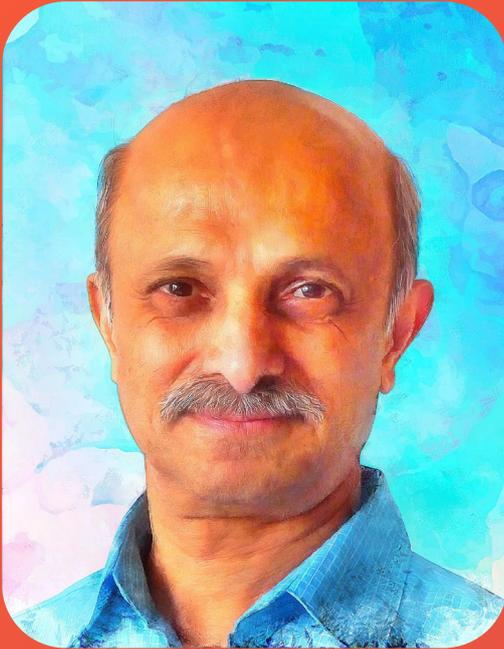




Indian Institute of Technology Madras
Office of Alumni and Corporate Relations



*Impact of
Your Giving*
**Prof. Jagadeesh
S. Moodera**





Prof. Bhaskar Ramamurthi
Director, IIT Madras

“ IITs offer a fantastic environment to learn, not only from teachers but also from each other. Every IIT student must use the four or five years they spend here to realize their full potential and excel, both academically and professionally. Our experience shows that alumni who use the opportunities provided here well, go on to flourish in ways we would not even have imagined when they were students.

We have an entire pre-incubation ecosystem on campus with a Centre for Innovation where students can walk in with an idea and walk out with a product, with facilities and funding support to progress with an idea, our research intensity therefore is growing rapidly.

The Institute will continue to focus on fundamental and translational research given the development imperative of the country and find solutions to pressing problems facing society.

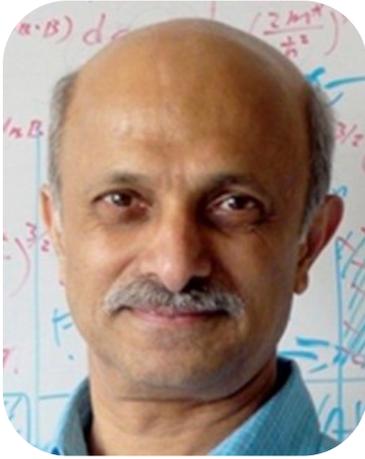
IIT Madras is proud of its global alumni diaspora and well-wishers, who are second to none in terms of their accomplishments.”



Prof. Mahesh Panchagnula
Dean, Alumni and Corporate Relations
IIT Madras

“ *Heartfelt thanks to Prof. Jagadeesh S. Moodera from IIT Madras.*

Our aim to provide continued solutions to social problems on a global scale is realised through the sustained support of alumni such as you. We thank you for your contribution as we present a report of its impact. We hope to continue receiving your help and support for our future endeavours to take IIT Madras to the global stage.”



Prof. Jagadeesh S. Moodera

Ph.D, Department of Physics, Batch of 1978

*Senior Research Scientist, Physics Department
Plasma Science and Fusion Center
Massachusetts Institute of Technology*

Prof. Jagadeesh S. Moodera is a senior research scientist at MIT's Francis Bitter Magnet Laboratory, where he leads a multinational team of researchers in developing a novel magnetic semiconductor that will greatly increase the computing power and flexibility of future electronic devices, while dramatically reducing their power consumption.

Prof. Jagadeesh S. Moodera received his Ph.D. in Physics from the Indian Institute of Technology Madras. In 1981, he joined the MIT research staff at the Francis Bitter National Magnet Laboratory (FBML), where he currently leads the Thin Film Magnetism, Superconductivity and Nanospintronics group. He has worked in several areas of fundamental and applied physics, involving nanospintronics, spin polarized transport and tunneling, thin film magnetism, superconductivity, and topological insulators. He was elected Fellow of the American Physical Society in 2000, and was awarded the Oliver E. Buckley Condensed Matter Prize from the American Physical Society in 2009.

