

Curriculum Vitae

N. Tejaswi Venumadhav
Fifth Year Undergraduate Student
Department of Physics
Indian Institute of Technology, Kanpur
Email: ntveem@gmail.com

Education

Year	Degree/Certificate	Institute/School, City	Score
July 2005-May 2010	M.Sc (Intg) Physics	Indian Institute of Technolgy, Kanpur	10/10
2005	Class XII (Board of Intermediate Education, AP)	Ratna Junior College, Hyderabad	96.8%
2003	Class X (CBSE)	Hyderabad Public School (Ramanthapur), Hyderabad	98.4%

Research Interests

- Astrophysics
- Particle Physics
- Condensed Matter Physics (Superconductivity)
- Optics
- Theoretical Physics in General

Projects Done

- **Project at IIT Kanpur (Aug 2009 - April 2010)**

Under the guidance of Prof Zakir Hossain

Abstract -

We report on the synthesis and characterization of Sb doped EuFe_2As_2 . This series is of importance because of the superconducting transition induced in the same parent compound by chemical pressure via P doping. We find that Sb enters the lattice in limited amounts, and does not suppress the SDW transition. A phase separation results when we try to make single crystalline EuFe_2Sb_2 , limiting the amount of Sb absorbed by the lattice. The Anti-Ferromagnetic transition of the Eu^{2+} ions is unaffected by this unit cell enlargement. The SDW and bad metal states below and above the high temperature transition show electronic transport analogous to that observed in other series of Pnictides.

Intermediate report available at http://home.iitk.ac.in/~ntveem/Projects/EP_Report1.pdf

- **Project at IIT Kanpur (Aug 2009 - Nov 2009)**

Under the guidance of Prof Pankaj Jain

Abstract -

Cosmic Rays are energetic particles which are incident on the Earth's atmosphere from outer space. Finding their direction is important for determining their sources. We use data from simulations (CORSIKA) of showers on the GRAPES array to deduce the direction and opening angle of the conical shower fronts. We aim to determine these from the timing information of the events themselves, and

not their distribution, as is commonly done. We explore various ways of choosing initial conditions and give expressions to be minimized to fit to different wavefront geometries.

Report available at http://home.iitk.ac.in/~ntveem/Projects/TP_report.pdf

- **Project at the Max Planck Institute for the Physics of Complex Systems in Dresden (May - July 2009)**

Under the guidance of Prof. Roderich Moessner

Abstract -

For a Bose-Hubbard dimer, we study quenches of the site energy imbalance, taking a highly asymmetric Hamiltonian to a fully symmetric one. The ramp is carried out over a finite time that interpolates between the instantaneous and adiabatic limits. We provide results for the excess energy of the final state compared to the ground state energy of the final Hamiltonian, as a function of the quench rate. We show the fate of quantum ‘self-trapping’ when the ramp is not instantaneous.

Published in Phys. Rev. B, **81**, 054305 (2010)

- **Summer Undergraduate Research Fellowship (SURF) at The California Institute of Technology, Pasadena (May - July 2008)**

Under the guidance of Prof. Re'em Sari

Abstract -

Binary systems tend to evolve towards the energy minimum defined by synchronous rotation and a circular orbit through tidal interaction between the masses. This evolution can be interrupted if the satellite has a non-zero quadrupole moment - the system can get trapped in a state where the spin and orbital rates are related by integers or half integers. This has been extensively studied in the low eccentricity limit using different models for the tidal interaction. We study this spin-orbit coupling in the limit of highly eccentric orbits. We express the torques in terms of the coefficients of the Fourier expansion of the restoring torque, known otherwise as the spin-orbit H-functions. These H-functions are computed numerically and analytic approximations are developed. This formalism is applied to different models of the tidal interaction. We then use the derived results to study probabilities of capture into spin-orbit resonances. We also briefly look at the implications of the calculations for the spin states of extra-solar planets.

Report available at http://home.iitk.ac.in/~ntveem/Projects/caltech_2008_draft_v7.pdf

- **Summer Undergraduate Research Fellowship (SURF) at The California Institute of Technology, Pasadena (May - July 2007)**

Under the guidance of Prof. Andrew Lange

Abstract -

Slabs of birefringent materials, called waveplates, are necessary optical components for CMB polarization experiments. The performance of the wave-plates was studied using a different approach from the conventional Jones matrix, which used a 4x4 matrix to represent the transformation of the radiation as it passed through the system. This makes it easier to study the combined effect of the antireflection coatings also. The performance of the waveplate was studied off axis to around 10° and over two harmonics - at 150 and 225 GHz. The effects of dielectric loss, axis tilt and finite coherence length were also studied. The performances of Crystal Quartz and Sapphire were compared at 225 GHz. The algorithm used enables a complete study of the effect of any parameter on waveplate performance.

