AMEY GAIKWAD
Senior Undergraduate,
B.Tech(Hons.) in Engineering Physics with Minors in Mathematics,
Indian Institute of Technology, Bombay
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Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2019	9.72
Intermediate/+2	Mumbai University	Pace Junior Science College, Nerul	2015	94.9
Matriculation	ICSE, Delhi	Ryan International School, Kharghar	2013	96.7

FIELDS OF INTEREST

- Theoretical and Mathematical Physics.

KEY COURSES

- **IITB Courses**: General Relativity, Non Linear Dynamics, General Topology, Complex Analysis, Quantum Field Theory, Elementary Particle Physics, Theoretical Condensed Matter Physics and Statistical Physics.
- **Extra Courses**: Courses taken at other places:
  - **String Theory** - Ongoing - Prof. Shiraz Minwalla, TIFR, Mumbai
  - **Black Holes and Entanglement** - June 2018 - Prof. Timothy Hollowood, Swansea University.

ACADEMIC ACHIEVEMENTS

- **2017-18**: Ranked **third in the institute among a batch of 900 students**.
- **2016-17**: Ranked **second in the institute among a batch of 900 students**.
- **2015-17**: Ranked **first** in the Physics Department (batch of 2015) amongst 42 students.
- **2017-18**: Ranked **second** in the Physics Department (batch of 2015) amongst 42 students.
- **2015-16**: **Institute Academic Award, IIT Bombay**: In terms of GPA (9.94/10.0), for ranking**3rd in the Institute** among 905 students.
- **2015-16**: Secured an **Semester Point Index (SPI) of 10.0** in the first semester 2015-16.
- **2015-17**: Awarded **AP** grade (awarded to the top 1% of the class) for Calculus and Numerical Analysis.
- **2015**: Topper in Maharashtra State Board in **Physics** (100/100) and **Electrical Maintenance** (200/200)
- **2015**: Offered admission to the **Chennai Mathematical Institute (CMI), Indian Statistical Institute (ISI), and the Indian Institute of Science (IISc)** to pursue my undergraduate studies.
- **2015** : **National Top 1% in National Standard Examination in Physics (NSEP)**.
- **2014** : **National Top 1% in National Standard Examination in Astronomy (NSEA)**.
- **2014** : **All India Rank 22 - Kishore Vaigyanik Protsahan Yojana (KVPY)** - SA Stream (11th grade) among 40000 students, funded by the Department of Science and Technology.
- **2013**: **City and Industrial Development Corporation (CIDCO) Merit Prize** performance in X board exams.
- **2013** : **School Valedictorian** - Awarded for academic and extracurricular excellence over 10 years.
- **2012** : **All India Rank 04 - National Talent Search Examination (NTSE)** (among 1,000,000 students) organised by the National Council of Educational Research and Training **(NCERT)**.
- **2012** : **All India Rank 01 - All India Maths. Schol. Exam.**:- Institution for Promotion of Mathematics **(IPM)**.
- **2012** : **All India Rank 03 - Mathematics examination**:- Indian Institute for Studies in Mathematics **(IISMA)**.

- **2012** : **State Rank 04 - Maharashtra Talent Search Examination**: Scholarship program.
- **2009**: **All India Rank 02 - National Science Olympiad** organised by the Science Olympiad Foundation.

SCHOLARSHIPS AND FELLOWSHIPS

- **2019** : **Prime Minister Research Fellowship: Physics** :- Awarded by the **Ministry of Human Resource Development (MHRD), Government of India**. Selected for interview: 30th November at **IIT, Guwahati.**
- **2019** : **Prime Minister Research Fellowship: Mathematics** :- Awarded by the**Ministry of Human Resource Development, Government of India**. Selected for interview: 2nd December at **IIT, Kharagpur**.
- **2018**: **Swansea University**: invited to work with **Dr.S.Prem Kumar**.
- **2017**: **S.N. Bhatt Excellence Fellowship** :- 20 students awarded; worked at ICTS-TIFR under **Dr. Basu**.
- **2016**: **National Program on Differential Equations (NPDE)**: Amongst **13 students** selected to work under **Dr. Neela Nataraj** at **IIl Bombay** in the winter of 2016.
- **2015**: **Dhirubai Ambani Scholarship**: Awarded by the **Reliance Foundation** excellence in XII board exam.
- **2015** : **INSPIRE Scholarship** :- Awarded by the **Department of Science and Technology (DST), Ministry of Science and Technology, Government of India**. Qualified in top 1% of XII **Maharashtra state board**.
- **2014** : **KVPY**:- Awarded by **DST, Government of India**. Attended **4 day camp** held at **IISc, Bengaluru**.
- **2012** :**NTSE**: Oldest and most prestigious examination in India.Awarded by **NCERT, Government of India**. Attended a **week long nurturance** camp held at **HBCSE-TIFR**, Mumbai.

INVITATIONS

- **2018**: **International Centre for Theoretical Physics (ICTP)**: invited to work under **Dr. Atish Dabholkar**
- **2017**:**Tata Institute of Fundamental Research (TIFR), Mumbai**: Selected for the **Vacation Summer Research Program** -duration for 6 weeks at the **School of Mathematics, TIFR**.
- **2017**: **Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune**: Invited to work at the **IUCAA** under **Dr. Sukanta Bose**.
- **2017** : **Indian Academy of Sciences (IAS)**: Selected to work under **Prof. Kaushal Verma** at the **Indian Institute of Science, Bengaluru** as a part of the **Summer Research Fellowship Program (SRFP)**.

