Lokesh Kumar

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Contents

1 Basic information

Dr. Lokesh Kumar
Assistant Professor
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Area of Specialization: Experimental high-energy physics: heavy-ion physics, QCD phase diagrams, properties of Quark Gluon Plasma.

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2 Employment and Academic Details

2.1 Positions Held

- **Assistant Professor** (currently) at
  Department of Physics, Panjab University, Sector 14
  Chandigarh - 160014, India

- **Scientific Officer "E"** at
  School of Physical Sciences,
  National Institute of Science Education and Research (NISER)
  IOP Campus, Sachivalaya Marg, Sainik School (P.O.)
  Bhubaneswar - 751005, Odisha, India
  "Bestowed upon the title of *Assistant Professor* of
  Homi Bhabha National Institute (HBNI),
  Mumbai "

- **Post-Doctoral Research Associate** (more than three years) at
  (Stationed at *Brookhaven National Lab, Upton, New York, USA*)
  Department of Physics,
  Kent State University,
  Kent, OH 44242, USA

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2.2 Education Details

- **Doctor of Philosophy, Ph. D. (Physics)** at Department of Physics, Panjab University, Chandigarh - India.
  Title of thesis : *"Identified Particle Production, Fluctuations and Correlations Studies in Heavy Ion Collisions at RHIC Energies"*.
- **Master of Science (Physics)** First Class, Department of Physics, Panjab University, Chandigarh, India.
  Special papers - 1. Experimental Techniques in Nuclear Physics 2. Microprocessor and Computer Architecture.
- **Bachelor of Science** First Class, Guru Nanak Dev University, Amritsar, India
- **Secondary Education [10+2]** First Class, C.B.S.E, India
- **Matriculation [10th]** First Class, C.B.S.E, India

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2.3 National Level Examinations

i) Qualified **CSIR-JRF (Junior Research Fellow)** fellowship in **CSIR-UGC** exam conducted jointly by **Council of Scientific and Industrial Research** in INDIA and **University Grants Commission** of INDIA in December 2005.

ii) Qualified the **GATE-2005 (Graduate Aptitude Test in Engineering)** exam conducted jointly by the **Indian Institute of Science** and **Indian Institutes of Technology** on behalf of the National Coordinating Board - GATE, Department of Education, **Ministry of Human Resource Development (MHRD)**, Government of India.

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2.4 Skills

- **Computation :** FORTRAN, C, C++, HTML, Latex, MS word, excel, PPT, and basics of Java.
- All the necessary software tools for high energy simulation and physics analysis.
- Advanced stage programming necessary for modelling etc.
- Experience in working in Grid computing environment.
- High energy simulation and modelling of experimental set up.

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2.5 Awards & Honors

- Received the **Early Career Research (ECR) Award** grant funded by Science and Engineering Research Board (SERB) for three years in 2016.
- Received the **UGC Start-Up Grant** funded by University Grants Commission (UGC) in 2015.
- **Won** the **Rahul Basu Memorial Award** for the best thesis in High-Energy Physics for the period 2010-12.
  The award is coordinated through the Indian Physics Association and is given for the most outstanding Ph.D. thesis from India, in the area of experimental High Energy Physics, during a 2-year period starting from September 1 of each even year.
- Faculty position since 2013 - **Assistant Professor** bestowed by *Homi Bhabha National Institute*, Training School Complex, AnushaktiNagar, Mumbai - 400094.
- **Featured article** in 2013 newsroom at Relativistic Heavy Ion Collider experiment at Brookhaven National Laboratory, Upton, NY.
  More information can be found at: http://www.bnl.gov/newsroom/news.php?a=24408

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3 Responsibilities & Nature of Work

I am executing teaching duties, administrative responsibilities, and research activities in the Department of Physics. Details are given below:

3.1 Teaching Courses

I have taught following courses:

- **Statistical Mechanics** to M.Sc. II semester.
- **Classical Mechanics** to M.Sc. I semester.
- **Mathematical Physics-I** to B.Sc. V semester.
- **Thermodynamics** to B.Sc. IV semester.
- **Electronics & Network Theory** to B.Sc. III semester.
- **Advance course on Particle physics, Collider Physics & Accelerator** to pre-Ph.D. students.
- **Tutorials** on Classical Mechanics to pre-Ph.D. students.

I have taught following laboratory courses:

- **Physics Laboratory** to M.Sc. IV semester.
- **Physics Laboratory** to M.Sc. III semester.
- **Computer Laboratory – C++** to M.Sc. II semester.
- **Computer Laboratory – SciLab** to B.Sc. III semester.
- **Physics Laboratory** to B.Sc. II semester (core and subsidiary classes).
- **Physics Laboratory** to B.Sc. I semester (core and subsidiary classes).

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3.2 Administrative Duties

I have served on the following administrative works in department of Physics:

- **Member of Research Monitoring Committee (RMC)** for the research in the field of High Energy Physics.
- **Maintaining and updating** the Physics Department website: http://physics.puchd.ac.in/
- **Managing** the contributory tea-club (tea-cum-faculty discussions) in the Department.
- *Member* of **Board of Control (BOC)** committee of Physics department.
- *Member & Secretary* of **Academic Committee** of Physics department.
- *Member & Secretary* of **Administrative Committee** of Physics department.
- *Member* of **UGAPMEC** committee of Physics department.
- *Member* of **purchase committee** of Physics department.
- *Member* of B.Sc. (Hons.) Physics **admission committee** of Physics department.
- *Member* of M.Sc. (Hons.) Physics **admission committee** of Physics department.
- **Department Coordinator & Mentor** from Physics Department for Choice Based Credit System (CBCS) for undergraduate courses.
- **Laboratory mentor & member organizing committee** for the DST INSPIRE Internship Camp, Physics Department.
- *Member* of team of **election duty** for Panjab University Campus Students' Council Elections at department and University level.

- **Internal examiner** for the undergraduate and postgraduate final practical Physics & Computer Lab. examinations in Physics Department.
- **External examiner** for the postgraduate final practical Physics Lab. examinations in Colleges affiliated to Panjab University Chandigarh.
- **Paper setter** for the postgraduate final theory Physics examinations in Colleges affiliated to Panjab University Chandigarh.

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3.3 Research Activities

- Scientific research in **A Large Ion Collider Experiment (ALICE)** at Large Hadron Collider (LHC) in European Organization for Nuclear Research (CERN) Laboratory, Geneva, Switzerland.
- Scientific research in **Solenoidal Tracker At RHIC (STAR)** experiment at Relativistic Heavy-Ion Collider (RHIC) in Brookhaven National Laboratory (BNL), Upton, USA.
- Scientific research in **Compressed Baryonic Matter (CBM)** experiment at Facility for Antiproton and Ion Research (FAIR) in GSI, Darmstadt, Germany.
- **Supervising students** for their Ph.D.
- **Supervising students** for their Masters' project.
- **Research guidance** to summer students. Guiding the students for summer project selected by the *Indian Academies' Summer Research Fellowship program.*

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4 Professional Experience

4.1 Research Projects

I have administered the following research projects.

1. Study of Quantum Chromodynamics Phase Diagram and bulk properties in heavy-ion collisions through Early Career Research Award-2016. Funded by Science and Engineering Research Board (SERB) (Rs. 1741190/- for three years).
   Role: Principle Investigator
2. UGC Start-Up Grant. Funded by University Grants Commission (Rs. 6 Lacs for two years) up to Year 2018.
   Role: Principle Investigator

3. Study of phase structure of strong interactions using relativistic heavy-ion collisions. Funded by SERB DST (about Rs. 60 Lac for three years) up to Year 2017. (This project is based in NISER)
   Role: Co-Principle Investigator

4. ALICE Upgrade, Operation and Utilization. Funded by Department of Science and Technology, India (Rs. 2.45 crore) up to Year 2019.
   Role: Co-Principle Investigator

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4.2 Visits in world labs for scientific work

My research work and international collaboration provides me opportunity to work and interact with eminent scientists in the world labs. *For the collaborative meeting, physics analysis, physics discussions, and data taking I* **regularly visit the Brookhaven National Laboratory in USA and CERN Lab in Switzerland.**
I had opportunities to stay at the following experimental facilities for the specific research work as mentioned below.

- **Lawrence Berkeley National Lab, Berkeley, USA**: Visiting Scholar at Lawrence Berkeley National Laboratory, USA for two months in the year 2008. Research work done was to demonstrate the STAR experiment's capability to carry out the Beam Energy Scan (BES) program aimed to study the QCD phase diagram. In 2010, I visited LBNL for one month to work on the embedding (used to evaluate the tracking efficiency) for the Beam Energy Scan data.