Report available at http://home.iitk.ac.in/~ntveem/Projects/caltech_2007.pdf

- **Project under the National Initiative on Undergraduate Science, HBCSE (December 2005)**

Under the guidance of prof Annapurni Subramaniam

Performed photometric analysis of open cluster BE - 63 using data from the Hanle Telescope, Ladakh. Determined parameters of the cluster such as distance and age. The project was carried out at the Vainu Bappu Observatory at Kavalur.

Academic Achievements

2010	Awarded The President's Gold Medal for the best academic performance in the graduating class of undergraduate and dual degree programmes in all disciplines in IIT Kanpur.
2010	Awarded The General Proficiency Medal for the best academic performance in the Master of Science (Integrated) programme in Physics in IIT Kanpur.
2009	Selected for the 2010-11 International Fulbright Science and Technology award by the Institute of International Education (IIE) on behalf of the U.S. Department of States Bureau of Education and Cultural Affairs (ECA).
2009	Participated in the 3rd Asian Science Camp in Tsukuba, Ibaraki, Japan.
2009	Selected for the Academic Excellence Award by IIT Kanpur for the Academic Year 2007-08.
2008	Awarded a Summer Undergraduate Research Fellowship by the California Institute of Technology, Pasadena.
2008	Selected for the Academic Excellence Award by IIT Kanpur for the Academic Year 2006-07.
2007	Was one of three students from IIT Kanpur to be selected for the SURF programme in the California Institute of Technology, Pasadena - took part in a 10 week summer research project.
2007	Member of a three-strong team selected for the South Asia Regional finals of the International Collegiate Programming Contest 2007, organized by the ACM.
2007	Selected for the Academic Excellence Award by IIT Kanpur for the Academic Year 2005-06.
2006	Member of a three-strong team selected for the South Asia Regional finals of the International Collegiate Programming Contest 2006, organized by the ACM.
2005	Won the Silver Medal at the 36th International Physics Olympiad held in Salamanca, Spain while part of the Indian Contingent to the event.
2005	Secured an All India Rank of 5 in IIT-JEE 2005 in which more than 200,000 students appeared.
2005	Secured an All India Rank of 3 in AIEEE 2005.
2005	Secured a score of 436 out of 450 in BITSAT, conducted for admission into the Birla Institute of Technology and Science.
2005	Selected as Indian National Mathematics Olympiad Awardee and qualified for the Senior Selection Camp for the International Mathematics Olympiad 2005.
2005	Secured 96.8% in the Senior Intermediate Examination conducted by the Board of Intermediate Education, AP.
2004	Selected as Indian National Mathematics Olympiad Awardee and attended the Junior Selection Camp for the International Mathematics Olympiad 2004.
2004	Selected as a KVPY (Kishore Vaigyanik Protsahan Yojana) Scholar: Awarded the KVPY scholarship by the Dept. of Science and Technology, Govt. of India; attended a summer camp and performed a summer project as part of the programme.
2004	Secured 2400 out of 2400 in SAT II conducted by the College Board corporation and administered by the Educational Testing Service (ETS).
2004	Secured 1600 out of 1600 in SAT I conducted by the College Board corporation and administered by the Educational Testing Service (ETS).
2004	Selected for the Pratibha Award for Outstanding Students by the Andhra Pradesh State Government.
2003	Secured 98.4% and the first rank in the All India Senior Secondary Examination conducted by the Central Board of Secondary Education (CBSE).
2003	Secured All India Rank 1 in the National Science Olympiad conducted by the Science Olympiad Foundation, New Delhi.
2003	Selected for the NTSE Scholarship by the NCERT, New Delhi.

Extra Curricular Activities

- Coordinator of the Quiz Club, IIT Kanpur for the Academic Year 2007-08
- Coordinator of Online quiz events and Tesseract in Techkriti 2008 and 2009 - IIT Kanpur's Technical Festival
- Coordinator of Online events in Antaragni 2008 and 2009 - IIT Kanpur's Cultural Festival
- Secretary of the Book Club, IIT Kanpur for the Academic Year 2006-07
- Coordinator of Scimatex - the Mathematics and Science events in Techkriti 2008
- Coordinator of I-Quiz - the Quizzing events in Techkriti 2008
- Student Guide in Counselling Service, 2006
- Link Student in Counselling Service, 2006
- Pursued painting and sketching as a hobby

