Curriculum Vitae

Name	:	Victor Roy
Gender	:	Male
Date of Birth	:	22nd February 1984
Nationality	:	Indian
Present Position	:	Assistant Professor (September 2016 - present)
Office Address	:	School of physical Sciences, Room number-113 National Institute of Science Education And Research (NISER), Bhubaneswar, India.
Email	:	victor@niser.ac.in victor.physics.pm@gmail.com
Phone	:	+91 674 249 4105

-: Academic Career :-

Degree	Subject	Year Of Passing	Institute/University
B.Sc.	PHYSICS (HONS.)	2005	University of Kalyani.
M.Sc.	PHYSICS	2007	University of Kalyani.
Pre Doctoral	PHYSICS	2008	VECC, Homi Bhaba National Institute.
PhD	Thesis Title: Dissipative Fluid Dynamics for Ultra-Relativistic Nuclear Collision. Advisor: Dr. A.K. Chaudhuri.	2008-2012	VECC, Homi Bhaba National Institute
Post Doctoral Research	Collaborator: Prof.Bedangadas Mohanty	2012-2013 (6 months)	National Institute of Science Education and Research, Bhubaneswar, India.
	Collaborator: Prof. Xin-Nian Wang	2013-2014	Central China Normal University, China.
	Alexander von Humboldt Post doctoral Fellow Collaborator: Prof. Dr. Dirk Hermann Rischke	2014-2016	Institute fur theoretische Physik Goethe Universitat Frankfurt am Main / Frankfurt Institute for advanced studies.

- Thesis URL: http://www.hbni.ac.in/phdthesis/phys/PHYS04200704003.pdf

§ Other Academic merits §

(i) Referee for international peer reviewed journal: Physical Review, Journal of High Energy Physics, European Journal of Physics and others.

(ii) Served as a guest editor for a special issue on "Collectivity in High Energy Heavy Ion Collisions" published in Advances in High Energy Physics Volume 2017,1485353

-: List of Publication :-

§ Publications in referred journals §

1. Equation of state dependence of Mach cone like structures in Au+Au collisions.

Victor Roy, A.K. Chaudhuri.

Published in **J.Phys.G 37 (2010) 035105.**

2. Transverse Momentum Spectra and Elliptic Flow in Ideal Hydrodynamics and Geometric Scaling.

Victor Roy, A.K. Chaudhuri.

Published in **Phys. Rev. C 81 (2010) 067901.**

3. Hadronic resonance gas and charged particle's p_T spectra and elliptic flow in /sqrt s = 200 GeV Au+Au collisions.

Victor Roy, A.K. Chaudhuri.

Published in **Phys. Rev. C 82 (2010) 031901.**

4. Elliptic flow (v_2) in pp collisions at energy available at the CERN Large Hadron Collider: A hydrodynamical approach.

S.K. Prasad, Victor Roy, S. Chattopadhyay , A.K. Chaudhuri.

Published in **Phys. Rev. C 82 (2010) 024909**.

5. Charged particle's elliptic flow in 2+1D viscous hydrodynamics at LHC (2.76 TeV) energy in Pb+Pb collision.

Victor Roy, A.K. Chaudhuri.

Published in **Phys. Lett. B 703 (2011) 313.**

6. Hydrodynamical analysis of centrality dependence of charged particle's multiplicity in 2.76 TeV Pb+Pb collision.

A.K. Chaudhuri, Victor Roy.

Published in **Phys. Rev. C . 84 (2011) 027902**.

7. 2+1 dimensional hydrodynamics including bulk viscosity: A Systematics study.

Victor Roy, A.K. Chaudhuri.

Published in **Phys. Rev. C. 85 (2012) 024909**.

8. Elliptic flow of thermal dilepton as a probe of QCD matter._

Payal Mohanty, Victor Roy, Sabyasachi Ghosh, Santosh K Das, Bedangadas Mohanty, Sourav Sarkar, Jane Alam, Asis K Chaudhuri.

Published in **Phys.Rev. C85 (2012) 031903**.

9. Comparison of results from a 2+1D relativistic viscous hydrodynamics model to elliptic flow of charged hadrons measured in Au-Au Collisions at $sqrt{S_{NN}}$=200 GeV.

Victor Roy, Asis K. Chaudhuri, and Bedangadas Mohanty

Published in **Phys.Rev. C86 (2012) 014902.**

10. Fluctuating initial condition and smoothening effect on elliptic and triangular flow.

Md.Rihan Haque, Victor Roy, A. K. Chaudhuri.