- **Brookhaven National Lab, Upton, USA**: Worked as a post doctoral fellow from Kent State University from January 2010 to June 2013. At this experimental site, I worked on the following research activities:

  (a) Beam Energy Scan program to study QCD phase diagram.

  (b) In-charge of the particle spectra physics working group - responsible for analysis related to the detectors Time Projection Chamber and Time of Flight.

  (c) Person in-charge of online calibrations and monitoring for the trigger detector – Beam Beam Counter, during beam time.

  (d) Trained as data taking Shift leader and detector expert in STAR.

- **CERN, Geneva, Switzerland**: Short periods (∼1.5 months each) in 2006 and 2007. Main work carried out are: Photon Multiplicity Detector (PMD) test beam, PMD high voltage testing, module fabrication, and installation at CERN.

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4.3 Leadership role in the STAR experiment

- **Elected convener of the STAR's "Light Flavor Spectra" Physics working group, since Aug. 2011**: The main tasks are to help and guide the STAR Physics related to Light Flavored particles and spectra. This working group is also the main group where anti-alpha (published in Nature) and anti-hypertriton (published in Science) discovery analysis were carried out. I contributed specifically in the paper writing and reproducibility of anti-alpha results published in Nature. The work also includes giving critical reviews, comments and permissions for the presentations to be presented in conferences and papers to be published in on behalf of STAR. Another important thing is to guide and mentor several students across different countries in their Ph.D. data analysis and Physics issues. For this, I organize weekly meetings. In addition, we discuss present and future STAR Physics goals among leaders of different groups and Physics Analysis Coordinator, based on those we make the guidelines.

- **Elected member of STAR experiment talks committee, Jan 2011-May 2013**: Only 4-5 members are selected from about 500 collaborators. Main task is to help in selecting the potential candidates for the talks to be presented on behalf of STAR in various conferences. The STAR Talks Committee (STC) recommends speakers to the spokesperson among the collaborators who have been nominated (by any STAR collaborator) for a particular talk, or have been nominated (by any STAR collaborator) to be on the standing roster of STAR talk nominees. Person with good physics standing, large contribution to the experiment and with ability to interact with all colleagues or acceptable to all 500 collaborators are usually chosen for the member of this committee.

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4.4 Professional Activities & Memberships

- **Thesis Reviewer** Implemented the Memorandum of Understanding (MOU) between Panjab University and HBNI. http://iqac.puchd.ac.in/docs/2018/20180625154500-mouhomibhabanationalinst.puchd.pdf

- **Thesis Reviewer** for the Rahul Basu Memorial Best Thesis Award in DAE-HEP symposium.

- **Referee** of the *International Journal of Modern Physics E*.

- **Guest Editor** in the journal Advances in High Energy Physics (AHEP) – https://www.hindawi.com/journals/ahep/2017/9291623/

- **Referee** of the journal *Modern Physics Letters A*, Springer Proceedings Series.

- **Referee** of the journal *Zeitschrift für Naturforschung A*.

- **Project Reviewer** for the research project proposal submitted to the *National Science Center, a Government Agency at Poland.*
- **Project Reviewer** for *Research (EMR) funding* under Science and Engineering Research Board (SERB), Department of Science & Technology (DST).
- Invited as an **external subject expert** for the Post Doctoral Fellow interviews held on Feb. 10, 2017, at Indian Institute of Technology (IIT) Ropar, Punjab.
- **Reviewer** of the *Internal notes in ALICE collaboration.*
- **Member** of the *paper review committee (GPC)* in STAR collaboration.

4.4.1 Memberships

- Chandigarh Science Congress, Lifetime.
- American Physical Society (APS), 2010-2011.

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4.5 Selected Invited Lectures & plenary talks

I have been invited at various places within India as well as outside India for the lectures & plenary talks. The invited talks for the conferences are decided by the members of the international advisory committee and the local committee. From the collaboration of large number of international scientists, only very few people get chance for the invited talk.

15. **Invited talk**
    "Recent results on light flavored particles in ALICE"
    Symposium on Heavy-ion Physics at FAIR, RHIC and LHC Facilities, June 18-19, 2018.
    National Institute of Science Education & Research, Odisha.

14. **Invited Lectures**
    "Lectures on experimental high energy physics event generators"
    XI Science & Engineering Research Council (SERC) School on Experimental High Energy Physics, Nov. 7-27, 2017.
    National Institute of Science Education & Research, Odisha.

13. *"Spectra Analysis and Latest Results from the ALICE Experiment"*
    ALICE-India Collaboration Meeting, April 12-16, 2017.
    Variable Energy Cyclotron Center (VECC), Kolkata, India.

    Requested by ALICE-India Spokesperson to give a technical talk for ALICE-India students to give them idea about the techniques of spectra analysis in ALICE and present the latest ALICE results.

12. *"Review of Latest Results from RHIC"*
XXII DAE-BRNS High Energy Physics Symposium 2016, December 12-16, 2016.
University of Delhi, Delhi.

The DAE-BRNS High Energy Physics (HEP) Symposium is a premier event held every other year in India, supported by the Board of Research in Nuclear Sciences (BRNS), Department of Atomic Energy (DAE), India.

11. *"Highlights of Indian Contribution in STAR Experiment"*
DAE-DST Special Task Force Meeting, September 2-4, 2016. Bhabha Atomic Research Center (BARC), Mumbai, India.

DAE-DST Special Task Force Meeting is held regularly to see the Indian contribution in world experiments including CMS and ALICE at CERN, and STAR experiment at BNL. The budget and funding of various Indian groups and Collaborations is discussed in this meeting.

10. "*Experimental results on freeze-out dynamics in heavy-ion collisions*"
6^{th} Asian Triangle Heavy-Ion Conference, Feb. 15-19, 2016
India International Center, Delhi.

This conference brings the Asian heavy-ion physics community together to discuss new developments in the field. Physicists from CIJK (China, India, Japan and Korea) are critical partners in the international group of physicists working to understand hot and dense QCD.

9. "*Experimental Results from the RHIC BES-I*"
National Seminar on Nuclear, Astro and High Energy Physics (NSHEP-2015), October 29-30, 2015
Department of Physics, Kuriakose Elias College, Mannanam, Kottayam, Kerala.

This is the UGC-sponsored event where the organizers invited the **resource persons** *to interact with college students, provide them the information of the world research in HEP and motivate them.*

8. "$K^{*0}(892)$ *and* $\phi(1020)$ *resonance production at RHIC*"
Resonance workshop at Catania-2014, November 3-7, 2014
INFN Division of Catania, Catania.

The purpose of the workshop is to bring together all the experts from theory and experiment working in the field of resonance. This would serve as a guideline for experimentalists and theorists to improve their understanding of the QCD and of the properties of the resonances in partonic and hadronic matter.

7. "*Review of Recent Heavy-Ion Results from RHIC*"
Triggering Discoveries in High Energy Physics, September 9-14, 2013
Department of Physics and Electronics, University of Jammu.

The conference organizers invited pioneer experts from different fields of research to present review talks on the latest results of their experiments.

6. "*STAR Results from RHIC beam energy scan-I*"
   XXIII International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter 2012, August 13-18, 2012
   Washington DC, USA.

   Quark Matter Conference series is held at an interval of about 18 months and is the top most conference in our field of research.

5. "*Report from STAR for heavy-ion data taking in Run-12*"
   2012 RHIC & AGS Annual Users' Meeting, June 12-15, 2012
   Brookhaven National Laboratory, Upton, NY, USA.

   This annual meeting is most critical for BNL, as all representatives from the funding agencies are invited to this meeting to judge RHIC and experiment performances.

4. "*Results from the STAR Beam Energy Scan Program*"
   6^{th} **International Conference on Physics and Astrophysics of Quark Gluon Plasma (ICPAQGP 2010), December 6-10, 2010**
   Goa, India

   ICPAQGP series is the biggest international conference in India related to our field. It is held once every four years.

3. "*Identified Hadron Production from the RHIC Beam Energy Scan* "
   Meeting of the Division of Particles and Fields of the American Physical Society, August 9-13, 2011
   Brown University, Providence, Rhode Island, USA

   This corresponds to a series of regular meetings organized by American Physical Society (APS)

2. "*Results from the Lowest Beam Energy Collisions at RHIC*
   - First Step Towards Beam Energy Scan Program"
   September 30, 2008
   Nuclear Science Division,
   Lawrence Berkeley National Laboratory,
   Berkeley, USA.

1. "*Particle production in Au+Au collisions at* $\sqrt{s_{NN}} = 9.2$ *GeV at RHIC*"
   Free Meson Seminar, November 19, 2009
   Tata Institute of Fundamental Research, Mumbai, India.