Prof. Jagadeesh S. Moodera's Journey from IIT Madras



B.Sc. & M.Sc.
University of
Mysore



Ph.D.
IIT Madras



PDF
West Virginia
University



Scientist
Francis Bitter
Magnet Lab, MIT



Visiting Professor
Eindhoven University
of Technology



Adjunct Professor
Suffolk University
Boston



*Distinguished
Foreign Scientist*
CSIR-National Physical
Laboratory



*Distinguished
Alumnus*
IIT Madras

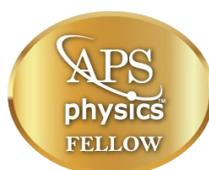
Glimpses into the Awards Received by Prof. Moodera



**Oliver E. Buckley
Condensed Matter Prize**
2009



Coorg Person of the Year
2008



American Physical Society Fellow
2000

For pioneering and sustained contributions to the understanding of spin-polarized transport in solids



IBM Research Award
1995–97



TDK Research Award
1999–2000



*Gordon Research Conferences
frontiers of science*

**Elected Chairman of the
Gordon Research Conference**



**Executive Member of
GMAG of APS**



American Competitiveness and Innovation Fellow
by National Science Foundation

Summary of Your Contributions



2018

Support to St. Anne's Institution, Virajpet, Karnataka

USD 30,000



2016

CERN
(USD 15,000)

**Chennai
Flood Relief**
(USD 2,000)

**Summer Internship,
Physics Department**
(USD 8,000)

USD 25,000



2015

**Summer Internship,
Physics Department**
(USD 30,000)

**Stipend for
Students**
(USD 4,000)

USD 34,000



2012

Gurukula Project

USD 300,000



2011

Thin Film Lab, Physics Department

USD 100,000

Support to St. Anne's Educational Institution, Karnataka

Prof. Jagadeesh Moodera's thoughtful contribution helped to fund the development of the library at St. Anne's Educational Institution, as well as a financial aid scholarship for students of the institution. We would like to thank you for this aid that will help us change the future of many underprivileged children, creating a future where education is accessible to all.



Chennai Flood Relief

IIT Madras also contributed extensively to the relief and rehabilitation of Chennai Flood Victims. A few relief measures initiated by IITM are as follows.



IITM's Reverse Osmosis plants were used to filter 5000 litres of water, which was then given to Deepam Trust, who distributed the water to residents in Taramani, along with volunteers from campus.



An IIT Madras student group distributed rations to over 2000 people from marginalised sections.

Compact Muon Solenoid (CMS) Experiment

India has been part of the Compact Muon Solenoid experimental collaboration since its inception in the early 1990s. The CMS Collaboration currently has about 3000 physicists and about 40 countries as collaborating members. The CMS began conducting collisions and analysing data in 2009. Among its stellar research milestones is the announcement in 2012 of the discovery of the Higgs boson, after which the Nobel Prize in physics was awarded to Prof. Peter Higgs for theorizing the particle's existence in the early 1970s.

In 2014, Prof. Prafulla Kumar Behera and Prof. James Frederick Libby took the initiative of joining the CMS Collaboration. The collaboration was approved by the India–CMS Collaboration early that year, following which Prof. Behera and Prof. Nagarajan (Former Dean, International and Alumni Relations) were invited to CERN and presented a detailed proposal for joining the CMS Collaboration. It was approved by the CMS collaboration board, and IIT Madras became an institute with full membership in the CMS Collaboration in November 2014—the first IIT to do so.

A research project proposal had been submitted to the Department of Science and Technology (DST), but lacked funds to initiate the research. Having approached Prof. Moodera through the Alumni Relations Office, we received a generous donation of about INR 10 lakh, which gave the project a head start. The group has showed successful progress since, and has subsequently received funding from the DST.

In late 2016, an undergraduate summer program for IITM students was initiated, and about 20 students got the opportunity of summer internships at CERN during 2015–2018. Below are photographs of Prime Minister Narendra Modi interacting with IITM students at CERN, Geneva in the summer of 2016.