Published in **Phys.Rev. C86 (2012) 037901.**

11. Elliptic and Hexadecapole flow of charged hadron in viscous hydrodynamics with Glauber and Color Glass Condensate initial conditions for Pb-Pb collision at /sqrt{S_NN}=2.76 TeV

Victor Roy, Bedangadas Mohanty, and Asis K. Chaudhuri,

Published in **J.Phys. G40 (2013) 065103.**

12. Event-by-event hydrodynamical simulations for /sqrt{S_NN}= 200GeV collisions and the correlation between flow coefficients and initial asymmetry measures.

Asis K. Chaudhuri,Md.Rihan Haque, Victor Roy, and Bedangadas Mohanty.
Published in **Phys.Rev. C87 (2013) 034907.**

13. Longitudinal de-correlation of Anisotropic Flows in Heavy-ion collisions at LHC,

Long-Gang Pang, Guang-You Qin, Victor Roy, Xin-Nian Wang, G-L Ma

Published in **Phys.Rev. C91, 044904 (2015)**

14. Analytic Bjorken flow in one-dimensional relativistic magnetohydrodynamics

Victor Roy, Shi Pu, Luciano Rezzolla, Dirk Rischke

Published in **Phys.Lett. B 750 (2015) 45-52.**

15. Shear and Bulk viscosities of quark matter from quark-meson fluctuations in the Nambu-Jona-Lasinio model.

Sabyasachi Ghosh, Thiago C. Peixoto, Victor Roy, Fernando E Serna, Gastao Krein.

Published in **Phys.Rev. C93 (2016) no.4, 045205.**

16. Event-by-event distribution of magnetic field energy over initial fluid energy density in \sqrt{s_{NN}}= 200 GeV Au-Au collisions.

Victor Roy, Shi Pu

Published in **Phys.Rev.C.92,064902 (2015).**

17. Decorrelation of anisotropic flow along the longitudinal direction

LongGang Pang, Hannah Petersen, Guang-You Qin, Victor Roy, Xin-Nian Wang

Published in **Eur.Phys.J. A52 (2016) no.4, 97.**

18. Bjorken flow in one-dimensional relativistic magnetohydrodynamics with magnetization

Shi Pu, Victor Roy, Luciano Rezzolla, Dirk H. Rischke

Published in **Phys.Rev. D93 (2016) no.7, 074022.**

19. Relativistic hydrodynamics in heavy-ion collisions: general aspects and recent developments

Amaresh Jaiswal, Victor Roy

Published in **Adv.High Energy Phys. 2016 (2016) 9623034.**

20. Effect of intense magnetic fields on reduced-MHD evolution in $\sqrt{s_{NN}}=$200 GeV Au+Au collisions.

Victor Roy, Shi Pu, Luciano Rezzolla, Dirk H. Rischke

Published in **Phys.Rev. C96 (2017) no.5, 054909.**

§ Paper Communicated §

21. Magneto-vortical evolution of QGP in heavy ion collisions

Ashutosh Dash, Victor Roy, Bedangadas Mohanty

arXiv:1705.05657

Click the following web-link for the complete list of work

http://inspirehep.net/search?ln=en&p=find+a+victor+roy&action_search=Search

§ Conference & Symposium proceedings §

1. Transverse Momentum Spectra and Elliptic Flow in Ideal Hydrodynamics and Geometric Scaling.

Victor Roy, A. K. Chaudhuri.

Proceeding of the **DAE Symp. On Nucl. Phys. 55 (2010) 582**.

2. Lattice Based Equation and Transverse Momentum Spectra of Identified Particles in Ideal and Viscous Hydrodynamics.

Victor Roy, A. K. Chaudhuri.

Proceeding of the **DAE Symp. On Nucl. Phys. 55 (2010) 624.**

3. Elliptic flow (v_2) in pp collisions at LHC : A hydrodynamical approach.

S.K. Prasad, Victor Roy, S. Chattopadhyay, A.K. Chaudhuri.

Proceeding of the **DAE Symp. On Nucl. Phys. 54 (2009) 574.**

4. Charged particle p_{T} spectra and elliptic flow in a 2+1D viscous hydrodynamics including shear and bulk viscosity .

Victor Roy, A K Chaudhuri.

