

Natasha Sharma

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Academic Qualification

Ph.D., Experimental High Energy Heavy-Ion Physics, Panjab University, Chandigarh, India (2012)

M.Sc., 1st Division, Department of Physics, Panjab University, Chandigarh, India (2006)

B.Sc., 1st Division, M.C.M. D.A.V. College, Sector-36, Chandigarh, India (2004)

PROFESSIONAL EXPERIENCE

DEPARTMENT OF PHYSICS, Panjab University, Chandigarh, INDIA

Ramanujan Fellow, Feb. 2016 -- present

Teaching B.Sc. 3rd year – Mathematical Physics (July -- Dec. 2016)

Research in ALICE experiment at CERN

Mentoring Ph.D. and master students for their research projects.

UNIVERSITY OF TENNESSEE, Knoxville, TN, USA

Postdoctoral Research Associate, 2012 – 2013 and 2014 – 2016

Research in ALICE experiment at CERN

Mentor grads and undergrads for their thesis research projects.

Taught supplementary class to undergrads – Classical Mechanics 2 (2015-P312)

INSTITUTE OF PHYSICS, Bhubaneswar, ODISHA, INDIA

Postdoctoral Research Associate, 2013 – 2014

Research in ALICE experiment at CERN

Awards/Recognitions:

- **Ramanujan Fellowship** from Science and Engineering Research Board, Department of Science & Technology, Government of India in September 2015.
- **Young Scientist Award** from Elsevier Nuclear Physics A for best oral presentation in the international conference QM2015 at Kobe, Japan. Received a citation and a cash prize of 400 Euros.
- Won one of the **best posters** among 800 posters in the international conference QM2011 at Annecy, France.
- Qualified **National Eligibility Test** conducted by University Grant Commission (UGC) of India (2006).
- **Featured articles:**
 - *Focus on: Ayben Karasu Uysal and Natasha Sharma:*
<http://alicematters.web.cern.ch/?q=focuson-natasha-and-ayben> ,
 - *ALICE's Natasha Sharma wins Nuclear Physics A Young Scientist Award:*
<http://alicematters.web.cern.ch/?q=content/node/930> , and
 - *Focus on: Natasha Sharma:* <http://alicematters.web.cern.ch/?q=content/node/927>

Professional Training:

- i. **Area of research:** I have been actively working in the field of Experimental High Energy Physics. The theory of strong interactions, QCD, predicts the formation of Quark-Gluon-Plasma (QGP) at high temp. and/or high baryon density region. This state of matter is suggested to have existed just after the Big Bang. The ultra-relativistic heavy-ion collisions are best suited to produce and study the QGP. During my doctoral and post-doctoral period, I have gained experience of hardware work, software development, data taking, data analyses as well as theoretical work.
- ii. **Some of the significant work:** Below is the list of some of the significant contributions of my work in the experimental high-energy heavy ion field.
 - a. **Theoretical work:** Worked on the theoretical study of complex antinuclei production using the statistical thermal model and the coalescence concept. A paper based on these results was published in the *Phys. Rev. C* journal.
 - b. **Data analysis:** In continuation of the nuclei theoretical work, I have analyzed data collected by the ALICE experiment to understand nuclei and anti-nuclei production in proton-proton and heavy-ion collisions. I studied deuterons, tritons, Helium3, and Helium4 (Alpha) nuclei and their anti-nuclei in more details. I have also contributed in the discovery of anti-alpha (anti-Helium4) from the ALICE experiment. This work is published in the *NATURE PHYSICS* journal and a long paper in the *Phys. Rev. C* journal.
 - c. **Photon Multiplicity Detector (PMD):** I have contributed extensively in the assembling, hardware and electronic testing, and also in the installation of the **Indian built PMD detector** in the ALICE experiment at CERN. A paper based on the data collected by PMD is published in the *Eur. Phys. J. C* journal.
 - d. **Jet Physics:** Contributed in the study of di-hadron and jet-hadron correlation data analyses in ALICE. Also developed **new technique** to reject background in the correlation analyses. Two paper based on these are published in the *Phys. Rev. C* journal and *Phys. Rev. C* Rapid communication journal.
- iii. **Software & Technical expertise:**
 - Office Applications – Microsoft Office (Word, Excel, PowerPoint), Mac OS (Keynote), LATEX scripting
 - Operating Systems – Windows 2000/XP/7, Linux/Unix, Mac OS 10+
 - Programming Languages – C, C++, FORTRAN
 - Web Development – HTML, XML, JavaScript, Python

Selected Talks:

