17th, 2016), Johannes Gutenberg University, Mainz, Germany (February 29th 2016), University of Florida , Gainesville, USA (November 23th, 2010), Carnegie Mellon University, Pittsburgh, USA (March 18th, 2010), Humboldt-Universitat zu Berlin, Berlin, Germany (December 11th, 2009), Indian Association for the Cultivation of Sciences, Kolkata, India (January 4th, 2007).

  LPC Topic of the Week: Fermilab, USA, September 23-24th, 2013: Jet substructure studies in ATLAS and Improving Monte Carlo generators for ATLAS Run 2.

Other Conference/Workshop talks:

- ***Semi-visible jets: where do we go from here?***
  Contributed talk at **Dark Interactions**, Vancouver; October 16-18th, 2024.
- ***Exploration of b-philic SVJ and new discriminating observables***
  Contributed talk at **Roadmap of dark matter Models for run 3**, CERN; May 13-17th, 2024.
- ***Debriefing: ATLAS SVJ Result***
  Invited talk at **YOUNGST@RS - Colours in darkness: towards improved modelling of strongly interacting dark-sector showers**, online; October 17-20th, 2023. Proceedings at `arXiv:2311.16330 [hep-ph]`.

- ***Search for boosted hadronic resonances in ATLAS***
  Contributed talk at **41st International Conference on High Energy Physics**, at Bologna, Italy; July 6-13th, 2022.
- ***Measurement of jet fragmentation using the ATLAS detector***
  Contributed talk at **11th International Workshop on Boosted Object Phenomenology, Reconstruction and Searches in HEP (BOOST 2019)**, at Boston, USA; July 21-26th, 2019.
- ***Double parton scattering in final states with jets, Probing colour reconnection using boosted hadronically decaying top quarks***
  Contributed talk at **10th International Workshop on Multiple Partonic Interactions at the LHC**, at Perugia, Italy; December 10-14th, 2018.
- ***Some recent developments in the area of jet substructure***
  Contributed talk at **International Workshop on Discovery Physics at the LHC (KRUGER2018)** at Kruger National Park, South Africa; December 3-7th, 2018.
- ***Putting the "Science" back in Science Education in South Africa***
  Contributed talk at **International Conference on Physics Education (ICPE) 2018**, South Africa; December 1-5th, 2018.
- ***Measuring jet substructure observables at the ATLAS Experiment***
  Contributed talk at **39th International Conference on High Energy Physics** at Seoul, South Korea; July 4-11th, 2018.
- ***Latest Minimum Bias and Underlying Event Measurements with the ATLAS Detector, Studies of Monte Carlo modelling of Jets in ATLAS, and Interplay of underlying event and event shape observables in Z-boson events***
  Contributed talks at **9th International Workshop on Multiple Partonic Interactions at the LHC**, at Shimla, India; December 11-15th, 2017.
- ***Recent Developments in Tagging***
  Contributed talk at **62nd Annnual Conference of South African Institute of Physics**, at Stellenbosch; July 3-7th, 2017.
- ***UE and MPI tuning in ATLAS***
  Talk at **ATLAS-CMS Monte Carlo Generators Workshop** at CERN, Switzerland; May 2-5th, 2017.
- ***Systematics of quark/gluon tagging***
  Contributed talk at **International Workshop on Discovery Physics at the LHC (KRUGER2016)** at Kruger National Park, South Africa; December 4-8th, 2016.
- ***Angular correlations as a function of multiplicity in pp and p-Pb collisions in the ATLAS experiment***
  Contributed talk at **8th International Workshop on Multiple Partonic Interactions at the LHC**, San Cristobal, Chiapas, Mexico; 28 November-2 December 2016.
- ***Minimum bias measurements at the LHC***
  Contributed talk at **38th International Conference on High Energy Physics** at Chicago, USA; August 3-10th, 2016. Proceedings at PoS(ICHEP2016)631.
- ***First Run 2 Soft QCD Results from ATLAS***
  Contributed talk at **61st Annnual Conference of South African Institute of Physics**, at Cape Town; July 4-8th, 2016.
- ***Substructure: a discovery tool at the LHC***
  Contributed talk at **South African Institute of Physics Meeting** at Port Elizabeth, South Africa; June 29 - July 3, 2015. Proceedings at link.
- ***Double Parton Scattering and UE tunes***
  Contributed talk at **Rencontres du Vietnam 2014: Physics at LHC and Beyond** at Quy-Nhon, Vietnam; August 10-16th, 2014.
- ***Powheg+Pythia8 matching Studies***
  Contributed talk at **Parton Showers, Event Generators and Resummation 2014**, Muenster, Germany; June 10-12th, 2014.
- ***Underlying Event and Monte Carlo Generators at the LHC***
  Contributed talk at **What next at LHC** at TIFR, India; January 6-8th, 2014.
- ***Using substructure techniques to probe Multiple Parton Interactions***
  Contributed talk at **MPI@LHC 2013, Workshop on Multi-Parton Interactions at the LHC**, Antwerp, Belgium; 2-6 December 2013.
- ***Transverse energy flow and charged particle event shapes with ATLAS***
  Contributed talk at **XXI. International Workshop on Deep-Inelastic Scattering and Related Subjects**, Marseille, France; 21-26th April 2013.