Proceeding of the **DAE Symp. On Nucl. Phys. 56 (2011) 844.**

5. Probing elliptic flow of QCD matter by lepton pairs.

Payal Mohanty, Victor Roy, Sabyasachi Ghosh, Santosh K Das, Bedangadas Mohanty, Sourav Sarkar, Jan-e Alam, Asis K Chaudhuri.

Proceeding of the **DAE Symp. On Nucl. Phys. 56 (2011) 856.**

6. Transport properties of the matter formed in heavy-ion collisions at the Large Hadron Collider.

Victor Roy, A K Chaudhuri.

Proceeding of the **DAE Symp. On Nucl. Phys. 56 (2011) 910.**

7. Enhancement of Elliptic flow of π^{-} under intense magnetic filed in $\sqrt{s_{NN}}$ =200 GeV Au+Au collisions : A 2+1 dimensional reduced-MHD model study

Published in Universe 3 (2017) no.4, 82.

§ Talks at Conference/ Workshop/ Symposium/ School §

1. **Transverse momentum spectra and elliptic flow in ideal hydrodynamics and geometric scaling.**

The Berkeley School of Collective Dynamics in High Energy Heavy Ion Collision, June 7-11, 2010, LBNL, California, USA.

2. **Transverse momentum spectra and elliptic flow in heavy ion Collision using ideal hydrodynamics and geometric scaling.**

QCD in the medium-2010, University of Calcutta, Kolkata, India. October 4-6, 2010.

3. **Charged particles' p_T spectra and elliptic flow in $\sqrt{s}$=200 GeV in Au+Au collisions: QGP vs. hadronic resonance gas.**

6th International conference on Physics and Astrophysics of Quark Gluon Plasma-2010 , Goa, India December 5-10, 2010.

4. **Initial energy density scaling and transverse momentum spectra and elliptic flow of charged particles in $\sqrt{s}$=200 GeV Au+Au collisions.**

DAE Symposium on Nuclear Physics, BITS, Pilani, Rajasthan, December 20-24, 2010.

5. **The effect of shear and bulk viscosity on charged hadron p_T spectra and v_2 in heavy ion collision: A hydrodynamic model study.**

Free Meson Seminar, Tata Institute of Fundamental Research, Mumbai, 19-24, September, 2011.

6. **Transport Coefficient in Heavy Ion collision.**

International School for High Energy Nuclear Collision, CCNU, Wuhan, China, 31st October-5th November, 2011.

7. **The effect of temperature dependence of bulk viscosity on charged hadron p_T spectra and v_2 in heavy ion collision.**

7th International Workshop on Critical Point and Onset of Deconfinement, Institute of Particle Physics, Wuhan, China, 7-11 November, 2011.

8. **Charged particle p_T spectra and elliptic flow in a 2+1D viscous hydrodynamics including shear and bulk viscosity.**

DAE Symposium on Nuclear Physics, December 26-30, 2011, Andhra University, Visakhapatnam, India.

9. Plenary talk: **Implementation of bulk viscosity in 2+1D viscous hydrodynamics.** Twelfth Workshop on High Energy Physics Phenomenology, January 2-15, 2012, Mahabaleshwar, India.

10. **Recent progresses in viscous hydrodynamics and the shear viscosity of QGP**.

The fourth Asian Triangle Heavy Ion Conference (ATHIC), Nov 14-17, 2012, Pusan, South Korea.

11. **Flow fluctuation and correlation from E-by-E hydrodynamics and transport model**.

2^{nd} workshop on initial fluctuations and final correlations, August 11-14, 2013, Chengdu, China.

12. **Flow fluctuation and event plane correlation from E-by-E hydrodynamics and transport model**.

New frontiers in QCD, November 18- December 6, 2013, Kyoto, Japan.

13. Longitudinal de-correlation of Anisotropic Flows in Heavy-ion collisions at LHC

Transport Meeting, Goethe University, Frankfurt, Germany. March 6, 2015.

14. Invited talk: **Mini-Review talk on Hydrodynamics in QCD**

DAE-BRNS High Energy Physics Symposium, New Delhi, India, December 2016.

15. Invited talk: E**ffect of intense magnetic field in high energy heavy ion collisions**

The 10th Bolyai-Gauss-Lobachevsky conference, Gyöngyös, Hungary, August, 2017.

Physics group seminars at VECC

1. **Equation of state dependence of Mach cone like structures in Au+Au collisions.**

21^{st} August 2009.