Note: Please see full list of talks in Section 6.1

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5 Research Experience

5.1 Area of research and scientific impact

I work in the field of Quark Gluon Plasma. My research interest is the understanding the phase structure of the Quantum Chromo Dynamic (QCD) phase diagram. QCD phase diagram is usually plotted as temperature (T) versus baryon chemical potential (μ_B). Quark Gluon Plasma is a state of matter where quarks and gluons exist in free state rather than in a hadronic volume. This state is believed to be existed few microsecond after the big-bang. Lattice QCD predicts a transition to QGP at high temperature which can be achieved in experiments by smashing heavy-ions at relativistic speed.

The main experiments which are involved in the Physics of Quark Gluon Plasma are Solenoidal Tracker At RHIC (STAR) in RHIC at Brookhaven National Laboratory, USA; and A Large Ion Collider Experiment (ALICE) in CERN at Geneva, Switzerland. Both STAR and ALICE are complementary to each other in the QCD phase diagram. ALICE work in this high energy regime or low μ_B region where it is possible to study the properties of QGP in detail. However, STAR experiment covers large portion of the phase diagram. In addition to study QGP properties, STAR is aiming for exploring the QCD phase diagram to search for QCD critical point and QCD phase boundary. For this STAR had proposed a dedicated program called the Beam Energy Scan (BES) program.

My Ph.D. thesis work has led to the start of this new (BES) program at RHIC. For this program to be started, it was needed to scan wide range of energies (from lower $\sqrt{s_{NN}} \sim$ 7 GeV to higher $\sqrt{s_{NN}} \sim 200$ GeV) so as to cover the the large portion of the phase diagram. However, this was not straight-forward since the RHIC collider and STAR experiment were originally optimized to work at 200 GeV center of mass energy. The injection energy of the RHIC collider was $\sqrt{s_{NN}} = 19.6$ GeV. To see if the RHIC machine and the STAR experiment could work at the lower energies, a test run of Au+Au 9.2 GeV was performed. I analyzed the full data and found very good results which were consistent among the expected energy dependence trends. This work demonstrated that STAR and RHIC could obtain the Physics plots even at the lower energies. Based on this work, the RHIC Program Advisory Committee approved the BES program at RHIC which started in the year 2010. The results from the 9.2 GeV test run were published in : *Phys. Rev. C 81, 024911 (2010).*

I am involved in the discovery Physics from STAR namely: Observation of an Antimatter Hypernucleus (${}^{3}_{\Lambda}\bar{H}^{3}$), published as *Science 328, 58 (2010)*, and Observation of the Antimatter helium-4 nucleus (${}^{4}\overline{He}$), published as *Nature 473, 353 (2011).* In science paper, my contribution was in analysis and results discussions. For the nature paper, I was involved in the paper writing committee and also reproduced/confirmed the anti-alpha analysis and results before the results were made public.

I have the experience of working for the detector hardware. Specifically, I have contributed in the Photon Multiplicity Detector (PMD) which is completely made in India and installed in ALICE at the CERN. The main work include: PMD modules fabrication, high voltage testing, and installation at CERN.

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5.2 Detector Hardware Experience

I was involved in various hardware and collaborative tasks which included testing and fabrication of ALICE and STAR PMD modules; and participating in data taking as STAR detector operator (responsible for smooth running of detectors for data taking), shift crew (responsible for collecting data through Data AcQuisition, DAQ), and shift leader (managing the data taking during the shifts). Below are various contributions to the experimental and hardware work done by me chronically:

- Participated in ALICE-PMD test beam at CERN during September 27 - November 11, 2006.
- Participated in HV testing of ALICE-PMD super modules and in the PMD installation plans at CERN, Geneva, Switzerland during September 18 - October 31, 2007.
- Data taking and shift duty in STAR experiment, BNL, USA.
  As detector operator trainee during February 19 - 25, 2008,
  as shift crew during February 26 - March 4, 2008,
  and as detector operator during March 4 - 10, 2008.
  As detector operator for the RHIC low energy run (Au+Au 9.2 GeV) during March 11 - 12, 2008.
- Visiting Research Scholar at Lawrence Berkeley National Lab, Berkeley, California, USA for the period August 1 - October 2, 2008, to work on the Au+Au 9.2 GeV data analysis and embedding.
- Data taking and shift duty for p+p collisions at $\sqrt{s_{NN}} = 500$ GeV in STAR experiment, BNL, USA. As detector operator during March 10 - 17, 2009, and as a shift crew during April 7 - April 14, 2009.
- Data taking and shift duties: Performed shift duties for three weeks for STAR data taking for Beam Energy Scan Program in 2010 at BNL, USA.
- BBC online monitoring and calibrations - Worked on the BBC online monitoring and the BBC calibrations during the data taking in 2010 for the BES energies at BNL, USA.

- Local BES meeting: Organized weekly local beam energy scan meetings for calibration updates of various detectors during BES data taking for year 2010 at BNL, USA.
- BES fast-offline data: Worked on the STAR BES offline data Quality Assurance and preliminary analysis for year 2010 at BNL, USA.
- Embedding expert: Worked as an embedding expert from lfspectra Physics working group for the embedding of STAR BES data for year 2010 at BNL, USA. Embedding is done in STAR to get the correction factors to take care of detector efficiency and acceptance effects.
- Data taking and shift duties: Performed shift duties for three weeks for STAR data taking covering February and May month in 2011 at BNL, USA.
- Embedding expert: Worked at BNL, USA, as an embedding expert from lfspectra Physics working group for the embedding of STAR BES data to help presenting STAR results at the QM2011 conference.
- BBC online monitoring and calibrations - Helped on the BBC online monitoring and the BBC calibrations during the data taking in 2011 for the BES energies at BNL, USA.
- Local BES meeting: Organized weekly local beam energy scan meetings for calibration updates of various detectors for 19.6 and 27 GeV BES data taking for year 2011 at BNL, USA. Discussions include the data quality checks also.
- Data taking and shift duties: Performed shift duties for three weeks for STAR data taking during April-June in 2012 at BNL, USA.
- Worked on STAR PMD Nano-dst in VECC Kolkata, INDIA, during December 2005 - February 2006.
- Worked on High Voltage testing and Super Module fabrications for ALICE-PMD in VECC Kolkata, INDIA, during April-May, 2006.
- At VECC, Kolkata, INDIA to work on simulation chain and high voltage testing of super modules for ALICE-PMD test beam at CERN during July - August, 2006.
- At VECC, Kolkata, INDIA to work on the high voltage testing of super modules for ALICE-PMD during February - March, 2007.
- At Indian Institute of Technology, Bombay, Mumbai, to work on the Association Maker for the ALICE-PMD simulation during April - May, 2007.
- Worked for data clean up and gain calibration for Run 7 Au+Au 200 GeV STAR-PMD data during July - December 2007.

- Participated in the STAR-PMD simulation, data clean up and data analysis for Run 7 Au+Au 200 GeV data in VECC, Kolkata, INDIA during December 2007 - January 2008.
- Worked on the STAR-PMD data analysis for Au+Au 200 GeV in VECC, Kolkata, INDIA during April 1 - May 15, 2008.
- Worked on the STAR-PMD paper based on the analyses of Au+Au and Cu+Cu collisions at 200 GeV and 62.4 GeV in VECC, Kolkata, INDIA during May 25 - June 30, 2008.
- Worked on the Cu+Cu 62.4 GeV simulation and data analysis for STAR-PMD in VECC, Kolkata, INDIA for the period October 31 - November 30, 2008.

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6 Conferences & Workshops

6.1 Seminars, talks and poster presentations

Talks and Seminars:
Below is the list of all talks presented by me.

47. **Invited Talk**
"*Introduction to CBCS*"
Orientation Program 2018, Physics Department, PU Chandigarh, Sep. 4, 2018
Department of Physics, Panjab University, Chandigarh.

46. **Talk**
"*Phi meson production in p-Pb collision at 8.16 TeV with ALICE at LHC*"
ALICE-STAR-INDIA Collaboration Meeting, Sep. 17-20, 2018
National Institute of Science Education & Research, Odisha.

45. **Invited talk**
"Recent results on light flavored particles in ALICE"
Symposium on Heavy-ion Physics at FAIR, RHIC and LHC Facilities, June 18-19, 2018.
National Institute of Science Education & Research, Odisha.

44. **Invited Lectures**
"Lectures on experimental high energy physics event generators"
XI Science & Engineering Research Council (SERC) School on Experimental High Energy Physics, Nov. 7-27, 2017.
National Institute of Science Education & Research, Odisha.

43. **Invited Talk**
"*CBCS in PU*"
Orientation Program 2017, Physics Department, PU Chandigarh, Sep. 4, 2017
Department of Physics, Panjab University, Chandigarh.