- Talk on “Jet-h correlations with identified associated particles” in ALICE Jet workshop, Jan. 15-16th, 2016 held at **Lawrence Berkeley National Laboratory (LBNL), Berkeley, California, USA**.
- Invited talk on “(Anti-)(hyper-)nuclei production and exotica searches at LHC” in Workshop on High Energy Physics Phenomenology (WHEPP 2015), Dec. 4th -13th, 2015 held at **Indian Institute of Technology Kanpur, India**.
- Invited Plenary Talk as Resource Person on “ALICE results at LHC energies” National Seminar on Nuclear, Astro and High Energy Physics (NSHEP- 2015), October 29-30, 2015, **Department of Physics, Kuriakose Elias College, Mannanam, Kottayam, Kerala, India**.
- Talk on title “Results from (anti-)(hyper-)Nuclei Production and Searches for Exotic Bound States with ALICE at the LHC” in 25th International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter conference, Sept. 26th - Oct. 3rd, 2015 at **Kobe, Japan**.
- Nuclear Physics Seminar on “(Anti-)(hyper-)Nucleus Production with ALICE at the LHC” in the **Department of Physics and Astronomy, University of Tennessee, Knoxville, TN, USA**, March 23rd, 2015.
- Nuclear Physics Lecture/Seminar on “Review of (anti-)(hyper-)Nuclei Production and Search for Exotic States with ALICE at the LHC in the **Faculty of Physics, University of Warsaw, Poland**, March 13th, 2015.
- Invited talk on “(Anti-)(hyper-)Nucleus Production with ALICE at the LHC” at **Brookhaven National Laboratory (BNL), Upton, NY, USA** on March 6th, 2015.
- Invited talk on “Review of (anti-)(hyper-)Nuclei Production and Search for Exotic Baryon States with ALICE at the LHC” in the International Conference on Discovery Physics at the LHC (Kruger2014), December 1-6, 2014 at **Kruger, South Africa**.

- Invited talk on “Overview talk of ALICE results” in the 81st Annual Meeting of the APS Southeastern Section (SESAPS 2014), November 12-15, 2014 at **University of South Carolina, Columbia, South Carolina, USA**.
- Invited talk on “Anti-nuclei study in the ALICE experiment”, December 20, 2011 at **Physics Department, Brookhaven National Laboratory (BNL), NY, USA**.
- Plenary Flash talk on title “Production of nuclei and antinuclei in pp and Pb-Pb collisions with ALICE at the LHC” in 22nd International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter conference, May 22-28, 2011 at **Annecy, France**.
- Talk on “Light nuclei and anti-nuclei production in pp and Pb-Pb collisions with ALICE” in International Conference on Strangeness in Quark Matter 2011, September 18-24, 2011 at **Cracow, Poland**.
- Presented poster on “Anti-Matter production in pp and Pb-Pb collisions” in 105th LHC Experiments Committee (LHCC) meeting 2011, March 23-24, 2011 at **CERN, Switzerland**.
- Presented talk on “Production of antinuclei in pp collisions at $\sqrt{s} = 7$ TeV with ALICE at the LHC” in 6th International Conference on Physics and Astrophysics of Quark Gluon Plasma (ICPAQGP) 2010, December 05-10, 2010 at **Goa, India**.
- Poster on “Photon Multiplicity Detector in ALICE experiment at CERN-LHC” in 19th International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter conference, March 29 - April 4, 2009 at **University of Tennessee, Knoxville, TN, USA**.
- Presented poster on title “Investigation of high p_T events in Nucleus-Nucleus collisions using the Hijing event generator” in 20th International Conference on Ultra relativistic Nucleus-Nucleus Collisions - Quark Matter conference, February 4-10, 2008 at **Jaipur, India**.

Selected List of Publications:

The below list is a selected list. For full *list of publications*, please see:

http://inspirehep.net/search?ln=en&p=a+natasha+sharma&of=hb&action_search=Search&sf=earliestdate&so=d)

1. “Disappearance of the Mach Cone in heavy ion collisions”, C. Nattrass, **N. Sharma**, J. Mazer, M. Stuart and A. Bejood, Phys. Rev. C 94, no. 1, 011901 (2016).
2. “Background subtraction methods for precision measurements of di-hadron and jet-hadron correlations in heavy ion collisions”, **N. Sharma**, J. Mazer, M. Stuart and C. Nattrass, Phys. Rev. C 93, no. 4, 044915 (2016).
3. “Thermal Model Description of Collisions of Small Nuclei”, J. Cleymans, B. Hippolyte, H. Oeschler, K. Redlich and **N. Sharma**, arXiv:1603.09553 [hep-ph].
4. “Results from (anti-)(hyper-)nuclei production and searches for exotic bound states with ALICE at the LHC”, **N. Sharma** for the ALICE Collaboration, Accepted by Nuclear Physics A, arXiv:1602.02173 [nucl-ex].
5. “Production of light nuclei and anti-nuclei in pp and Pb-Pb collisions at energies available at the CERN Large Hadron Collider”, J. Adam et al. (ALICE Collaboration), Phys. Rev. C 93, 2, 024917 (2016).
6. “Precision measurement of the mass difference between light nuclei and anti-nuclei”, J. Adam et al. (ALICE Collaboration), Nature Phys. 11, no. 10, 811 (2015).
7. “ ${}^3_\Lambda\text{H}$ and anti- ${}^3_\Lambda\text{H}$ production in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV”, J. Adam et al. (ALICE Collaboration), Phys. Lett. B 754, 360 (2016).
8. “Search for weakly decaying anti- (Λn) and $\Lambda\Lambda$ exotic bound states in central Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV”, J. Adam et al. (ALICE Collaboration), Phys. Lett. B 752, 267 (2016).
9. “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**, Advances in High Energy Physics 2015, 349013 (2015), 20.
10. “Antimatter production in proton-proton and heavy-ion collisions at ultra-relativistic energies”, J. Cleymans, S. Kabana, I. Kraus, H. Oeschler, K. Redlich, and **N. Sharma**, Phys. Rev. C 84, 054916 (2011), arXiv:1105.3719 [hep-ph].