2. **Lattice based equation of state and transverse momentum spectra of identified particles in ideal and viscous hydrodynamics.**

13^{th} July 2010.

§ School/ Conference/ Symposium/ Workshop participated §

1. *20th International Conference on Nucleus-Nucleus Collision, Quark Matter*, February 4-10, 2008. Jaipur, India.

2. *QGP Meet 2008*, November 25-27, 2008. Variable Energy Cyclotron Centre, Kolkata, India.

3. *Physics with FAIR-2010*, March 6-8, 2010 Variable Energy Cyclotron Centre, Kolkata, India.

4. *The Berkeley School of Collective Dynamics in High Energy Heavy Ion Collision*, June 7-11, 2010, LBNL, California, USA.

5. *QCD in the medium-2010*, October 4-6, 2010. University of Calcutta, Kolkata, India.

6. *Workshop on Physics of Quark Gluon Plasma at RHIC*, December 3-4, 2010, Goa, India.

7. *International conference on Physics and Astrophysics of Quark Gluon Plasma-2010*. December 5-10, 2010, Goa, India.

8. *DAE Symposium on Nuclear Physics*, December 20-24, 2010, BITS, Pilani, Rajasthan.

9. *International School on High-Energy Nuclear Collisions (SCHOOLNP2011),* October 31st- November 5th, 2011, Wuhan, China.

10. *7th International Workshop on Critical Point and Onset of Deconfinement,* November 7-11, 2011, Wuhan, China.

11. *DAE Symposium on Nuclear Physics,* December 26-30, 2011, Andhra University, Visakhapatnam, India.

12. *Twelfth Workshop on High Energy Physics Phenomenology*, January 2-15, 2012, Mahabaleshwar, India.

13. *Quark Matter 2014, Darmstadt, Germany.*

14. *DAE-BRNS High Energy Physics Symposium, New Delhi, India, December 2016.*

15. *The 10th Bolyai-Gauss-Lobachevsky conference, The Károly Róbert Campus of the Eszterházy Károly University, Gyöngyös, Hungary, August 21-26, 2017.*

-: Research Activities :-

§ Present Research Interest §

Almost all of the available experimental data and their interpretation from theoretical model studies indicate that a strongly coupled state of Quark Gluon Plasma (QGP) is produced in high-energy heavy ion collisions. The experiments in this direction is currently going on at Relativistic Heavy Ion Collider (RHIC near New York) and at Large Hadron Collider (LHC near Geneva). QGP is a transient state of almost free quarks and gluons (the ultimate constituent of all nuclei), which last for very short period of time ($\sim 10^{-23}$ seconds) after its creation when two heavy nuclei collides at high energies. According to Quantum Chromo Dynamics (the theory of strong interaction), one can never separate a single quark from the parent hadron because of confinement. But in some special situations we can make them almost free. This then will enable us to study some interesting properties of this fundamental constituent of all visible matter. Not only this, QGP provide us some exotic state of matter which mankind so far has achieved in any laboratory experiments. It is the hottest man made object, for high energy heavy ion collisions we create the most intense magnetic field known in the present day universe, according to present understanding QGP has the lowest value of specific shear viscosity among all known matter (or in other words among all the known fluids it is most close to a perfect fluid). It is the brightest man made object, etc. My own research project is mainly focused on the study of this novel state of matter by using theoretical models (such as relativistic hydrodynamics) and existing experimental data. There is various aspect of studying such exotic matter; I have only tried to involve myself in few of them in the past and also pursuing in the present. Below I give brief outline of my present and past research experience.

Application of Magneto-hydrodynamics in Heavy Ion collisions

In the recent time it was theoretically estimated that the intensity of magnetic field produced in off-central (when the distance between two colliding nucleus at closest approach is non zero) heavy ion collision is $\sim 10^{18}$ Gauss. This is the highest known magnetic field in the present day universe. The reason for this high magnetic field is the ultra relativistic velocity of the two positively charged nucleons, which is equivalent to a huge current. In such strong magnetic field many interesting phenomenon can happen. One of such theoretical prediction is Chiral Magnetic wave and Chiral separation effect. Which is basically the separation of left and right handed fermions in presence of strong magnetic filed, which in turn produce a electric charge separation in the produced nuclear matter. The effect of the magnetic filed on the above-mentioned phenomenon largely depend on the lifetime of such high magnetic field. Without any other feedback the large magnetic field in heavy ion collision only last for a fraction of total life time of the plasma phase. But we really need to consider the finite electric conductivity of the plasma and should perform a full magneto-hydrodynamics analysis to get the estimate of how long the high magnetic field can sustain in the plasma. At the present we are trying to estimate this lifetime of magnetic field in the plasma phase by numerically solving magneto-hydrodynamics equations for the quark gluon plasma phase. This ongoing project will also provide us an estimate of the effect of such high magnetic filed on the space-time evolution of quark-gluon-plasma.