- *ATLAS MPI Tunes with various PDFs*
  Contributed talk at the **Workshop on Multi-Parton Interactions at the LHC**, DESY, Hamburg, Germany; November 21-25th, 2011. Proceedings at link.
- *ATLAS Studies of Soft QCD Processes at 7 TeV*
  Contributed talk at the **Europhysics Conference on High-Energy Physics 2011**, Grenoble, France; July 21-27th, 2011. Proceedings at link.
- *Minimum Bias and Early QCD at ATLAS*
  Contributed talk at **Hadron Collider Physics Symposium**, Toronto, Canada; August 23-27th, 2010. Proceedings at `arXiv:1010.3302 [hep-ex]`.
- *Measurement of the Underlying Event at Tevatron*
  Contributed talk at **XLIVth Rencontres de Moriond - QCD and High Energy Interactions**, La Thuile, Italy; March 17th 2009. Proceedings at (La Thuile 2009, QCD and high energy interactions; 277-280) `arXiv:0905.2323 [hep-ex]`.
- *Using Drell-Yan to Probe the Underlying Event in Run 2 at CDF*
  Contributed talk at **Pheno 2008 Symposium** Madison, USA; April 2008.

Schools and Workshops Attended

- **Tightening the Gap Between Scattering Amplitudes and Events at the LHC at High Orders** Aspen Center for Physics, USA (2024).
- **BOOST Workshop:** Boston, Ma, USA (2019), Paris, France (2018), Buffalo, NY, USA, (2017), Zurich, Switzerland (2016), Chicago, USA (2015), London, UK (2014), Valencia, Spain (2012).
- **Physics at TeV Colliders** (first session:) Les Houches (2017, 2015, 2013), second session (2019).
- **The LHC Awakens: A New Energy Frontier Workshop** Aspen Center for Physics, USA (2016).
- **Higgs Tasting:** Benasque, Spain (2016).
- **Summer Schools:** CERN-FNAL Hadron Collider Physics Summer School, Fermilab (2008), CERN (2007); Prospects in Theoretical Physics (PiTP), Institute of Advanced Studies, Princeton (2007).

Other Professional and Organisational Experience

- Steering Committee member of Dark Showers Workshop, held online in January 2025.
- Organised a workshop named DarkShowerTools with 10 experts Aviemore, Scotland in April 2024.
- Organised an international school on computing in high energy physics with about 30 students and 10 experts at Johannesburg in January 2024.
- Elected as an ordinary member of South African Institute of Physics council for the term 2023-2025, member of Professional Standards and Awards Committee.
- Selected as an associate member of National Institute for Theoretical and Computational Sciences (NITheCS), South Africa.
- Member of KRC (Knowledge Resource Committee), and previously an elected member of transformation committee of School of Physics at the University of Witwatersrand (2019), also part of the committee that evaluates NRF applications and research proposals
- Judge of 2020/2021/2022 PhD student symposium at the University of Witwatersrand.
- Referee for PDG article on Dynamical Electroweak Symmetry Breaking (2018, 2023), Referee for JHEP, IoP Journal of Physics G: Nuclear and Particle Physics.
- Member of Institute of Physics (IoP), South African Institute of Physics (SAIP), and former member of American Physical Society.
- Former member of MCNet, which is a European Union funded Marie Curie Initial Training Network dedicated to developing and supporting general-purpose Monte Carlo event generators throughout the LHC era and beyond, and providing training of a wide selection of its user base.
- Examiner of internal and external (University of Cape Town, University of Johannesburg, University of Zululand) masters and doctoral theses.
- Member of local organising committee of Kruger Workshops (2016, 2018, 2020, 2022), HEPP Workshop (2015, 2016, 2017; held in iThemba Lab, Johannesburg).
- Organised IoP/IPPP half day meeting on Monte Carlo models for jet substructure studies in Glasgow, October 2013.