42. **Invited Talk**
"Spectra Analysis and Latest Results from the ALICE Experiment"
ALICE-India Collaboration Meeting, April 12-16, 2017.
Variable Energy Cyclotron Center (VECC), Kolkata, India.

41. **Invited Mini Review Talk**
"Review of Latest Results from RHIC"
XXII DAE-BRNS High Energy Physics Symposium 2016, December 12-16, 2016. University of Delhi, Delhi.

40. **Invited Talk**
"Highlights of Indian Contribution in STAR Experiment"
DAE-DST Special Task Force Meeting, September 2-4, 2016.
Bhabha Atomic Research Center (BARC), Mumbai, India.

39. **Invited Talk**
"*Experimental results on freeze-out dynamics in heavy-ion collisions*"
6^{th} Asian Triangle Heavy-Ion Conference, Feb. 15-19, 2016
India International Center, Delhi.

38. **Talk**
"*Status of beam energy scan spectra paper*"
STAR regional meeting, Feb. 13-14, 2016
NISER, Bhubaneswar, Odisha

37. **Talk**
"*Freeze-out in heavy-ion collisions*"
Workshop on High Energy Physics Phenomenology, December 4-13, 2015
Indian Institute of Technology, Kanpur

36. **Talk**
"*EIC, eSTAR and heavy-ion contribution*"
Workshop on High Energy Physics Phenomenology, December 4-13, 2015
Indian Institute of Technology, Kanpur

35. **Invited Plenary Talk as Resource Person**
"*Experimental Results from the RHIC BES-I*"
National Seminar on Nuclear, Astro and High Energy Physics (NSHEP-2015), October 29-30, 2015
Department of Physics, Kuriakose Elias College, Mannanam, Kottayam, Kerala.

34. **Talk**
"*Freeze-out Conditions in High Energy Heavy-Ion Collisions*"
DAE-HEP symposium, December 8-12, 2014
IIT Guwahati, Assam, India

33. **Invited Plenary Talk**
"$K^{*0}(892)$ *and* $\phi(1020)$ *resonance production at RHIC*"
Resonance workshop at Catania-2014, November 3-7, 2014
INFN Division of Catania, Catania, Italy.

32. **Talk**
"*Systematics of kinetic freeze-out properties in high energy collisions from STAR*"
XXIV International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter 2014, May 19-24, 2014
Darmstadt, Germany

31. **Invited Plenary Talk**
"*Review of Recent Heavy-Ion Results from RHIC*"
Triggering Discoveries in High Energy Physics, September 9-14, 2013
Department of Physics and Electronics, University of Jammu.

30. **Talk**
"*Energy and centrality dependence of chemical freeze-out parameters from model calculations*"
8th International Workshop on Critical Point and Onset of Deconfinement, March 11-15, 2013
Napa, CA.

29. **Invited Plenary Talk**
"*STAR Results from RHIC beam energy scan-I*"
XXIII International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter 2012, August 13-18, 2012
Washington DC, USA.

28. **Invited Plenary Talk**
"*Report from STAR for heavy-ion data taking in Run-12*"
2012 RHIC & AGS Annual Users' Meeting, June 12-15, 2012
Brookhaven National Laboratory, Upton, NY, USA.

27. **Talk**
"*Centrality dependence of freeze-out parameters from Au+Au Collisions at* $\sqrt{s_{NN}}$ *=7.7, 11.5, and 39 GeV at RHIC* "
Critical Point and Onset of Deconfinement (CPOD), November 7-11, 2011
Institute of Particle Physics (CCNU), Wuhan, China.

26. **Invited Talk**
"*Identified Hadron Production from the RHIC Beam Energy Scan* "
Meeting of the Division of Particles and Fields of the American Physical Society, August 9-13, 2011
Brown University, Providence, Rhode Island, USA

25. **Talk**
"*Results from the RHIC Beam Energy Scan Program in STAR experiment*"
BNL Group Seminar, June 29, 2011
Upton, NY, USA

24. **Parallel Talk**
"*Identified Hadron Production from the RHIC Beam Energy Scan Program in STAR experiment*"
XXII International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter 2011, May 23-28, 2011
Annecy, France

23. **Invited Plenary Talk** :
"*Results from the STAR Beam Energy Scan Program*"
6^{th} **International Conference on Physics and Astrophysics of Quark Gluon Plasma (ICPAQGP 2010), December 6-10, 2010**
Goa, India

22. **Talk**
"*Results from the lowest energy ($\sqrt{s_{NN}}$ = 9.2 GeV) collisions at RHIC* "
American Physical Society April meeting 2010, February 13-17, 2010
Washington, DC, USA

21. **Talk**
"*Bulk properties in Au+Au collisions at $\sqrt{s_{NN}}$ = 9.2 GeV in STAR experiment at RHIC* "
Quark Matter 2009, March 29 - April 04, 2009
Knoxville, TN, USA

20. **Parallel Talk**
"*First results from Au+Au collisions at $\sqrt{s_{NN}} = 9.2$ GeV in STAR*"
International Conference on Strangeness in Quark Matter 2008, October 6-10, 2008
Tsinghua University, Beijing, China.

19. **Invited Talk** :
"*Recent Results from STAR* "
Physics Seminar, August 26, 2010
Indian Institute of Technology, Ropar, India.

18. **Invited Talk** :
"*Particle production in Au+Au collisions at* $\sqrt{s_{NN}}$ *= 9.2 GeV at RHIC*"
Free Meson Seminar, November 19, 2009
TIFR, Mumbai, India.

17. **Invited Talk**
"*Results from the Lowest Beam Energy Collisions at RHIC*
- First Step Towards Beam Energy Scan Program"
Heavy Ion Tea Seminar, September 30, 2008
Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, USA.

16. **Talk** :
"*Photon Multiplicity Measurements in Au+Au and Cu+Cu Collisions at* $\sqrt{s_{NN}}$ *= 200 and 62.4 GeV at RHIC* "
DAE Symposium on Nuclear Physics, December 22 - 26, 2008
Indian Institute of Technology, Roorkee, Uttarakhand, India.

15. **Talk** :
"*First results from Au + Au collisions at* $\sqrt{s_{NN}}$ *= 9.2 GeV in STAR* "
18th DAE-BRNS High Energy Physics Symposium, December 14 - 18, 2008
Department of Physics, Banaras Hindu University, Varanasi, India.

14. **Talk** :
"*Energy and System-size Dependence of* p_t *Fluctuations and Correlations in STAR Experiment at RHIC* "
18th DAE-BRNS High Energy Physics Symposium, December 14 - 18, 2008
Department of Physics, Banaras Hindu University, Varanasi, India.

13. **Talk** :
"*Results from Au+Au collisions at* $\sqrt{s_{NN}}$ *= 9.2 GeV at RHIC*"
Workshop on Search for QCD Critical Point, September 17-19, 2009
Patnitop, Jammu, India.

12. **Talk** :
"*First results for Au+Au collisions at* $\sqrt{s_{NN}} = 9.2$ *GeV*"
QGP Meet'08, November 25-27, 2008
Variable Energy Cyclotron Center, Kolkata, India.

11. **Talk**
"*QM2009 Rehearsal Talk: Bulk properties in Au+Au collisions at* $\sqrt{s_{NN}}$ *= 9.2 GeV in STAR experiment at RHIC* "
STAR Collaboration Meeting (BNL Spring 2009), March 23 - 28, 2009
Brookhaven National Laboratory, Upton, New York, USA.

10. **Talk** :
"*PMD results from run-7 AuAu 200GeV and paper status*"
STAR Regional Meeting, November 24-25, 2008
Variable Energy Cyclotron Center, Kolkata, India.

9. **Talk**
"*Preliminary analysis of π, K, and p spectra from BES fast offline data*"
STAR analysis meeting 2010, June 15-18, 2010
UCLA, CA, USA

8. **Talk**
"*Spectra at 9.2 GeV*"
STAR Analysis Meeting, September 2008
Beam Energy Scan Focus Group, Brookhaven National Laboratory, Upton, New York, USA.

7. **Talk**
"*Identified particle production in 9.2 GeV Au+Au collisions and SQM2008 talk presentation*"
STAR Analysis Meeting, September 2008
Spectra Physics Working Group Parallel Session, Brookhaven National Laboratory, Upton, New York, USA.

6. **Talk**
"*Status of hadronic spectra analysis in Au+Au 9.2 GeV*"
Soft-Hadron group meeting, August 18, 2008
Relativistic Nuclear Collisions Group, Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, USA.