Unofficial Grade Sheet

Indian Institute of Technology, Kanpur

YEAR/SEM	COURSE	TITLE	UNIT	GRADE	SPI	CPI
2005-06 FIRST	CHM101N	CHEMISTRY LAB	2	A		
	ESC101N	FUNDAMENTAL OF COMPUTING	5	A		
	MTH101N	MATHEMATICS I	4	A		
	PHY102N	PHYSICS-I	4	A		
	PHI142	INTRODUCTION TO LOGIC	4	A		
	PHY101N	PHYSICS LAB	2	A		
	PE101*	MORNING EXERCISE	0	S		
					10.0	10.0
2005-06 SECOND	ESC102N	INTRODUCTION TO ELECTRONICS	5	A		
	PHY100*	INTRODUCTION TO PROFESSION	0	S		
	MTH102N	MATHEMATICS - II	4	A		
	PE102*	EVENING EXERCISE	0	S		
	PHY103N	PHYSICS - II	4	A		
	TA101N	ENGINEERING GRAPHICS	4	A		
					10.0	10.0
2006-07 FIRST	CHM201N	CHEMISTRY	4	A		
	COM200*	COMMUNICATIONS SKILLS	0	S		
	PHY224	OPTICAL PHYSICS	4	A		
	ESO202	THERMODYNAMICS	4	A		
	ESO212	FLUID MECHANICS AND RATE PROCESSES	5	A		
	MTH203N	MATHEMATICS - III	4	A		
					10.0	10.0
2006-07 SECOND	ECO201	MICROECONOMICS - I	4	A		
	PHY204	QUANTUM PHYSICS	4	A		
	PHY210	THERMAL PHYSICS	4	A		
	PHY218	OPTICS LAB	4	A		
	TA201N	INTRODUCTION TO MANUFACTURING PROCESSES	5	A		
					10.0	10.0
2007-08 FIRST	PHI449	PHILOSOPHICAL PROBLEMS	4	A		
	PHY315	MODERN PHYSICS LABORATORY	4	A		
	PHY401	CLASSICAL MECHANICS	4	A		
	PHY421	MATHEMATICAL METHODS I	4	A		
	PHY431	QUANTUM MECHANICS I	4	A		
					10.0	10.0
2007-08 SECOND	CS201	DISCRETE MATHEMATICS	4	A		
	MTH304	TOPOLOGY	4	A		
	PHY412	STATISTICAL MECHANICS	4	A		
	PHY422	MATHEMATICAL METHODS II	4	A		
	PHY432	QUANTUM MECHANICS II	5	A		
					10.0	10.0

2008-09	PHY407	SPECIAL AND GENERAL RELATIVITY	4	A		
FIRST	PHY461	EXPERIMENTAL PHYSICS I	4	A		
	PHY543	CONDENSED MATTER PHYSICS I	4	A		
	PHY552	CLASSICAL ELECTRODYNAMICS I	4	A		
	PHY611	ADVANCED QUANTUM MECHANICS	4	A		
					10.0	10.0
2008-09	PHY462	EXPERIMENTAL PHYSICS II	4	A		
SECOND	PHY524	INTRO TO ATOMIC AND NUCLEAR PHYSICS	4	A		
	PHY553	CLASSICAL ELECTRODYNAMICS II	4	A		
	PHY590	SPECIAL TOPICS IN PHYSICS	4	A		
	PHY680	PARTICLE PHYSICS	4	A		
					10.0	10.0
2009-10	PHY563	EXPERIMENTAL PROJECT I	4	A		
FIRST	PHY565	EXPERIMENTAL PROJECT II	4	A		
	PHY570	THEORETICAL PROJECT I	4	A		
	PHY613	ADVANCED STATISTICAL MECHANICS	4	A		
	PHY690E	QUANTUM DYNAMICS	4	A		
					10.0	10.0
2009-10	ECO423	FINANCIAL ECONOMICS	4	A		
SECOND	PHY566	EXPERIMENTAL PROJECT III	4	A		
	PHY568	EXPERIMENTAL PROJECT IV	4	A		
	PHY614	SPECIAL TOPICS IN QUANTUM MECHANICS	4	A		
	PHY690W	LOW DIMENSIONAL QUANTUM MANY BODY SYSTEMS	4	A		
					10.0	10.0

THE STUDENT HAS COMPLETED THE PROGRAMME IN MAY 2010

GRADING A=Excellent B=Good C=Pass D=Marginal F=Fail S=Satisfactory W=Waiver
POINTS A=10 B=8 C=6 D=4 F=2 S=substituted R=Repeated X=Unsatisfactory
SPI = Semester Performance Index CPI = Cumulative Performance Index
Max. CPI=10-0 Min. Graduating CPI B.Tech/M.Sc.(Int) = 5.0 M.Sc.(2Yr) = 6.0

Academic Office

IIT Kanpur

Asst. Registrar(ACADEMIC)