

Manoj Kumar Mandal

Ricercatore Tempo Determinato – A
Dipartimento di Fisica e Astronomia "G.Galilei"
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CURRENT POSITION

- **University of Padova** Padova, Italy
Ricercatore Tempo Determinato – A 2023 (June) – Present

RESEARCH INTEREST

- Mathematical structures of scattering amplitudes in Quantum Field Theory.
- Analytical and numerical evaluation of multi-loop Feynman Integrals
- Precision computation for collider phenomenology.
- Precision computation for Gravitational Wave phenomenology within Effective Field Theory.
- Resummation and threshold effects for Higgs and Drell-Yan production.

PAST EXPERIENCE

- **INFN Padova** Padova, Italy
Marie Skłodowska-Curie FELLINI Fellow 2020 (June) – 2023 (May)
- **University Of Padova** Padova, Italy
Post doctoral research associate 2018 (October) – 2020 (May)
- **Indian Institute of technology** Guwahati, India
Post doctoral research associate 2018 (May) – 2018 (October)
- **Université catholique de Louvain** Louvain, Belgium
Post doctoral research associate 2016 – 2018
- **Asia Pacific Center For Theoretical Physics** Pohang, Korea
Post doctoral research associate 2015 – 2016

EDUCATIONAL QUALIFICATION

- **Harish-Chandra Research Institute** Allahabad, India
Doctor of Philosophy in Physics 2011 - 2015
 - Supervisor: Prof. V. Ravindran
 - Thesis: Precise Prediction for processes of interest at LHC
 - Defended in: February, 2016

- **Harish-Chandra Research Institute** Allahabad, India
Master of Science in physics with first class 2008 - 2011
- **University of Calcutta** Calcutta, India
Bachelor of Science in physics with first class 2004 - 2007

FELLOWSHIPS AND AWARDS

- Marie Sklodowska-Curie Seal of Excellence, 2023
- Marie Sklodowska-Curie FELLINI (Fellowship for Innovation at INFN) Fellowship at INFN Padova, 2020-2023
- IPDF Fellowship for Postdoctoral Studies at IIT Guwahati, 2018-2018
- National Post-Doctoral Fellowship (NPDF) for Postdoctoral Studies in India, 2018. (did not accept)
- BELSPO Fellowship for Postdoctoral Studies at Louvain (CP3), Belgium, 2016-2018
- MCnet short-term studentship (six months) at Louvain (CP3), Belgium, 2013. (Could not join due to health problem)

SUPERVISION

- Giovanni Boni, UniPD, 2024, Supervision of his Masters Thesis “*Evaluating Feynman Integrals using Physics-Informed Neural Networks*” – (Ongoing).
- Marco Bigazzi, UniPD, 2024, Co-supervision of his Masters Thesis “*Scattering Amplitudes for heavy-quark pair production at NNLO*” – (Ongoing).
- Marco Bigazzi, UniPD, 2023, Co-supervision of his project (2 Months) “*Introduction to Tropical Monte Carlo Integration*”.
- Giacomo Brunello, UniPD, 2022, Co-supervision of his Masters Thesis “*Effective Field Theory Approach to General Relativity and Feynman Diagrams for Coalescing Binary Systems*”.
 - Awarded the “2023 Menossi-Paccagnella award” from University of Padova and “Yassen Stanislavov Stanev award” from University of Tor Vergata, Rome
- Giacomo Brunello, UniPD, 2021, Co-supervision of his *Mille e Una lode* project (3 Months) “*Diagrammatic approach to Gravitational Waves Physics: Theory and Phenomenology*”

ORGANIZATION OF INTERNATIONAL SEMINARS/CONFERENCES

- **MATHEMAMPLITUDES 2025** Mainz Institute of Theoretical Physics, Germany
22-26 September 2025
- **MATHEMAMPLITUDES 2023** University of Padova, Italy
QFT at the computational Frontier 25-27 September 2023
- **EFT METHODS FROM BOUND STATES TO BINARY SYSTEMS** *28-30 October 2020*
University of Padova, Italy
- **MATHEMAMPLITUDES 2019** University of Padova, Italy
Intersection Theory and Feynman Integrals 18-20 December 2019
- **MINI-MEETING:INTRODUCTION TO INTERSECTION THEORY** 16-20 September 2019
University of Padova, Italy
 - A kickstart meeting with the focus on Intersection theory and Feynman integrals, where Prof. Matsumoto and Prof. Goto from Japan gave a mini-course on Intersection theory of Hypergeometric functions.
- **THEORY SEMINARS (PHENOMENOLOGY)**
University of Padova, Italy *2019-2020*

TEACHING EXPERIENCES

- Teaching Assistant (Ph.D Course):
 - Electrodynamics: Fall 2012
 - Advanced Quantum Field Theory: Fall 2014
- Ph.D Course
 - 2023-24. Lecturer, *Scattering Amplitudes: Application to collider physics and gravitational waves*, DFA-UNIPD (12 hours) (Ongoing, will finish by July end).