The research group currently has three faculty from the Physics Department and eleven graduate students. The first student graduated from the project in October 2021, and the second student is going to submit his thesis soon.

Important Milestones Achieved by the IIT Madras CMS Research Group

Contributions towards two significant physics results published in 2020:

Measurement of the CP violating weak phase φ_s in the $B_s^0 \rightarrow J/\psi\phi \rightarrow \mu^+\mu^-K^+K^-$ channel in proton-proton collision at $\sqrt{s} = 13$ TeV

Physics Letters B, Volume 816, 10 May 2021, 136188.

The CMS Collaboration press release can be found at <https://cms.cern/news/crack-mirror>.

Measurement of the inclusive and differential Higgs boson production cross sections in the leptonic WW decay mode at $\sqrt{s}=13$ TeV

In *Journal of High Energy Physics (JHEP)*, published in 2021

Md. Albordi, who graduated in October, conducted research in the area of the first paper.

In addition to the research milestones described above, the group also hosted the [27th International Workshop on Vertex Detectors](#) at Chennai in 2018, with more than 50 international participants. The conference proceedings can be found here: <https://pos.sissa.it/348/>

The group also hoisted the [XXIII DAE-BRNS High Energy Physics Symposium](#) on campus in 2018, with more than 400 participants. Select proceedings, peer-reviewed, have been [published in Springer](#).

Upcoming Research

The IIT Madras research group, along with other groups in India and around the world, are now focusing on the silicon building detector for the CMS phase II upgrade scheduled to start in 2023. In late 2016, it received funding of about INR Rs 3.2 crore for four years from the DST, which accelerated our research. The group has established a dedicated laboratory for the precision mechanics required for the silicon detector. The prototypes it has produced have been sent to CERN for the detector's construction. IIT Madras is the only institute in the CMS Collaboration to do this. The group has also submitted a proposal for a mega science project worth Rs. 10 crore to the DST, and is expecting to receive funding in 2022.

We thank Prof. Jagadeesh S. Moodera for his generous support at the start of the project, which was instrumental in establishing the CERN research group that we see today. We are now fortunate to be one of the best experimental particle groups in India, and are striving to establish our research excellence outside India.

Summer Internship Programme – Physics Department

Prof. Moodera has supported the G.N. Ramachandran Fellowship, the Physics Department's summer internship programme designed to encourage promising young researchers. So far, eleven scholars have benefited through this Fellowship.

Name	Year Awarded	Mentor
Kunjesh Agashiwala	2015	Dr. Mahaveer Kumar Jain
Shraavan Sivasubramanian	2015	Dr. Mahaveer Kumar Jain
Vaishak Prasad	2015	Dr. Sriramkumar L.
Ayusman Acharya	2016	Dr. Prasanta Kumar Tripathy
Bhaskar Jyoti Borah	2016	Dr. Dillip Kumar Satapathi
R Gayatri	2016	Dr. C. Vjayan
S. Aravindan	2017	Dr. Prasanta Kumar Tripathy
S. Yashwanth Prabhu	2017	Dr. Jim Libby
Pragyan Pratim Bordoloi	2018	Dr. Dawood Kothawala
Ish Mohan Gupta	2018	Dr. Vaibhav Madhok
Maria Sebastian	2019	Dr. Somnath Chanda Roy



Feedback from beneficiary S. Aravindan

Summary

- **Title:** Preliminaries to AdS/CFT correspondence
- The project involved reading and working through the prerequisites of Ads/CFT correspondence.
- The prerequisites involve two parts—learning about the gravitational aspects of Anti deSitter spacetime (AdS) and the quantum field theoretical aspects of conformal field theories.
- Along the line, I also spent time reading and picking up the essential basics of quantum field theory (QFT).

Feedback

The project was a reading project in which I was expected to read up materials and discuss with my advisor Dr. Prasanta Kumar Tripathy. It was a great learning experience for me. I had very productive interaction sessions with my advisor which helped me build my background and continue further in related topics for my master thesis as well as for my PhD, which I am currently pursuing at Charles University, Prague.