§ Future Research Plan §

Currently we are investigating the effect of intense transient magnetic field produced in high energy heavy ion collisions. In near future we would like to write a 3(space) + 1(time) dimensional relativistic magnetohydrodynamics code. Once developed, the numerical code can be applied for further study of evolution of QGP and the effect of electromagnetic fields in heavy ion collisions. This will also help us to better understand the possible effect of strong magnetic field in the charge dependent elliptic flow coefficient as measured in recent experiments at RHIC.

As a continuation of an earlier study, we intend to calculate the spatial distribution of electromagnetic field in full 3+1 dimension for different colliding nuclei. This might be used as the initial input for the electromagnetic field in the proposed numerical magneto-hydrodynamic code.

§ Previous Research Topics §

1. Contribution to development of 2+1D viscous hydrodynamics code.

(a) Relativistic viscous hydrodynamics is used to study the space-time evolution of the matter produced in high-energy heavy ion collisions. With a few assumption and realistic input parameters, viscous hydrodynamics can explain most of the experimental measurements in heavy-ion collision, like transverse momentum dependence of particle production and elliptic flow. By treating the shear and bulk viscosity as an input to the numerical code of viscous hydrodynamics simulation one can extract the values of bulk shear viscosity by confronting the simulation results with the corresponding experimental data.

My group at Kolkata was involved in such studies of extracting the shear viscosity to entropy density ratio of the QCD medium produced in high-energy heavy ion collision. After my joining, I contributed towards including the effect of bulk viscosity in the evolution equations for the fluid as well as the necessary corrections to the distribution function. This work has been published in Physical Review C.

(b) Theoretical understanding of the viscosities tells us that shear and bulk viscosity should vary as a function of temperature. While shear viscosity to entropy density is expected to be a minimum at the cross over temperature, the bulk viscosity to entropy density ratio is expected to attain a maximum value. A realistic temperature dependence of the bulk viscosity to entropy ratio was implemented using the lattice QCD and hadron resonance gas calculations. A temperature dependent shear viscosity to entropy density ratio was implemented in later studies. This work was published in Physical Review C.

(c) Resonance decay contributions to the Pion production is an important aspect to include in calculations of particle momentum distributions in hydrodynamics model. As much as 45% of the total Pions could have come from resonance decays at RHIC energies. In earlier calculations from our group such contributions were either not considered or a overall numerical factor was multiplied (which is transverse momentum independent) to consider the effect. We have estimated the transverse momentum dependent contributions using a thermal model calculation and folded it into our viscous hydrodynamics code. This allowed for a significantly better description of the data and setting up of the initial conditions for the theory calculations.

(d) Fixing the initial conditions for our hydrodynamic simulations. The initial energy density in the transverse plane used in the hydrodynamics simulation was calculated using a two-component Glauber model. Such a model had free parameter in our calculation. The relative fraction of the contribution from soft (number of participating nucleons) and hard (number of binary collisions) and the initial energy density for zero impact parameter collisions, both of which can be fixed by reproducing the charged hadron pseudo-rapidity as a function of centrality. Details of which are published in Physical Review C.

2. Extracting the transport properties of the matter formed in heavy-ion collisions at RHIC and LHC

(a) RHIC: We have carried out a detailed investigation of the measured charged hadron elliptic flow and transverse momentum spectra for various collision centralities. Specifically, I have studied the effect of different equation of state, ideal, shear viscosity and bulk viscosity in the context of relativistic viscous hydrodynamics. Part of this systematic study has been published in Physical Review C.

(b) LHC: Recent ALICE measurement of charged hadron differential elliptic flow, p_T spectra, and transverse momentum integrated elliptic flow, charged multiplicity produced in Pb+Pb collision at mid rapidity for C.M energy 2.76 TeV per nucleon, was explained in a viscous hydrodynamics simulation. The shear viscosity to entropy density ratio was extracted based on the comparative study of theoretical simulation and the experimental data. This work has been published in Physical Review C and Physics Letters B.