- Formerly a postdoctoral representative at the School of Physics and Astronomy Management Team and Teaching Committee at the University of Glasgow .
- Organised the weekly graduate student seminar in department of Physics, University of Florida.

Science Education/Outreach

- Organised an interactive exhibition on LHC physics as as a part of Wits centenary celebrations, 2nd September, 2022
- Volunteered in CERN Open Days in September, 2019.
- Organised a panel discussion titled *The Impact of Indigenous Knowledge Systems on Science* at Wits School of Education on 19th October, 2018.
- Formerly a STEMNET (Science, Technology, Engineering and Mathematics Network) Ambassador in the West of Scotland.
- Took part in I am a Scientist, Get me out of here, which is an online event for school students to interact with scientists.
- Was a judge at the Alachua Region Science and Engineering Fair on 28th February 2008 at Gainesville, Florida.
- Regular contributor to the ATLAS blog.

Publications

Books/Book Chapters

- D. Kar, *Understanding the measurements and searches at the Large Hadron Collider*, ISBN: 978-0-7503-2110-5, IOP Publishing.
- P. Bartalini, J. R. Gaunt (editors), *Advanced Series on Directions in High Energy Physics: Multiple Parton Interactions at the LHC*, ISBN: 978-981-3227-75-0, World Scientific (Co-author of the chapter *Measurement of the Observables Sensitive to Underlying Event*).

Papers (outside of CDF/ATLAS Collaborations)
All non-collaboration articles can found at this link

- D. Kar, W. Nzuza, S. Sinha, *2B or not 2B, a study of bottom-quark-philic semi-visible jets*, SciPost Phys. Core 7, 071 (2024), arXiv:2207.01885 [hep-ph]. **Cited 3 times.**
- D. Kar, *How deep learning is complementing deep thinking in ATLAS*, Eur. Phys. J. Spec. Top. 233, 2641–2656 (2024).
- A. Buckley, D. Kar, S. Sinha, *Towards discrimination and improved modelling of dark-sector showers*, SciPost Phys. Proc. 15, 006 (2024), arXiv:2209.14964 [hep-ph]. **Cited 1 time.**
- J. Bonilla *et al.*, *Jets and Jet Substructure at Future Colliders* , Front. Phys., 22 June 2022, arXiv:2203.07462 [hep-ph]. Part of an ebook, **Cited 19 times.**
- G. Albouy *et al.*, *Theory, phenomenology, and experimental avenues for dark showers: a Snowmass 2021 report*, EPJC 82, 1132 (2022), arXiv:2203.09503 [hep-ph]. **Cited 49 times.**
- K. du Plessis, M. M. Flores, D. Kar, S. Sinha, H. van der Schyf, *Hitting two BSM particles with one lepton-jet: search for a top partner decaying to a dark photon, resulting in a lepton-jet*, SciPost Phys. 13, 018 (2022), arXiv:2112.08425 [hep-ph]. **Cited 7 times.**
- S. Amoroso, D. Kar, M. Schott, *How to discover QCD Instantons at the LHC*, EPJC 81 (2021) 7, 624, arXiv:2012.09120 [hep-ph]. **Cited 11 times.**
- D. Kar, S. Sinha, *Exploring Jet Substructure in Semi-visible jets*, SciPost Phys. 10, 084 (2021), arXiv:2007.11597 [hep-ph]. **Cited 23 times.**
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