I also found the program very useful because the department of Physics at IIT-M organized weekly lectures on interesting and important topics for the summer students.

I also had the opportunity to apply for and secure the G.N. Ramachandran fellowship for summer students. Overall the summer program was a great learning experience which played an important role in my further studies.

E Gurukula Fund

The interest accrued from the E Gurukula fund is used to support stipends for final-semester MA students, who undertake various responsibilities associated with the award of the stipend for a period of 6 hours per week. Some of these students also take up various requirements with the Office of Alumni and Corporate Relations. More than 50 students have been benefitted through this endowment.

List of 2020 Batch MA Students who Received Stipend

#	Roll Number	Name
1.	HS15H021	Melwin James
2.	HS15H036	Sourav Rames
3.	HS15H029	Rathnika Thomas
4.	HS15H008	Avinaash R
5.	HS15H006	Ashraya Maria
6.	HS15H009	Deva Nandan H
7.	HS15H001	Akshaya S. Kumar
8.	HS15H026	Ramya Kannan
9.	HS15H030	Rohitha Naraharisetty
10.	HS15H034	Sethu Lakshmi
11.	HS15H019	Meena C

#	Roll Number	Name
12.	HS15H041	Sunaina Bose
13.	HS15H044	Vasanthakumar B.G.
14.	HS15H012	Kamala Devi
15.	HS15H050	Sharanya Menon
16.	HS15H013	Jyotsna Jaishankar K
17.	HS15H046	Vimal George
18.	HS15H045	Vignesh K
19.	HS15H011	Guru Darshna
20.	HS15H008	Bitthal Nilotpal Sarangi
21.	HS15H038	Sridhar S
22.	HS15H005	Aparna VS

Work and Responsibilities Carried Out by the Students

Department Library Work

The above students have catalogued books and updated the library database with additional information in a spreadsheet. And along with the department's technical team, the students set up the OPAC software, which enabled easy and wide access to books available in the department library. Finally, a department library policy was charted for accessing the department library; borrowing of books etc.

Students involved: Aparna VS, Deva Nandan H, Darshna

Work at the Institute Heritage Centre

The work involved cataloguing the archives; identifying keywords for every article, photograph, and item in six issues of the Institute publication Campastimes as part of metadata generation for Centre's website; as a part of digitising institute publications, work was undertaken on Pradeep, the annual alumni magazine of IITM.

Students involved: Ashraya Maria, Akshaya S Kumar, Jyotsna Jaishankar, Meena C and Sethu Lakshmi



Book Digitising for Prospective Urban Studies Reading Centre

The students Digitised around 400 books for the proposed Urban Studies reading centre by Dr. Solomon Benjamin (Faculty at the HSS Department). Books, journal papers, journals, magazines and other material were first identified and then catalogued thematically.

Students involved: Sharanya Menon and Vimal George

Preparation of Department Exchange Guidebook

The students prepared a semester exchange guidebook for the perusal of the department students. They compiled a list of scholarships and funding opportunities available to our department students. Further, the details on Visas, accommodation, academics and other relevant information was included in the guidebook.

Students involved: Ramya Kannan, Rathnika Thomas and Kamala Devi

LaTeX Workshops

LaTeX is a standard typesetting documentation used in many domains. The sessions introduced LaTeX - document preparation, basic LaTeX commands, making a presentation using LaTeX. Further, the sessions discussed how to prepare Term Papers with citations using LaTeX in tandem with Zotero. In addition to LaTeX, a session on Introduction to R Markdown was also conducted.

Student involved: Sridhar S

Maths Study Circle

A Maths Study Circle was started to teach and help the students from junior batches primarily on mathematical and statistical concepts. Since, for the first two years in the MA programme, no mathematics courses are there, this study circle was useful in ensuring that the students were learning essential concepts. The topics dealt with were set theory; types of functions and their graphs; descriptive statistics; index numbers; probability; optimisation and two-variable calculus.