REVIEW ACTIVITIES

- Referee for the Journal of High Energy Physics, Physical Review D, Computer Physics Communications
- Member of the editorial committee for the proceedings of the conference MathemAmplitudes 2019 (PoS MA2019)

COMMITTEES

- Member of the Graduation committee - Laurea Magistrale in Fisica, 2023

- Panel member for the selection of Postdoc and Research Fellow
 - Concorso Assegno di Ricerca, UNIPD, 2023

OUTREACH ACTIVITIES

- *The Mathematics behind the smallest scale experiment of the universe*, European Reserachers night, Padova, Italy, September, 2021

SELECTED PRESENTATIONS

- *Feynman Integrals: Synergies between Particle Physics and Gravitational Waves*, QCD@Work, Trani, Italy, July, 2024, (Contributed speaker)
- *Two loop amplitude for MUonE*, 4th MUonE general collaboration Meeting, CERN, May, 2023, (Invited speaker)
- *Feynman Integral: Synergies between Particle physics and Gravitational waves*, University of Regensburg, Germany, May, 2023, (Invited speaker)
- *Feynman Integral: Synergies between Particle physics and Gravitational waves*, IPhT Saclay, France, April, 2023, (Invited speaker)
- *MUonE: Theory Status*, Flavour changing and conserving processes, Anacapri, Italy, September, 2022, (Invited speaker)
- *Feynman Integrals: Harnessing it through Intersection theory*, string and pheno joint seminars, University of Torino, Italy, May, 2022, (Invited speaker)
- *Analytic Evaluation of the 2-Loop Amplitude of Muon-Electron scattering*, 3rd MUonE General Collaboration Meeting, CERN, Remote semianr, May, 2022, (Invited speaker)
- *The Mathematics Behind The Precision Computations in High-Energy Particle Physics*, City University of NewYork, USA, Remote semianr, March, 2022, (Invited speaker)
- *Scattering Amplitude and Gravitational Wave Physics*, Gravitational Wave Day @UniPD, Padova, Italy, December, 2021, (Invited speaker)
- *Analytic Evaluation of the NNLO virtual corrections to Muon-Electron scattering*, Strong 2020, Remote Seminar, November, 2021, (Invited speaker)
- *Feynman Integrals: Role of Intersection theory*, Milan Joint Pheno Seminar, Remote Seminar, June, 2021, (Invited speaker)
- *Analytical and numerical evaluation of 2- and 3-loop integrals with massive lines*, International Workshop on the High Energy Circular Electron-Positron Collider, Sanghai, China, October, 2020, (Invited speaker)

- *Feynman Integrals: from Integral-By-Parts reduction to Intersection theory*, International Workshop on Precision QCD @LHC, Hyderabad, India, February, 2020, (Invited speaker)
- *Applications of Intersection Theory to Feynman Integrals: multivariate case*, Selected Speaker at MathemAmplitudes 2019, Padova, Italy, December, 2019.
- *Decomposition of Feynman Integrals on the Maximal Cut by Intersection Numbers*, RADCOR, France, September, 2019, (Contributed speaker)
- *Decomposition of Feynman Integrals by Multivariate Intersection Numbers*, LoopFest, Fermilab, August, 2019, (Contributed speaker)
- *Top-quark Effects In Di-photon Production Through Gluon Fusion At NLO In QCD*, Max Planck Institute, Munich, Germany, April, 2019, (Invited Seminar)
- *Higgs pair production through gluon fusion with full top quark mass effects at NLO*, IMSc, Chennai, India, February, 2018, (Invited Seminar)
- *Threshold corrections of the rapidity distribution of the Higgs production at third order in QCD*, QCD and DM at the LHC, KIAS, Seoul, Korea, April, 2016, (Invited speaker)
- *Threshold corrections at third order in QCD for Higgs production at the LHC*, APCTP 2015 Workshop on Frontiers of Physics, Pohang, Korea, December, 2015, (Invited speaker)
- *Threshold corrections at third order in QCD for Higgs production at the LHC*, Non-conventional searches at the LHC (IBS-CTPU Focused workshop), IBS, Daejeon, Korea, December, 2015, (Invited speaker)
- *Threshold Corrections at N^3LO in QCD for the Higgs production at LHC*, KIAS-CFHEP Workshop and the 5th KIAS Workshop on Particle Physics and Cosmology, Seoul, Korea, November, 2015, (Contributed speaker)
- *Rapidity distribution in Higgs production at threshold to third order in QCD*, International Workshop on Frontiers of QCD, IIT Bombay, Mumbai, December, 2014, (Contributed speaker)
- *Introduction to NLO*, Invited lectures (2) at Discussion Meeting on Radiative Corrections, Institute of Physics, Bhubaneswar, March, 2014.

LONG TERM RESEARCH STAYS

- October 2022 - April 2023, **Associate researcher**, University of California, Los Angeles, USA.
- July 2022, **Associate researcher**, MIAPBP program “Novel Developments in Scattering Amplitudes”.
- August - September, 2019, **Invited researcher**, Fermilab, USA.

- August - September, 2017, **Invited researcher**, Fermilab, USA.
- May - July 2015, **Invited researcher**, CP3, UCL, Belgium.

Data: 19.07.2024

Place: Trieste, Italy