5. **Talk**
"*Status of embedding studies in Au+Au 9.2 GeV data*"
Soft-Hadron group meeting, August 11, 2008
Relativistic Nuclear Collisions Group, Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, USA.

4. **Synopsis Presentation** :
"*Fluctuations and Correlations Studies in Heavy Ion Collisions at RHIC Energies*"
Synopsis Presentations, March 31, 2008
Department of Physics, Panjab University, Chandigarh, INDIA

3. **Talk** :
"*System size dependence of p_t correlations in STAR*"
STAR Collaboration Meeting, January 28 - February 2, 2008
Indian Institute of Technology, Mumbai, INDIA.

2. **Talk** :
   "p_t *fluctuations*"
   51st PMD Collaboration Meeting, November 30 - December 1, 2007
   Department of Physics, Panjab University, Chandigarh, INDIA.

1. **Talk** :
   "*ALICE PMD high Voltage testing*"
   48th STAR/ALICE PMD Collaboration Meeting, April 24 - 26, 2006
   Variable Energy Cyclotron Centre, Kolkata, INDIA.

Poster Presentations:

11. *"Study of energy dependence of nuclear modification factor using models*
    Chandigarh Science Congress (CHASCON-2018), Feb. 12-14, 2018
    Panjab University, Chandigarh.

10. *"Particle production in heavy-ion collisions using A Multi Phase Transport string melting model"*
    Chandigarh Science Congress (CHASCON-2017), March 9-11, 2017
    Panjab University, Chandigarh.

9. *"Understanding light nuclei production using A Multi Phase Transport (AMPT) model"*
   XXII DAE-BRNS High Energy Physics Symposium 2016, December 12-16, 2016 University of Delhi, Delhi, India.

8. *"Study of bulk properties in Cu+Au,Cu+Cu and Au+Au Collision at* $\sqrt{s_{NN}}$ *=200 GeV using AMPT and UrQMD models"*
   'XXII DAE-BRNS High Energy Physics Symposium 2016, December 12-16, 2016
   University of Delhi, Delhi, India.

7. "*Study of particle yields in heavy-ion collisions using a A Multi Phase Transport Model*"
   Chandigarh Science Congress (CHASCON-2016), February 29- March 2, 2016
   Panjab University, Chandigarh.

6. "*Particle Ratios Study in RHIC Beam Energy Scan Using UrQMD*"
   Chandigarh Science Congress (CHASCON-2015), February 25-27, 2015
   Panjab University, Chandigarh.

5. "*Identified Particle Production in heavy-ion collisions at RHIC energies*"
   2011 RHIC & AGS Annual User's Meeting, June 20-24, 2011
   Brookhaven National Lab, Upton, NY, USA

4. "*STAR measurement of System size and incident energy dependence of p_t correlations at RHIC*"
   Quark Matter 2008, February 4-10, 2008
   Jaipur, INDIA.

3. "*System size and incident energy dependence of p_t correlations at RHIC Energies*"
   DAE Symposium on Nuclear Physics, December 11-15, 2007
   Sambalpur University, Jyotivihar,
   Burla, Orissa, INDIA.

2. "*Beam Energy and System-size dependence of photon production at forward rapidity at RHIC*"
   Chandigarh Science Congress (CHASCON-2009), February 26 -28, 2009
   Panjab University, Chandigarh,
   Chandigarh, INDIA.

1. "*Energy and system-size dependence of p_t Fluctuations and correlations in STAR Experiment at RHIC*"
   Chandigarh Science Congress (CHASCON-2009), February 26 -28, 2009
   Panjab University, Chandigarh,
   Chandigarh, INDIA.

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6.2 Conferences & Workshops Organized

- Helped in organizing the **Vortex-2018** valedictory function, Department of Physics, Panjab University, Chandigarh, Feb. 24, 2018.

- Member of local organizing committee of 2nd **H. S. Hans Memorial Lecture** in Department of Physics, Panjab University Chandigarh, March 5, 2018.

- Member of local organizing committee of 9th **International Workshop on Multiple Partonic Interactions at the LHC** in Hotel Peterhoff, Shimla, India, December 11-15, 2017. More details: https://indico.cern.ch/event/625304/

- Convener of the **Helmut memorial session in the** 6th **International Conference on New Frontiers in Physics**, 17-19, Aug 2017. More details: https://indico.cern.ch/event/559774/page/9371-helmut-oeschler-memorial-session

- Member of local organizing committee of **National School cum Workshop in Accelerator Physics** in Department of Physics, Panjab University Chandigarh, March 15 -18, 2016

- Convener of the Working Group-IV: Heavy-ion and QCD, in the **Workshop on High Energy Physics Phenomenology (WHEPP)**", held at Indian Institute of Technology (IIT) Kanpur, India during December 4-13,2015. More details: http://www.iitk.ac.in/phy/activities/2015-2016/whepp/workingGroup.html

- Member of the local organizing committee of the 1st **Prof. B. M. Anand Memorial** program held at Department of Physics, Panjab University, Chandigarh, on 10^{th} of April, 2015.

- Served as a committee member of the organizing committee of first **Young Researcher Symposium 2012**, held at Brookhaven National Laboratory, Upton, NY on November 30, 2012. This symposium was organized by the postdocs in discussion and support from Lab authorities. The symposium is a way to bring together early career researchers (postdocs and graduate students) from a wide range of disciplines across BNL to exchange information and presenting their research work in a supportive scientific environment. More details: http://www.bnl.gov/bnlyrs2012/

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6.3 Conferences, workshops and meetings attended

56. "ALICE-STAR-INDIA Collaboration meeting"
National Institute of Science Education & Research, Sep. 18-21, 2018
http://www.niser.ac.in/asic-meeting/

55. "Symposium on Heavy-ion Physics at FAIR, RHIC and LHC Facilities"
National Institute of Science Education & Research, June. 18-19, 2018
http://www.niser.ac.in/symposium_heavy_ion/

54. "Refresher course in Information Technology"
University Institute of Engineering and Technology, Panjab University, Chandigarh, Jan. 4-24, 2018.

53. "International Workshop on Multiple Partonic Interactions at the LHC"
Hotel Peterhoff, Shimla, India, December 11-15, 2017
https://indico.cern.ch/event/625304

52. "ALICE-India collaboration meeting"
Jammu University, Jammu, October 26-29, 2017

51. "Orientation course for teachers"
HRDC center, Panjab University, Chandigarh, India, June 28 - July 25, 2017.

50. "Chandigarh Science Congress (CHASCON-2017)"
Panjab University, Chandigarh, India, March 9 - 11, 2017.
http://chascon2017.in/

49. "XXII DAE-BRNS High Energy Physics Symposium 2016"
University of Delhi, Delhi, India, December 12 - 16, 2016.
http://duhep.in/dae/

48. "ALICE-INDIA collaboration meeting"
Panjab University, Chandigarh, India, August 3-4, 2016.

47. "Chandigarh Science Congress (CHASCON-2016)"
Panjab University, Chandigarh, India, February 29 - March 2, 2016.
http://chascon.puchd.ac.in/'

46. "Orientation-cum training programme on URKUND"
Panjab University Chandigarh, February 10, 2016.

45. "6^{th} Asian Triangule Heavy-Ion Conference-2016 "
India International Center, New Delhi, India, Feb. 15-19, 2016
http://theory.tifr.res.in/~athic6/
https://indico.cern.ch/event/487533/

44. "STAR regional meeting-2016 "
National Institute of Science Education and Research (NISER), Bhubaneswar, Orissa, India, Feb. 13-14, 2016
http://www.niser.ac.in/STAR-QCD/

43. "Workshop on High Energy Physics Phenomenology" *Indian Institute of Technology (IIT), Kanpur, UP, India, December 4-13, 2015*
http://www.iitk.ac.in/phy/activities/2015-2016/whepp/

42. "ALICE-India Collaboration meeting-2015 "
Institute of Physics, Bhubaneswar, Orissa, India, July 22-24, 2015
http://www.iopb.res.in/aliceindia2015/

41. "Refresher course in Information Technology"
University Institute of Engineering and Technology, Panjab University, Chandigarh, Jan. 4-24, 2018.

40. "STAR Collaboration meeting-2015 "
Stony Brook University, USA, June 1-6, 2015
https://drupal.star.bnl.gov/STAR/conference/timetable/talk/32871

39. "XXIV International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter 2014 "
Darmstadt, Germany, May 19-24, 2014.
http://qm2014.gsi.de/

38. "STAR Collaboration meeting-2014 "
Frankfurt Institute for Advanced Studies, Germany, May 13-16, 2014.
http://fias.uni-frankfurt.de/physics/conferences/star2014/

37. "STAR Collaboration meeting-2014"
Brookhaven National Laboratory, USA, February 10-14, 2014.
https://drupal.star.bnl.gov/STAR/conference/timetable/talk/29077

36. "ALICE-India Collaboration meeting "
Variable Energy Cyclotron Center, Kolkata, January 12-14, 2014.

