Application Form

S.N. BOSE SCHOLARS PROGRAM 2014

1. **Name:**

First name	Atul	Middle name	Singh
Surname	Arora		

2. **Male** ■ **Female** ☐

3. **Date of Birth (dd/mm/yy):** 20/11/1991

4. **Passport number:** H4822446
   Country: India
   Expiration Date: 18/06/2019
   Date Issued: 19/06/2009
   If you do not have a passport and have applied for it, mention "Applied For"

5. **Name of the University/Institution:**

6. **Address:**

Institution / University Address	Indian Institute of Science Education and Research, Mohali, SAS Nagar, Punjab - 140306	
Residential Address	4317/3 Ansari Road, Darya Ganj, New Delhi 110002	
Telephone	**Landline Number #**	**Mobile #**
	011 43542019	+91 8699413350
Alternative Telephone No.		+91 9818055646
E-mail	toatularora@gmail.com	
Skype id	toatularora@hotmail.com (works with Skype, tested in Windows 8)	

7. **Major field of study:** Physical Sciences

8. **Degree program currently enrolled in (e.g., BS, MS, B.Tech., MBBS, M.Tech., Integrated BS/MS):** Integrated BS/MS

9. **Cumulative Grade Point Average / Percentage:** 9.2

10. Expected date of Graduation (Completion of Degree): 05 (mm) 16 (yy)

11. Academic Record:

EDUCATIONAL QUALIFICATIONS (10th Standard onwards)					
Examination/ Degree	University/ Board	Institute/ College/ School	Duration (from mm/yy to mm/yy)	Subjects studied/ Specialization	Percent -age/ CGPA/ Rank
X	CBSE	Sardar Patel Vidyalaya, New Delhi	April 2007 to March 2008	Prescribed subjects; Information Technology extra	93
XII	CBSE	Sardar Patel Vidyalaya, New Delhi	April 2009 to March 2010	Physics, Chemistry, Mathematics, Biology, Computer Science	80

11. Statement of Purpose: Research interests, possible project ideas and what you hope to gain from this experience (Please restrict your response to the space given below)

Research interests:
I am interested primarily in theoretical physics, not because I don't like experimental physics, but because I find theory more challenging. Having learnt about Quantum Field Theory, I have become interested in unification and quantum gravity, even though I haven't had formal courses on the latter two.
More recently I have become interested in Quantum Optics, both its theoretical and practical aspects, for numerous reasons. Other than the fascination with light (and its quanta, the photon), it seems particularly attractive because of its connection with apparently diverse topics such as quantum field theory, fundamentals of quantum mechanics and quantum computation & information all of which I have had the privilege of studying in some detail and find interesting in themselves.
I have also been and still am interested in Quantum Computation in itself. Building a functional quantum computer being the obvious most interesting practical problem. The more specific area of Quantum Simulation had also been a source of fascination.

Possible Project Ideas:
Unification and Quantum Gravity: Since I haven't had formal courses on these topics yet, I suppose I will attempt reading the texts & papers, and begin exploring from there on.
Quantum Optics: I am currently doing a course on Quantum Optics and would by the end of it be in a better position to discuss ideas.
Quantum Computation: I would like to contribute to the construction of a quantum computer, hopefully in a sensible way.

What I hope to gain from this experience: To learn how to explore new areas of a subject (theoretical) and gain hands on experience with performing cutting edge experiments in the field (practical), under the guidance of experts in the field. The research atmosphere and opportunity would be pivotal to encouraging my pursuit of research, even after the programme.

13. Research experience, technical background, other internships, courses, lab work, techniques exposed to and past lab experience (Please restrict your response to the space given below)

Internships/Experience:

Summer 2014, Intern, *Indian Institute of Science Education and Research*, Mohali, The project involved reading of books and papers, followed by reproducing the results of a paper (quantum simulation algorithm) using a quantum computer simulator and an independent discovery of a simple quantum algorithm to simulate mixed states (this result was however already known). I was guided by Prof. Arvind and had helpful discussions with Dr. Sudipta Sarkar and Dr. Abhishek Choudhury.

Monsoon 2013, School, *National Centre for Biological Sciences*, Bangalore, Participated in a Monsoon School on Physics of Life where we treated selected biological phenomena with physical rigor, headed by Dr. Mukun Thattai

Summer 2013, Intern, *National Physical Laboratory*, New Delhi, Worked on setting up an experiment to study dynamics of a two dimensional magnetic dipole lattice, with Dr. Ravi Mehrotra. This involved instrumentation and extensive vision programming.

Winter 2012, Intern, *Indian Institute of Science Education and Research*, Mohali, Studied Quantum Mechanics from J.J. Sakurai, under the guidance of Prof. Jasjeet Bagla and created a corresponding LaTeX report.

Summer 2012, Intern, *Indian Institute of Science Education and Research*, Mohali, Studied Group Theory and Linear Algebra for understanding Symmetry, under Prof. Kapil Hari Paranjape. A brief introductory understanding of the Knot Theory was also undertaken. LaTeX was learnt during this period, to be able to efficiently communicate via the internet

Summer 2011, Intern, *Indian Institute of Technology*, Bombay, Worked on Image Recognition techniques using OpenCV, for Yarn Fault detection under the supervision of Prof. Anirban Guha. This was an extension to an IIT alumni's Masters thesis and involved understanding of OpenCV to be able to solve the problem at hand.