Students involved: Sourav Rames and Avinaash R

Basic Concepts Study Circle

This study circle aimed to engage with the several paradigms of social theory that shape the contours of the interdisciplinary studies undertaken by the MA students in the HSS department. The circle covered philosophical and social theories from the Greco-Roman tradition to the Enlightenment Thought.

Students involved: Rohitha and Sunaina

Academic Reading and Writing Assistance Study Circle

Sessions were conducted on writing term papers and reviewing academic articles. The sessions discussed the process of writing and creating timelines for all papers. The sessions included a detailed discussion on finding academic papers and using citation systems. The process, timeline, citations and structuring of reviews for academic papers, authors and concepts was also discussed

Students involved: Upasana Bhattacharjee

Alumni Cell

The students continued the work of previous final year batches on Alumni Cell. Apart from updating and maintaining the alumni database of the department, the students also worked on conducting alumni lectures and webinars titled Alumni Speak. They were also involved in reaching out to the alumni to set up social media groups batchwise and city/state wise. These helped in easier access of the current students to alumni in the coming years.

Students involved: Vignesh K and Melwin James

UPSC Study Circle and History & Concepts Study Circle

The students conducted multiple sessions for discussing and preparing for the UPSC and other competitive exams for both HSS department students and others. It was mainly intended for those in the final and pre-final years, although there was enthusiastic participation from other junior batches as well. Some of the topics covered in this study circle were: Current Affairs, Ancient Indian history; Indian Polity; Indian Constitution; Geography; Environment and Ecology etc

Students involved: Vasanthkumar BG, Melwin James, Sourav Rames, Bithal Niloptal Sarangi and Jyotsna Jaishankar

Thin Film Lab in Physics Department

We thank Prof. Moodera for his contribution towards the Physics Department's Thin Film Lab, which has enabled us to acquire the following instrumentation and supercharge the department's research capabilities.

Major Facilities

Measurement Facility



Teslatron PT (1.4 to 300 K, 8 T) cryogen-free cryomag system from Oxford Instruments

Purpose: Used to carry out thermal and electrical transport measurements on oxide films and nanoparticle embedded oxide films under low temperatures and high magnetic fields.

Thin Film Deposition Facility



Omicron, UHV thin film sputter deposition system from Oxford Instruments

Purpose: Used to make thin metal oxide film deposits.

Utilization and Development

- Four Ph.D students and their research have benefited from the instruments.
- Several Masters and B.Tech students from IIT Madras, as well as from other institutions (including Anna University, Meenakshi College for Women, SRM University, Central University Haryana, and MS University Baroda) have gained exposure to these advanced facilities.
- Several research papers have been published in highly rated journals based on research conducted in this lab.
- These facilities have served as the base for several research proposals.
- Dr. Abhishek Mishra has been associated with the Thin Film Laboratory.

Select Publications based on Thin Film Lab Research

Home > Applied Physics Letters > Volume 110, Issue 17 > 10.1063/1.4979838

No Access · Submitted: 20 December 2016 · Accepted: 26 March 2017 · Published Online: 24 April 2017

Observation of subwavelength localization of cavity plasmons induced by ultra-strong exciton coupling

Appl. Phys. Lett. **110**, 171101 (2017); <https://doi.org/10.1063/1.4979838>

M. Balasubrahmaniam^{1,a)}, Durgesh Kar², Prabal Sen², Prem B. Bisht², and S. Kasiviswanathan^{2,b)}

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PDF ABSTRACT FULL TEXT FIGURES CITED BY TOOLS

TOPICS

- Plasma waves
- Insulators
- Geometrical optics
- Plasmons
- Optical properties
- Semiconductors
- Electrical properties and parameters
- Excitons
- Transition metals
- Plasmonics

Article Metrics

Views **710** Citations **Crossref 8** Web of Science **ISI 8**

This work was facilitated by Dr. J. S. Moodera, Francis Bitter National Magnet Laboratory, Massachusetts Institute of Technology, USA, and supported by Mr. S. Gopalakrishnan, Co-founder, Infosys Technologies, India, under the Grant No. PHY/11-12/251/ALUM/SKAS.