3. Other theoretical studies:

(a) Collectivity in proton-proton collisions: At Large Hadron Collider energy, the expected large multiplicities suggest the presence of collective behavior even in pp collisions. Motivated by the possible measurement of this by the experimental colleagues in our centre, we carried out a hydrodynamical based approach to estimate the expected elliptic flow v_2 in pp collisions at $\sqrt{s}$ =14 TeV. v2 of π^- was found to be strongly dependent on the parton density profile inside a proton [e.g., surface diffuseness parameter (ξ)]. For ξ = 0.105 fm, v_2 is found to be positive and larger compared to that at ξ = 0.25 fm. Appreciable $v_2(p_T)$ values about 6-24% was obtained. This work is published in Physical Review C.

(b) **Dilepton production:** Penetrating probes such as direct photons, dileptons are good probes to understand the properties of the QCD matter formed in heavy-ion collisions. In a recent study we investigated the variation of elliptic flow of thermal dileptons with transverse momentum and invariant mass of the pairs for Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV. The dilepton productions from quark gluon plasma (QGP) and hot hadrons have been considered including the spectral change of light vector mesons in the thermal bath. The space time evolution has been carried out within the frame work of 2+1 dimensional ideal hydrodynamics with lattice+hadron resonance gas equation of state. We found that a judicious selection of invariant mass (M) and transverse momentum (p_T) windows can be used to extract the collective properties of quark matter, hadronic matter and also get a distinct signature of medium effects on vector mesons. Our results indicate a reduction of elliptic flow (v2) for M beyond φ mass, which if observed experimentally would give the measure of v_2 of the Partonic phase. In this work, we combined the expertise in electromagnetic probes and hydrodynamic simulations that exists at our centre. The work is published in Physical Review C.

(c) Jet-medium interaction and Mach-cone: In jet quenching, a hard QCD parton, before fragmenting into a jet of hadrons, deposits a fraction of its energy in the medium. As the parton moves nearly with speed of light, much greater that the speed of sound of the medium, quenching jet can generate Mach shock wave. We have examined the possibility of Mach shock wave formation due to jet quenching. Assuming that the deposited energy quickly thermalize, we simulate the hydrodynamic evolution of the QGP fluid with a quenching jet and subsequent particle production. Angular distribution of pions, averaged over all the jet trajectories, resembles 'conical flow' due to Mach shock wave formation. However, speed of sound dependence of the simulated Mach angles are at variance with that due to shock wave formation in a static medium or in a medium with a finite flow velocity. This work is published in Journal of Physics G.

(d) **Event Plane correlation and event-by-event hydrodynamics:**

A useful experimental observable to study the properties of the QGP is the azimuthal anisotropy of the produced hadrons in such nuclear collision. This azimuthal anisotropy is quantified by different order flow harmonics v_n. Significant flow coefficient v_n have been measured at Relativistic Heavy Ion Collider (RHIC) at Brookhaven, USA. These observations are consistent with the hydrodynamical evolution picture of the system with a very small value of shear viscosity to entropy density ratio.

In this work we have used a 3+1D relativistic hydrodynamics and a transport model. Specifically we have studied the correlation between flow harmonics v_n to the corresponding initial asymmetry e_n (n=2-5) for Au+Au and Pb+Pb collisions at RHIC and LHC energies respectively. We are using the same fluctuating initial condition for both the hydrodynamics and transport model, which is obtained from HIJING. The initial condition used in our study contains fluctuation in both transverse and longitudinal directions. This enables us to also study the correlation in the longitudinal direction. It is well known that the initial condition plays an important role for any theoretical study of the transport properties of QGP. But for the present study, we are using two different dynamical models (Hydrodynamics and Transport model) with the same initial condition. In this case we expect that it will allow us to investigate the effect of evolution dynamics on the final flow harmonics.

§ Computational and Software Skill §

I use the following computer languages and software's for my research work.

FORTRAN, C++, MATHEMATICA, Cern-Root and other necessary software's and tools used in high-energy viscous hydrodynamic simulation and physics analysis.

I am also familiar with **Linux, Unix, Mac, and Windows** Operating Systems.

§ National Level Test Qualified §

1. Joint Entrance Screening Test for PhD in Physics in Indian Research Institutes, 2007 (JEST-2007).

2. National Eligibility Test for Lectureship and Research in Indian Universities,(CSIR-UGC NET December-2007)