35. "STAR Collaboration regional meeting "
Institute of Physics, Bhubaneswar, January 9-10, 2014.

34. "Triggering Discoveries in High Energy Physics "
Department of Physics and Electronics, University of Jammu, September 9-14, 2013.

33. "ALICE-India Collaboration meeting "
Department of Physics and Electronics, University of Jammu, September 7-8, 2013.

32. "8th International Workshop on Critical Point and Onset of Deconfinement "
Napa, CA, USA, March 11-15, 2013.

31. "XXIII International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter 2012"
Washington DC, USA, August 13-18, 2012.

30. "2012 RHIC & AGS Annual Users' Meeting "
Brookhaven National Lab, Upton, NY, USA, June 12-15, 2012.

29. "Critical Point and Onset of Deconfinement (CPOD)"
Institute of Particle Physics (CCNU), Wuhan, China, November 7-11, 2011.

28. "2011 RHIC & AGS Annual Users' Meeting "
Brookhaven National Lab, Upton, NY, USA, June 20-24, 2011.

27. "Meeting of the Division of Particles and Fields of the American Physical Society "
Brown University, Providence, Rhode Island, USA, August 9-13, 2011.

26. "XXII International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter 2011"
Annecy, France, May 23-28, 2011.

25. "STAR Collaboration Meeting 2011"
Czech Technical University,
Prague, Czech Republic, May 15-20, 2011.

24. "STAR Analysis Meeting 2011"'
Brookhaven National Laboratory,
Upton, New York, USA, Mar 14-18, 2011.

23. "6^{th} International Conference on Physics and Astrophysics of Quark Gluon Plasma (ICPAQGP 2010)"
Goa, India, December 6-10, 2010.

22. "STAR Collaboration Meeting 2010"
Brookhaven National Laboratory,
Upton, New York, USA, Nov 12-17, 2010.

21. "STAR Analysis Meeting 2010"
UCLA, CA, USA, June 15-18, 2010.

20. "American Physical Society April meeting 2010"
Washington, DC, USA, February 13-17, 2010.

19. "National Conference on High Energy Physics - Recent Developments and Future Challenges"
DAV College, Jalandhar, Punjab, India, February 4-5, 2010.

18. "Workshop on Search for QCD Critical Point"
Patnitop, Jammu, India, September 17 - September 19, 2009.

17. "Quark Matter 2009"
Knoxville, TN, USA, March 29 - April 04, 2009.

16. "STAR Collaboration Meeting (BNL Spring 2009)"
Brookhaven National Laboratory,
Upton, New York, USA, March 23 -28, 2009.

15. "Chandigarh Science Congress (CHASCON-2009)"
Panjab University, Chandigarh
Chandigarh, India, February 26 -28, 2009.

14. "QGP Meet'08"
Variable Energy Cyclotron Centre, Kolkata, INDIA, November 25-27, 2008.

13. "STAR Regional Meet"
Variable Energy Cyclotron Centre, Kolkata, INDIA, November 24-25, 2008.

12. "International Conference on Strangeness in Quark Matter 2008"
Tsinghua University, Beijing, CHINA, October 6-10, 2008.

11. "STAR Analysis Meeting"
Brookhaven National Laboratory, Upton, USA, September 24-29, 2008.

10. "Quark Matter 2008"
Jaipur, INDIA, February 4-10, 2008.

9. "Star Collaboration Meeting"
Indian Institute of Technology, Bombay, Mumbai, INDIA, January 28 - February 2, 2008.

8. "DAE Symposium on Nuclear Physics"
Sambalpur University, Orissa, INDIA, December 11-15, 2007.

7. "Advanced School on Quark-Gluon Plasma"
Indian Institute of Technology, Bombay, Mumbai, INDIA, July 3-13, 2007.

6. "Quark-Gluon Plasma and Hadron Physics :
   3rd SERC school on Nuclear Physics (Series-III)"
   Institute of Physics, Bhubaneswar, INDIA, December 21, 2006 to January 9, 2007.

5. "National Workshop On Simulation Techniques in Physics"
   Aligarh Muslim University, Aligarh, INDIA, March 20-25, 2006.

4. "International Workshop on Large Scale Computing"
   Variable Energy Cyclotron Centre, Kolkata, INDIA, February 8-10, 2006.

3. "Workshop on Quark Gluon Plasma (QGP Meet'06)"
   Variable Energy Cyclotron Centre, Kolkata, INDIA, February 5-7, 2006.

2. "International Year of Physics:
   Workshop on Hot and Dense Matter in Relativistic Heavy Ion Collisions"
   HEP Group, Department of Physics, University of Jammu, INDIA, May 5-9, 2005.

1. "Vth SERC School on Experimental High Energy Physics"
   Panjab University Chandigarh, INDIA, March 7-27, 2005.

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7 Publications

7.1 Internal notes as principle author in collaborations

- *Pion, kaon and (anti) proton production in U+U collisions at* $\sqrt{s_{NN}}$ *=193 GeV in STAR (2018):*
  http://drupal.star.bnl.gov/STAR/starnotes/private/psn0711
- *Bulk Properties of the system formed Au+Au collisions at* $\sqrt{s_{NN}}$ *= 14.5 GeV using the STAR detector at RHIC (2018):*
  https://drupal.star.bnl.gov/STAR/starnotes/private/psn0701
- *Bulk properties from Beam Energy Scan at RHIC (2015):*
  http://drupal.star.bnl.gov/STAR/starnotes/private/psn0620
- *System size dependence of transverse momentum correlations at RHIC (2012):*
  http://drupal.star.bnl.gov/STAR/starnotes/private/psn0563

- *Directed and elliptic flow of charged particles in Cu+Cu collisions at* $\sqrt{s_{NN}}$ *= 22.4 GeV (2011):*
  http://drupal.star.bnl.gov/STAR/starnotes/private/psn0537
- *Experimental study of the QCD phase diagram & search for the critical point: selected arguments for the run-10 beam energy scan (2009):*
  http://drupal.star.bnl.gov/STAR/starnotes/public/sn0493
- *Particle production in Au+Au collisions at* $\sqrt{s_{NN}}$ *= 9.2 GeV (2009):*
  http://drupal.star.bnl.gov/STAR/starnotes/private/psn0487
- *Energy and system size dependence of photon production at forward rapidity in RHIC (2008):*
  http://drupal.star.bnl.gov/STAR/starnotes/private/psn0464-0.

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7.2 Collaboration papers review

I have contributed as member in the paper review committee of the following papers.

6. *Measurements of* e^+e^- *production in Au+Au collisions at* $\sqrt{s_{NN}}$ *= 27, 39, and 62.4 GeV from the STAR experiment*
   arXiv:1810.10159 [nucl-ex]
5. *Direct virtual photon production in Au+Au collisions at* $\sqrt{s_{NN)}}$ *= 200 GeV*
   Phys. Lett. B **770** (2017) 451
4. *Probing Parton Dynamics of QCD Matter with Omega and Phi production*
   Phys. Rev. C **93** (2016) 21903
3. *Charge-neutral correlation at forward rapidity in* $\sqrt{s_{NN}}$ *= 200 Au+Au collision*
   Phys. Rev. C **91** (2015) 34905
2. *Observation of the antimatter Helium-4 nucleus*
   Nature **473** (2011) 353
1. *Higher Moments of Net-proton Distributions at RHIC*
   Phys. Rev. Lett. **105** (2010) 22302

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7.3 Selected list of publications

For full list of publications, see here: **List1** and **List2**.

Below is the list of recent publications

Few Author Papers:

9. **"Understanding Light Nuclei Production Using A Multi Phase Transport (AMPT) Model"**
   A. Kaur, L. Kumar and N. Sharma.
   Springer Proc. Phys. **203**, 855 (2018).

8. **"Study of Bulk Properties in Cu+Au, Cu+Cu and Au+Au Collision at $\sqrt{s_{\rm NN}}$ = 200 GeV Using AMPT and UrQMD Models"**
   S. Kumar, L. Kumar and N. Sharma.
   Springer Proc. Phys. **203**, 717 (2018).

7. **"Review of Latest RHIC Results and Future Perspectives"**
   L. Kumar.
   Springer Proc. Phys. **203**, 49 (2018).