RESEARCH PRESENTATIONS

- **OPE Inversion Formula**: Bachelors Thesis - B.Tech Project Stage 1: IIT Bombay (November 2018).
- **Quantum Complexity**: Research project - Swansea University, (July 2018).
- **Zero Dimensional QFT Feynman Diagrams** : Supervised Learning Project - IIT Bombay (November 2017)
- **Instantons and Monopoles**: SN Bhatt Fellowship - International Centre for Theoretical Sciences, (July 2017)

RESEARCH PROJECTS

- **Four point functions of double trace operators in large N matter Chern Simons theory using conformal bootstrap** (Bachelors Thesis - Research Project)
  *(Guide: **Dr. Shiraz Minwalla** (TIFR - Department of Theoretical Physics) and Coguide: **Dr.Urjit Yajnik**(Department of Physics, IITB) Spring 2018 - Ongoing)*
  - Studied the spacetime and Simon Caron-Huot's derivation of the OPE Lorentzian Inversion formula
  - Light ray transforms to extend the formula to spinning operators.
  - Report: https://github.com/ameypg16/Reports/blob/master/BTP-Stage-1-Inversion-formula.pdf
- **Quantum Complexity in Quantum Field theory - implications in Holography** (Research Project)
  *(Guide: **Dr.S. Prem Kumar** (University of Swansea : Particle Physics and Cosmology Theory Group) Summer 2018 - Ongoing)*
  - Connect complexity for AdS crunch black hole(bulk) to the scalar sector of N=4 SYM model(boundary).

- Positive results obtained indicate the possibility of turning into a publication in the near future.
- Report: https://github.com/ameypg16/Reports/blob/master/Quantum-Complexity.pdf

- **Quantum Field Theory** (EP 322 Supervised Learning Project)
  *(Guide: **Dr. R. Loganayagam** (ICTS-TIFR - String Group) and Coguide: **Dr. P. Ramadevi** (Department of Physics , IITB) , Autumn 2017-2018)*
  - Path Integral Formalism of Quantum Mechanics, Schwinger Dyson equation and Feynmann Diagrams.
  - Scattering matrix through the path integral formalism. Basics of Grassmanian algebra.
  - Report: https://github.com/ameypg16/Reports/blob/master/SLP-QFT-Report.pdf

- **Instantons, Monopoles and Solitons in Non Abelian Gauge theories** (ICTS SN Bhatt Memorial Excellence Fellowship Program)
  *(Guide: **Dr. Pallab Basu** (ICTS-TIFR - String Group) , Summer 2017)*
  - Instantons of the double well potential and in the Yang-Mills theory.
  - Polykov monopole and the BPST monopole via the Bogomol'nyi bound.
  - Report: https://github.com/ameypg16/Reports/blob/master/Amey-Report-SNBhatt.pdf.

- **Multistablity of planar bistable liquid crystals** (National Program on Differential Equations(NPDE))
  *(Guide: **Prof. Neela Nataraj** (HOD: Department of Mathematics,IITB) , Winter 2016)*
  - Finite Elements Method Newton-Galerkin: what drives bistable liquid crystals into multistability.
  - Analysis done using the Landau de Gennes free energy framework for the liquid crystals.
  - Report: https://github.com/ameypg16/Reports/blob/master/NPDE-report.pdf

COURSE PROJECTS

- **Anyons via the path integral approach** (PH 522 Theoretical Condensed Matter Physics)
  *(Guide: **Prof. Soumya Bera** (Department of Physics, IITB), Spring 2017-18)*
  - Studied the concept of anyons through the path integral approach. Only Abelian anyons were studied.

- **2D Mapping using Ultrasonics** (EP 315 Electronics Lab - Microprocessors)
  *(Guide: **Prof. Pradip Sarin** (Department of Physics, IITB), Autumn 2017-18)*
  - Used Arduino microprocessor and ultrasonics to map out the 2D topological features.

- **Music Synthesis** (EP 226 - Waves,Oscillations and Optics)
  *(Guide: **Prof. Tapanendu Kundu** (Department of Physics,IITB) , Spring 2016-17)*
  - Tailored a song from the bare essentials: the frequency of the chords involved and their duration.

- **Chaos in Cryptography** (PH 542 Non Linear Dynamics)
  *(Guide: **Prof. Amitabha Nandi** (Department of Physics,IITB) , Autumn 2016-17)*
  - Analyzed the topological similarities between cryptography and chaos theory.
  - Used the Baptista algorithm; chaotic maps were developed based on Lorenz's dynamical model.

MENTORING EXPERIENCE

- **Department Academic Volunteering Program (DAVP)**: Appointed as a tutor for the sophomores and third year students of the Physics Department.

- **Summer Of Science Mentor**: Maths and Physics Club organised Summer of Science Program: appointed as a mentor to three students interested in learning special and general relativity.

LEADERSHIP

- **2010-2013**: **Headed the quiz group** consisting of 15 members, in school.

- **2011-2012**: **Sports Minister** - Ryan International School.

- **2009-2010**: Selected for **People to People International Forum (PTPI)**, USA to nurture leadership.

- **2008-2009**: **House Captain** - Ryan International School.

SOCIAL IMPACT

- **2015-16**: **National Sports Organisation (NSO, India) - Yoga**: Encourage fitness among the Indian youth.

- **2012**: **Social Service Camp (SSC)**- Ryan International group: Sense of social responsibility among the youth.

- **2010**: **Helpage India Foundation**: An NGO caring for the welfare of disadvantaged elderly citizens.

PROJECT REPORTS

- Reports : https://github.com/ameypg16/Reports