

Application Summary

Name

Title: Mr
Family Name: Arora
First Name: Atul
Middle Name: Singh
Additional Middle Name:
Previous Name(s), if changed:
Previously attended, or attending, the University of Leeds?: No
Start and end dates of your course: (N/A)
9 digit student id number, if known: (N/A)
Previously applied to The University of Leeds: No

Planned Course of Study

Planned Course of Study: PhD Physics & Astronomy (Physics) Full-time
Proposed Start Date: 15 September 2016
How did you learn about the University of Leeds: Prospects Website
Representative who helped you with your application:
Can this representative contact you on our behalf? (N/A)
Other institution(s) you have applied to:

Permanent Home Address

Address Line 1: 4317/3 Ansari Road
Address Line 2: Darya Ganj
Address Line 3:
City: New Delhi
Post/Zip Code: 110002
Country: India
Telephone Number: +919056196709
Mobile Phone Number: +918699413350

Correspondence Address

Address Line 1: 4317/3 Ansari Road
Address Line 2: Darya Ganj
Address Line 3:

City: New Delhi
Post/Zip Code: 110002
Country: India
Telephone Number: +919056196709
Address valid from: 12 October 2015
Address valid until: 15 September 2016

Personal Information

Email Address: toatularora@gmail.com
Gender: Male
Ethnicity: Asian/Asian British - Indian
Date of Birth: 20 November 1991
Disability Details:
Disability that may require special arrangements:
Criminal Convictions: No
Country of Birth: India
Country of Nationality: India
Country of Domicile: India
Residency status: Overseas Rated Student
Passport Number: H4822446
Place passport was issued: India
Passport Expiration Date: 18 Jun 2019
Paying own academic fees: No
Paying Full/Part: (N/A)
Sponsor: Applying for the Commonwealth Scholarship & the LIRS
Paying own living costs: No
Paying Full/Part:
Sponsor: Applying for the Commonwealth Scholarship & the LIRS
Approached for sponsorship: Commonwealth Scholarship & the LIRS

Previous/Current Education

Institution Code: X93336
Institution Name: IISER Mohali
Address Line 1: Sector 81
Address Line 2: SAS Nagar
Address Line 3: Punjab
City: Mohali
Post/Zip Code: 140306
Country: India
Institution Attended From: August 2011
Institution Attended End Date: June 2016
Qualification: Master of Science
Main subject(s): Physics
Degree classification/grade obtained: A

English Language

Proficiency

Test: TOEFL Internet Test Overall
Score: 117
Date taken: September 2015

Test: TOEFL Internet Test Reading
Score: 28
Date taken: September 2015

Test: TOEFL Internet Test Listening
Score: 30
Date taken: September 2015

Test: TOEFL Internet Test Speaking
Score: 29
Date taken: September 2015

Test: TOEFL Internet Test Writing
Score: 30
Date taken: September 2015

IELTS (Academic)
qualification, please supply
the Test Report Form
Number:

English Language
qualifications not listed
above:

English Language test still to
be taken:

Employment History

Employer 1

Employer Name:

Employer Address:

Employment Job Title:

Employment Dates:

Employer 2

Employer Name:

Employer Address:

Employment Job Title:

Employment Dates:

Area of Research

Brief Description of Research: Foundations of Quantum Mechanics and Quantum Field Theories; Bohmian Mechanics; Quantum Computation and Simulation

Specific Research Proposal: Title: Foundations of Quantum Mechanics and Quantum Field Theory Abstract/Proposal: To even talk about the foundations of Quantum Mechanics (QM) is an embarrassing condition for a physical theory. The founders of QM were able to abstract out

the practically relevant from the philosophical implications. This forced them to have 'observers' play a pivotal role in the axioms of the theory. More precisely, the theory explicates how the system will evolve if it is not 'observed' and also how it evolves upon being 'observed'. This has been among the main focus of analyzing the foundations of the subject, for the theory fails to tell us precisely what being observed means; this maybe rephrased as that the theory fails to tell which type of evolution to use without any ad-hoc reference to observers. This has been studied in great depth in the past and is still an active area of research; foundations of Quantum Field theories on the other hand is still not as popularly studied. However, even if we are able to arrive at an answer to this question, there are atleast two other rather mysterious aspects at the heart of the theory worth exploring. The first involves what is called a Bell's inequality. This intriguing development proved that nature is not locally real (while some claim reality maybe derived from locality and vice versa). As though this wasn't startling enough, it was shown that despite this 'non-locality', one can't send signals faster than speed of light! Infact, a recent exploration of the constraint of no-signalling has shown that this by itself is too liberal. The quantum theory is more restrictive than simply satisfying no-signalling, which has been captured in what's called "information causality". This shows a very curious relation between apparently distinct concepts and a foundational aspect of a physical theory. Another fascinating direction of research is as follows. Imagine that we were to recast QM into a probability distribution. Now it would seem obvious that if QM is to have some peculiarities, then it must arise from these distributions going negative at some point. Else, it would appear that they represent something we can already imagine in the classical world. Well, it can be shown that this is not entirely true. There can be completely positive distributions that can defy local reality, yes, using the same Bell's inequality. The key here is that the measurement here corresponds to 'very sharp observables'. The nature of these observables isn't very well understood. This is of fundamental interest because the sharpness decides the degree of classicality; this in turn relates to understanding where we define the boundary between the quantum and classical, between the system and the observer. Of course, there are various other directions one can take to explore the different fundamental aspects of QM which exist and others that might arise as we progress, however I hope I have been able to convey the excitement and relevance of the intended research project.

Separate Research Proposal?:

No

Contact Supervisor Name (if applicable):

Almut Beige

Proposed Research Supervisor:

Almut Beige

Able to attend and interview?: No

Interview dates when not available:

Referees

Referee 1

Name: Arvind
Occupation: Professor of Physics
Address: IISER Mohali, Sector 81, SAS Nagar, Mohali - 140306, Punjab, India
Email Address: arvind@iisermohali.ac.in

Referee 2

Name: Ali Asadian
Occupation: Post Doc
Address: Emmy Noether Campus, (University of Siegen), Walter-Flex-Straße 3 57072 Siegen, Germany
Email Address: asadian@physik.uni-siegen.de

Referee 3

Name and Occupation: Prof. Charanjit S. Aulakh
Address and Email Address: IISER Mohali, Sector 81, SAS Nagar, Mohali - 140306, Punjab, India aulakh@iisermohali.ac.in

Emergency Contact

Title: Mr.
Relationship: Father
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