6. **"Methods for separation of deuterons produced in the medium and in jets in high energy collisions"**
   N. Sharma, T. Perez, A. Castro, L. Kumar and C. Nattrass.
   Phys. Rev. C **98**, no. 1, 014914 (2018)

5. **"Thermal model description of p–Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV"**
   N. Sharma, J. Cleymans and L. Kumar.
   Eur. Phys. J. C **78**, no. 4, 288 (2018)

4. **"Freeze-Out Conditions in High-Energy Heavy-Ion Experiments"**
   L. Kumar, S. Chatterjee, S. Das, D. Mishra, B. Mohanty, R. Sahoo and N. Sharma.
   Springer Proc. Phys. **174**, 99 (2016).

3. **"Freeze-Out Parameters in Heavy-Ion Collisions at AGS, SPS, RHIC, and LHC Energies"**
   S. Chatterjee, S. Das, L. Kumar, D. Mishra, B. Mohanty, R. Sahoo and N. Sharma.
   Adv. High Energy Phys. **2015**, 349013 (2015).

2. **"Experimental studies of the quantum chromodynamics phase diagram at the STAR experiment"**
   L. Kumar and D. Keane.
   Pramana **84**, no. 5, 773 (2015).

1. **"Chemical Freeze-out conditions for central Heavy-ion Collisions at AGS, SPS, RHIC and LHC Energies"**
   S. Chatterjee, S. Das, L. Kumar, D. Mishra, B. Mohanty, R. Sahoo and N. Sharma.
   DAE Symp. Nucl. Phys. **59**, 714 (2014).

Papers with Collaborations:

121. **"Centrality and transverse momentum dependence of D^0-meson production at mid-rapidity in Au+Au collisions at $\sqrt{s_{\rm NN}} = 200\,{\rm GeV}$"**
   J. Adam *et al.* [STAR Collaboration].
   arXiv:1812.10224 [nucl-ex]

120. **"Real-time data processing in the ALICE High Level Trigger at the LHC"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1812.08036 [physics.ins-det]
CERN-EP-2018-337

119. **"Measurement of the longitudinal spin asymmetries for weak boson production in proton-proton collisions at $\sqrt{s}$ = 510 GeV"**
J. Adam *et al.* [STAR Collaboration].
arXiv:1812.04817 [hep-ex]

118. **"Charged-particle pseudorapidity density at mid-rapidity in p-Pb collisions at $\sqrt{s_{\rm NN}}$ = 8.16 TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1812.01312 [nucl-ex]
CERN-EP-2018-315

117. **"Study of J/ψ azimuthal anisotropy at forward rapidity in Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 5.02 TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1811.12727 [nucl-ex]

CERN-EP-2018-319

116. **"Jet fragmentation transverse momentum measurements from di-hadron correlations in $\sqrt{s}$ = 7 TeV pp and $\sqrt{s_{\rm NN}}$ = 5.02 TeV p-Pb collisions"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1811.09742 [nucl-ex]

CERN-EP-2018-303

115. **"Measurements of Dielectron Production in Au+Au Collisions at $\sqrt{s_{NN}}$= 27, 39, and 62.4 GeV from the STAR Experiment"**
J. Adam *et al.* [STAR Collaboration].
arXiv:1810.10159 [nucl-ex]

114. **"$\Lambda_{\rm c}^{+}$ production in Pb-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1809.10922 [nucl-ex]

CERN-EP-2018-261

113. **"Event-shape engineering for the D-meson elliptic flow in mid-central Pb-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1809.09371 [nucl-ex]
CERN-EP-2018-260

112. **"Measuring $\mathbf{K^0_S K^\pm}$ interactions using pp collisions at $\sqrt{s} = 7$ TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1809.07899 [nucl-ex]
CERN-EP-2018-234

111. **"Charged jet cross section and fragmentation in proton-proton collisions at $\sqrt{s} = 7$ TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1809.03232 [nucl-ex]
CERN-EP-2018-235

110. **"Energy dependence of exclusive J/ψ photoproduction off protons in ultra-peripheral p-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1809.03235 [nucl-ex]
CERN-EP-2018-236

109. **"Transverse spin transfer to Λ and $\bar{\Lambda}$ hyperons in polarized proton-proton collisions at $\sqrt{s} = 200$ GeV"**
J. Adam *et al.* [STAR Collaboration].
arXiv:1808.08000 [hep-ex]
Phys. Rev. D **98**, no. 9, 091103 (2018)

108. **"Improved measurement of the longitudinal spin transfer to Λ and $\bar{\Lambda}$ hyperons in polarized proton-proton collisions at $\sqrt{s} = 200$ GeV"**
J. Adam *et al.* [STAR Collaboration].
arXiv:1808.07634 [hep-ex]
Phys. Rev. D **98**, no. 11, 112009 (2018)

107. **"The Proton-Ω correlation function in Au+Au collisions at $\sqrt{s_{NN}}$=200 GeV"**
J. Adam *et al.* [STAR Collaboration].
arXiv:1808.02511 [hep-ex]

106. **"Multiplicity dependence of light-flavor hadron production in pp collisions at $\sqrt{s} = 7$ TeV"**
S. Acharya *et al.* [ALICE Collaboration].
arXiv:1807.11321 [nucl-ex]

CERN-EP-2018-209

105. **"The DUNE Far Detector Interim Design Report, Volume 3: Dual-Phase Module"**
B. Abi *et al.* [DUNE Collaboration].
arXiv:1807.10340 [physics.ins-det]
FERMILAB-DESIGN-2018-04

104. **"The DUNE Far Detector Interim Design Report, Volume 2: Single-Phase Module"**
B. Abi *et al.* [DUNE Collaboration].
arXiv:1807.10327 [physics.ins-det]
FERMILAB-DESIGN-2018-03

103. **"The DUNE Far Detector Interim Design Report Volume 1: Physics, Technology and Strategies"**
B. Abi *et al.* [DUNE Collaboration].
arXiv:1807.10334 [physics.ins-det]
FERMILAB-DESIGN-2018-02

102. **"Medium modification of the shape of small-radius jets in central Pb-Pb collisions at $\sqrt{s_{\rm NN}} = 2.76$ TeV"**
S. Acharya *et al.* [ALICE Collaboration].
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Phys. Rev. Lett. **119**, no. 10, 102301 (2017)
CERN-EP-2016-229

11. **"Dijet imbalance measurements in $Au + Au$ and pp collisions at $\sqrt{s} = 200$ GeV at STAR"**
L. Adamczyk *et al.* [STAR Collaboration].
arXiv:1609.03878 [nucl-ex]
Phys. Rev. Lett. **119**, no. 6, 062301 (2017)

10. **"Measurement of electrons from beauty-hadron decays in p-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV and Pb-Pb collisions at $\sqrt{s_{\rm NN}} = 2.76$ TeV"**
J. Adam *et al.* [ALICE Collaboration].
arXiv:1609.03898 [nucl-ex]
JHEP **1707**, 052 (2017)
CERN-EP-2016-222

9. **"Charge-dependent directed flow in Cu+Au collisions at $\sqrt{s_{_{NN}}}$ = 200 GeV"**
L. Adamczyk *et al.* [STAR Collaboration].
arXiv:1608.04100 [nucl-ex]
Phys. Rev. Lett. **118**, no. 1, 012301 (2017)

8. **"Energy dependence of J/ψ production in Au+Au collisions at $\sqrt{s_{NN}}$ = 39, 62.4 and 200 GeV"**
L. Adamczyk *et al.* [STAR Collaboration].
arXiv:1607.07517 [hep-ex]
Phys. Lett. B **771**, 13 (2017)

7. **"Challenges in QCD matter physics –The scientific programme of the Compressed Baryonic Matter experiment at FAIR"**
T. Ablyazimov *et al.* [CBM Collaboration].
arXiv:1607.01487 [nucl-ex]
Eur. Phys. J. A **53**, no. 3, 60 (2017)

6. **"Direct virtual photon production in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV"**

L. Adamczyk *et al.* [STAR Collaboration].
arXiv:1607.01447 [nucl-ex]
Phys. Lett. B **770**, 451 (2017)

5. **"J/ψ suppression at forward rapidity in Pb-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV"**
J. Adam *et al.* [ALICE Collaboration].
arXiv:1606.08197 [nucl-ex]
Phys. Lett. B **766**, 212 (2017)
CERN-EP-2016-162

4. **"Enhanced production of multi-strange hadrons in high-multiplicity proton-proton collisions"**
J. Adam *et al.* [ALICE Collaboration].
arXiv:1606.07424 [nucl-ex]
Nature Phys. **13**, 535 (2017)
CERN-EP-2016-153

3. **"Measurement of azimuthal correlations of D mesons and charged particles in pp collisions at $\sqrt{s} = 7$ TeV and p-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV"**
J. Adam *et al.* [ALICE Collaboration].
arXiv:1605.06963 [nucl-ex]
Eur. Phys. J. C **77**, no. 4, 245 (2017)
CERN-EP-2016-129