Projects (description truncated):

Sem VI 2014, Drawdio, What is Drawdio: ``Imagine you could draw musical instruments on normal…
Summer 2013, Nazar Band, A face recognition system built using OpenCV with the aim …
Sem III 2012, Opportunity Cell Website, Team Project, A centralized web portal for the …
Sem III 2012, Fly Count Assister, For easing the task of counting flies (Biology experiment)…
Sem III 2012, NaveenTantra, Team Project, An Online Election system, based on a novel…
Summer 2012, Telescope, Team Project, Newtonian Reflection Telescope for observing …
Sem II 2012, Capacitive Touch Sensor, Sensitive enough to measure changes in PicoFarads..
2010-11, Chatur Chaalak, Developed with the aim of application in robotics, this project was …
2010, Live GSM, This was an attempt at controlling a phone using a microcontroller, to be …
Class XII 2010, 3D Modelling and Animation, Imitated the `21st Century FOX' animation and …
Class XI-XII 2009-10, Space Race, This game was developed using OpenGL to ensure …
Class XI 2009, Robotic Rescue Vehicle (RRV), It was designed using auto-mobile parts such...
Class X 2008, Math Project, A calculator built using micro-controllers, to verify the property…
Class IX 2006, ALive City 2 - DirectX 9.0, My second attempt at game making; this was…
Class VIII 2005, Motion Detection - Image Processing, This program was developed to save…
Class VIII 2005, ALive City - DirectX 8.0, My first computer graphics 3D project, a simple…
Class VII 2004, Edge Detecting Robot, Built using stepper motors and a microprocessor,…
Class VII 2004, AT Keyboard Interface, Built using the 8051 series of Microcontrollers and…
Class VII 2004, School Bell Scheduler 2, This application was re-written in Visual Basic.NET…
Class VI 2003, School Bell Scheduler, A program, written in Visual Basic 6, for automating …

Computer Techniques

OSs: Windows, Linux (Ubuntu, OpenSuse, Slackware),
Languages: Basic, C, C++, C#, Python, Javascript, SQL, HTML, PHP, LaTeX
Applications: LyX Visual Studio, Sublime Text, Microsoft Office (Word, Powerpoint, Outlook, OneNote, Excel), CorelDraw, Git, Sony Vegas, Autodesk Maya, GNU plot, SolidWorks, FL Studio, Sound Forge

14. References (One of the referees should be your teacher/tutor. In case you have completed a training/internship in any lab, a reference from your supervisor there would be preferred. The references should be provided on the official letter-heads of the Referees).

Details	Reference 1	Reference 2
REFERENCES (Please furnish details of persons who can provide an assessment of your suitability for this internship)		
Name of Referee: **Designation:** **Organisation:** **Email id:** **Phone number:**	Prof. Arvind Professor IISER Mohali arvind@iisermohali.ac.in +91 9888564456	Prof. Sudeshna Sinha HOD Physics, Professor IISER Mohali sudeshna@iisermohali.ac.in +91 9915662755
Relationship with Applicant	Instructor/Project Supervisor	Instructor

16. Supporting Documentation check-list:

Current transcript (Latest Marks sheet) ☐

Two letters of recommendation from a
faculty member, advisor or lab supervisor on their official letterhead
[These will be sent separately] ☐

No objection certificate from Parent Institution
(in the format provided in S.No. 16) ☐

Scanned copy of first and last page of passport ■

भारत गणराज्य REPUBLIC OF INDIA

REPUBLIC OF INDIA

THESE ARE TO REQUEST AND REQUIRE IN THE NAME OF THE PRESIDENT OF THE REPUBLIC OF INDIA ALL THOSE WHOM IT MAY CONCERN TO ALLOW THE BEARER TO PASS FREELY WITHOUT LET OR HINDRANCE AND TO AFFORD HIM OR HER, EVERY ASSISTANCE AND PROTECTION OF WHICH HE OR SHE MAY STAND IN NEED.

BY ORDER OF THE PRESIDENT OF THE REPUBLIC OF INDIA

एन० के० वर्मा/N. K. Verma
अधीक्षक /Superintendent
क्षेत्रीय पासपोर्ट कार्यालय
दिल्ली/Delhi
Regional Passport Office/Delhi

भारत गणराज्य REPUBLIC OF INDIA

टाईप / Type	P
राष्ट्र कोड / Country Code	IND
पासपोर्ट न./ Passport No.	H4822446
उपनाम / Surname	ARORA
दिया गया नाम / Given Name(s)	ATUL SINGH
राष्ट्रीयता / Nationality	INDIAN
लिंग / Sex	M
जन्मतिथि / Date of Birth	20/11/1991
जन्म स्थान / Place of Birth	DELHI
जारी करने का स्थान / Place of Issue	DELHI
जारी करने की तिथि / Date of Issue	19/06/2009
समाप्ति की तिथि / Date of Expiry	18/06/2019

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पिता / कानूनी अभिभावक का नाम / Name of Father / Legal Guardian

ASSA SINGH ARORA

माता का नाम / Name of Mother

TAJINDER ARORA

पति या पत्नी का नाम / Name of Spouse

पता / Address

4317/3 ANSARI ROAD

DARYA GANJ

NEW DELHI 110002

पुराने पासपोर्ट का नं. और इसके जारी होने की तिथि एवं स्थान / Old Passport No. with Date and Place of Issue

फाईल नं./ File No.

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