<https://aip.scitation.org/doi/abs/10.1063/1.4979838>

Home > Applied Physics Letters > Volume 114, Issue 21 > 10.1063/1.5086037

No Access · Submitted: 17 December 2018 · Accepted: 10 May 2019 · Published Online: 29 May 2019

Hot electron mediated enhancement in the decay rates of persistent photocurrent in gold nanoparticles embedded indium oxide films

Appl. Phys. Lett. **114**, 211103 (2019); <https://doi.org/10.1063/1.5086037>

Prabal Sen¹, Durgesh Kar¹, Ranjit Laha², M. Balasubrahmaniam¹, and S. Kasiviswanathan^{1,a)}

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PDF ABSTRACT FULL TEXT FIGURES SUPPLEMENTAL CITED BY TOOLS

TOPICS

- Surface plasmon resonance
- Semiconductors
- Metal oxides
- Nanoparticles
- Photoconductivity
- Physical vapor deposition

Article Metrics

Views **688** Citations **Crossref 2** Web of Science **ISI 1**

This work was facilitated by Dr. J. S. Moodera, Francis Bitter National Magnet Laboratory, Massachusetts Institute of Technology, USA, and supported by Mr. S. Gopalakrishnan, Cofounder, Infosys Technologies, India, under the Grant No. PHY/11-12/251/ALUM/SKAS. All authors would like to thank them. The authors also thank Mr. Manas Ranjan Sahu for fruitful discussion.

<https://aip.scitation.org/doi/10.1063/1.5086037>

Journal of Physics: Condensed Matter

PAPER

Electrical conduction in gold nanoparticles embedded indium oxide films: a crossover from metallic to insulating behavior

Prabal Sen¹, Durgesh Kar¹, Ranjit Laha², M R Ananthan³ and S Kasiviswanathan^{4,1}

Published 17 September 2019 · © 2019 IOP Publishing Ltd

Journal of Physics: Condensed Matter, Volume 31, Number 50

Citation Prabal Sen et al 2019 *J. Phys.: Condens. Matter* **31** 505702

Article PDF

Acknowledgments

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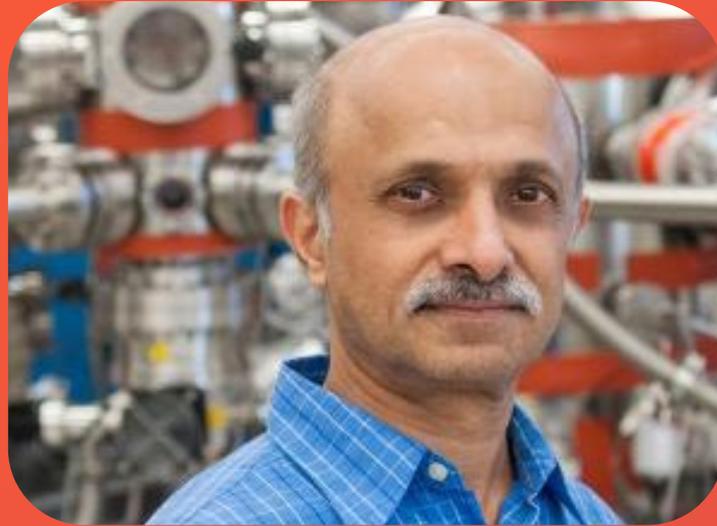
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<https://iopscience.iop.org/article/10.1088/1361-648X/ab3dlf>

We are grateful to you, Prof. Jagadeesh S. Moodera and Family!



Thank you for your sustained generosity to IIT Madras over the years. Contributors such as yourself enable our students and Professors to dream big and work towards a better and brighter future. We hope you are proud of your alma mater and how it has remained steadfastly committed to academic and research excellence during and after your time here. You and your family have been instrumental in facilitating this significant growth.

Our efforts to nurture the culture of academic excellence that is the hallmark of IIT Madras - quality education, cutting-edge research, and unfettered creativity - shall continue. We are privileged and humbled to have you and your family walking with us along this trail. We wish you and your family the best always in all walks of life!



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December 2021