11. "Particle Production in p-p and Heavy Ion Collisions at Ultrarelativistic Energies", J. Cleymans, S. Kabana, I. Kraus, H. Oeschler, K. Redlich, and **N. Sharma**, PoS KRUGER 2010 043 (2011), arXiv:1107.0450 [hep-ph].
12. "Production of nuclei and antinuclei in pp and Pb-Pb collisions with ALICE at the LHC", **N. Sharma** for the ALICE Collaboration, J. Phys. G G38, 124189 (2011), arXiv:1109.4836 [nucl-ex].
13. "Light nuclei and anti-nuclei production in pp and Pb-Pb collisions with ALICE", **N. Sharma** for the ALICE Collaboration, Acta Physica Polonica B Proceedings Supplement 5, 605 (2012).
14. "Production of antinuclei in pp collisions at $\sqrt{s} = 7$ TeV with ALICE at the LHC", **N. Sharma** for the ALICE Collaboration, arXiv:1104.3311 [nucl-ex] (Proceedings ICPAQGP 2010, Goa, India).
15. "Installation and commissioning of ALICE Photon Multiplicity Detector", **N. Sharma** et al. for the ALICE Collaboration, Proceedings of the DAE Symposium on Nucl. Phys. 55, 694 (2010).
16. "Characteristics of Photon Multiplicity Detector Modules in the ALICE Experiment", **N. Sharma** et al., for the ALICE Collaboration, Proceedings of the DAE Symposium on Nucl. Phys. 55, 696 (2010).
17. "Test results on the ALICE photon multiplicity detector modules with electron and pion beams at CERN", A. K. Dash, S. Jena, S. K. Prasad, M. M. Mondal, **N. Sharma**, S. Sharma, and R. Singh (for the ALICE-PMD Collaboration), Proceedings of the International Symposium on Nuclear Physics 54, 670 (2009).
18. "Investigation of high pt events in Nucleus-Nucleus collisions using the Hijing event generator", **N. Sharma** and Madan M. Aggarwal, Indian J. Phys. 85, 971 (2011).
19. "Charged-particle multiplicity density at mid-rapidity in central Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV", K. Aamodt et al. (ALICE Collaboration), Phys. Rev. Lett. 105, 252301 (2010).
20. "Elliptic flow of charged particles in Pb-Pb collisions at 2.76 TeV", K. Aamodt et al. (ALICE Collaboration), Phys. Rev. Lett. 105, 252302 (2010).
21. "Transverse momentum spectra of charged particles in proton-proton collisions at $\sqrt{s} = 900$ GeV with ALICE at the LHC", K. Aamodt et al. (ALICE Collaboration), Phys. Lett. B 693, 53 (2010).
22. "Midrapidity antiproton-to-proton ratio in pp collisions at $\sqrt{s} = 0.9$ and 7 TeV measured by the ALICE experiment", K. Aamodt et al. (ALICE Collaboration), Phys. Rev. Lett. 105, 072002 (2010).
23. "Charged-particle multiplicity measurement in proton-proton collisions at $\sqrt{s} = 0.9$ and 2.36 TeV with ALICE at LHC", K. Aamodt et al. (ALICE Collaboration), Eur. Phys. J. C68, 89 (2010).
24. "First proton-proton collisions at the LHC as observed with the ALICE detector: Measurement of the charged particle pseudorapidity density at $\sqrt{s} = 900$ GeV", K. Aamodt et al. (ALICE Collaboration), Eur. Phys. J. C65, 111 (2010).
25. "Two-pion Bose-Einstein correlations in pp collisions at $\sqrt{s} = 900$ GeV", K. Aamodt et al. (ALICE Collaboration), Phys. Rev. D 82, 052001 (2010).
26. "Higher harmonic anisotropic flow measurements of charged particles in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV", K. Aamodt et al. (ALICE Collaboration), Phys. Rev. Lett. 107, 032301 (2011).