2. **"Elliptic flow of electrons from heavy-flavor hadron decays in Au + Au collisions at $\sqrt{s_{\rm NN}} = 200$, 62.4, and 39 GeV"**
L. Adamczyk *et al.* [STAR Collaboration].
arXiv:1405.6348 [hep-ex]
Phys. Rev. C **95**, no. 3, 034907 (2017)

1. **"Observation of D^0 Meson Nuclear Modifications in $Au + Au$ collisions at 200 GeV"**
L. Adamczyk *et al.* [STAR Collaboration].
arXiv:1404.6185 [nucl-ex], arXiv:1809.08737 [nucl-ex]
Phys. Rev. Lett. **113**, no. 14, 142301 (2014), Erratum: [Phys. Rev. Lett. **121**, no. 22, 229901 (2018)]

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8 Detail Information

8.1 Semester wise teaching

9. July-December, 2018: M.Sc. (H.S.) I semester, Classical Mechanics
   Practical: Computer Lab. (SciLab) B.Sc. III Sem.

8. Jan-May, 2018: M.Sc. (H.S.) II semester, Statistical Mechanics
   Practical: Physics Labs. M.Sc. IV Sem. & B.Sc. II Sem. (subsidiary Lab.)

7. July-December, 2017: M.Sc. (H.S.) I semester, Classical Mechanics (2 sections)
   Practical: Physics Labs. M.Sc. III Sem. & B.Sc. I Sem. (Subsidiary)
   Tutorials on Classical Mechanics to pre-Ph.D. students during 2017-18.

6. Jan-May, 2017: M.Sc. (H.S.) II semester, Statistical Mechanics
   Practical: Physics Labs. M.Sc. IV Sem. & B.Sc. II Sem. (Core and subsidiary Labs.)

5. July-December, 2016: M.Sc. (H.S.) I semester, Classical Mechanics
   Practical: Physics Labs. M.Sc. III Sem. & B.Sc. I Sem.
   Pre-Ph.D. advance course on Particle physics, Collider Physics & Accelerator during 2016-17.
   Examiner of pre-Ph.D. self-study presentations.

4. Jan-May, 2016: M.Sc. (H.S.) II semester, Statistical Mechanics
   Practical: Physics Lab. M.Sc. IV Sem. & Computer Lab. (C++) M.Sc. II Sem.

3. July-December, 2015: B.Sc. (H.S.) V semester, Mathematical Physics-I
   Practical: Physics Labs. M.Sc. III Sem. & B.Sc. I Sem.

2. Jan-May, 2015: B.Sc. (H.S.) IV semester, Thermodynamics
   Practical: Physics Labs. M.Sc. IV Sem. & B.Sc. I Sem.

1. July-December, 2014: B.Sc. (H.S.) III semester, Electronics & Network theory
   Practical: Physics Labs. M.Sc. III Sem. & B.Sc. I Sem.

Copy of syllabus can be found at: http://physics.puchd.ac.in/courses.php

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8.2 Ph.D. Students

2. Mr. Sandeep Dudi, Physics Department, Panjab University, Chandigarh.
   Broad thesis work: Resonance production in ALICE.
   Status: Ongoing.

1. **Co-supervisor** of Ms. Debadeepti Mishra, National Institute of Science Education and Research (NISER), Bhubaneswar, Orissa.
   Broad thesis work: Particle production at Au+Au 14.5 GeV and U+U 192 GeV.
   Status: Ongoing.

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8.3 Project & Summer Students

8. May. 2018-July 2018: Mr. Abhirikshma Nandi, B.Tech. 3rd year, IIT Guwahati, Particle production study using different input cross-sections of AMPT model. (*Under the Summer Research Fellowship program of Science Academies, INDIA.)*

7. Jan. 2018-May 2018: Ms. Yachika Chopal, M.Sc. Phys (H.S.) , Panjab University, Beam energy dependence of Rcp measurements using HIJING event generator.

6. Sep. 2017-March 2018: Mr. Rajul Goel, M.Sc. Phys (H.S.) , Panjab University, Study of HIJING event generator.

5. Jan-May 2017: Ms. Simran Kour, M.Sc. Phys (H.S.) Semester IV, Panjab University, Particle production using AMPT string melting model.

4. May-Jul 2016: Mr. Nirmal Shiroya, B.Sc., SVNIT, Introduction of particle physics & thermodynamics quantities.

3. Jan-May 2016: Ms. Neha Sharma, M.Sc. Phys (H.S.) Semester IV, Panjab University, Study of Particle production using AMPT default model.

2. Jan-May 2015: Ms. Rajwinder Kaur, M.Sc. Phys (H.S.) Semester IV, Panjab University, Study of Particle ratios from UrQMD model.

1. May 2014: Ms. Subhashree Dey, Int. M.Sc. I, University of Hyderabad, Basics of Particle Physics.
   (Under the Summer Research Fellowship program of Science Academies, INDIA.)

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8.4 Students Mentoring

I like to interact with students. It is good to listen to their view points and what they learn, and think of their future directions. In my capacity, I try to help them and facilitate them to think broader.

- I usually **organize seminars** of the students of the class to whom I teach. It could be general topic or a topic related to the subject. This exercise provides them opportunity to sharpen their knowledge, teaching and presentation skills.

- Acted as **Mentor** and **Laboratory Mentor** respectively in the 1^{st} *and* 2^{nd} *DST INSPIRE Internship Camp*, organized at Panjab University, Chandigarh during March 23-27, 2015 and August 17-21, 2015, respectively.

- As the leader of the Light Flavour Spectra physics working group, I **guide** several students in their analysis projects. Typically at a given time about 10-15 graduate students work in our physics working group. Several students have directly benefited from interactions with me, they include students from UC Davis; VECC, Kolkata; IOP, Bhubaneswar; Kent State University; and Jammu University, Jammu..

- Served as **a panelist** to discuss and motivate students (DOE science graduate fellows) for the collaborative research, in the **Annual DOE SCGF Research Meeting, July 29-August 1, 2012'** held at Brookhaven National Laboratory, Upton, NY, USA.

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8.5 Departmental Duties

5. Session 2018-19:

    - Maintaining and updating the Physics Department website: http://physics.puchd.ac.in/
    - Managing the contributory tea-club (tea-cum-faculty discussions) in the Department.
    - Internal examiner for the computer and physics laboratory 3rd semester final practical exams in December.
    - Helped in organizing the vortex valedictory function.
    - Member of UGAPMEC Committee.
    - Member of B.Sc. (Hons.) Physics admission committee
    - Member & Secretary of Administrative Committee.
    - Election duty for Panjab University Campus Students' Council Elections.
    - Coordinator from Physics Department for Choice Based Credit System (CBCS) for undergraduate courses.

4. Session 2017-18:

    - Member & Secretary of Administrative Committee
    - Election duty for Panjab University Campus Students' Council Elections.
    - Member of B.Sc. (Hons.) Physics admission committee
    - Member of Academic Committee

- Coordinator from Physics Department for Choice Based Credit System (CBCS) for undergraduate courses.

3. Session 2016-17:

- **Coordinator and mentor** for B.Sc. (Hons.) first year admitted students.
- Member of B.Sc. (Hons.) Physics **admission committee**.
- Worked on the revised syllabus for **Choice Based Credit System (CBCS)** for the the B.Sc. (H.S.) Physics and B.Sc. (H.S.) Physics (Specialization in Electronics).
- Member of team to visit **Ooty TIFR cosmic ray lab** for the possibility of future collaborations with Physics Department, PU Chandigarh, Feb. 19 to Feb. 23, 2016.
- Member of **Purchase Committee**.
- Member of the **Board of Control (BOC)** meetings.

2. Session 2015-16:

- Committee member of the committee to look into providing research center status to DAV college Sector 10, Chandigarh.
- Election duty for Panjab University Campus Students' Council Elections.
- Judge of poster session for high energy physics posters in CHASCON-2016.
- Paper setter of college exams.
- External examiner of M.Sc. practical lab. exam in DAV college Sector 10, Chandigarh.
- Member of the research monitoring committee for High energy Physics.
- Member of M.Sc. I (Physics and Physics & Electronics) **admission committee**.
- Member & Secretary of **Academic Committee**.

1. Session 2014-15:

- External examiner for practical exam in M.Sc. (Physics) 1st Semester at GGDSD College, Sec - 32 Chandigarh
- Laboratory Mentor in "1st DST INSPIRE internship program" in Department of Physics, Chandigarh.
- Member of **Purchase Committee**.
- Member of the **Board of Control (BOC)** meetings.

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