

AMITAVA ADAK

Assistant Professor
Department of Physics
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EDUCATION AND PHD

- *MSc AND PhD (2009-2015)*

Institute: Tata Institute of Fundamental Research, Mumbai, India

Department: Department of Nuclear and Atomic Physics

Remarks: Passed MSc. and coursework for PhD in Physics with Distinction.

- *UNDERGRADUATE (BSc) (2006-2009)*

Subjects: Physics (Honours), Mathematics, Chemistry, Computer Programming in C

University: Jadavpur University, Kolkata, India

Remarks: Passed in First Class with Distinction

- *HIGHER SECONDARY (2004-2006)*

Board: WBCHSE

Remarks: Passed in First Division

- *SECONDARY (2002-2004)*

Board: WBBSE

Remarks: Passed in First Division

RESEARCH/TEACHING EXPERIENCE (POST-PHD)

- *Assistant Professor (March 2020-Present)*

Institute: IIT(ISM)Dhanbad, India.

- *Post-Doctoral Research Associate (Mar 2016-Feb 2020)*

Institute: JILA - University of Colorado Boulder, Colorado, USA.

- *Short term visiting fellow (Aug 2015-Jan 2016)*

Institute: Tata Institute of Fundamental Research, Mumbai, India.

RESEARCH INTEREST

Physics of high intensity laser-matter interaction in nanosecond to femtosecond regime. Ultrafast laser-plasma dynamics. Laser ablation study at plane solid and nanostructured surfaces. Warm-dense-matter science and laboratory astrophysics. High harmonic generation (HHG) and attoscience etc.

PROJECT FUNDING

1. Study of Strongly Coupled Non-Ideal Plasma States of Carbon at Extreme Conditions–DST(SERB)(357)/2022-2023/956/PHYSICS [INR 30.1 Lac]
2. Probing High Intensity Short Pulse Laser-Solid Interaction dynamics: Fundamentals and Applications–FRS(149)/2021-2022/PHYSICS [INR 15.0 Lac]

TOTAL PUBLICATIONS

Published: 29 [Nature Communications, Physical Review Letters, Nano Letters, ACS Appl. Mater. Interfaces, Nature Sci. Rep., Acta Materialia, Optics and laser technology, Optics Express, APL Photonics, Physics of Plasmas, APL, RSI etc.]

In Communication: 1

In Preparation: 3

SUPERVISION

PhD: 05 (ongoing)

M.Sc. Project: 06 (completed), 02 (ongoing)

B.Tech. Project: 03 (completed), 01 (ongoing)

PUBLICATIONS/CONFERENCE PAPERS

1. *Nonclassical plasmonic response of laser-plasma-engineered ultrasmall nearly-monodispersed clean copper nanoparticles* – Jyotsna Patra et al., **Optics & Laser Technology** **180**, 111444 (2025).
2. *Universal behavior of highly-confined heat flow in semiconductor nanosystems: from nanomeshes to metalattices* – B. McBennett et al., **Nano Letters** **23**, 2129 (2023).
3. *Luminous, relativistic, directional electron bunches from an intense laser driven grating plasma* – H. Habara et al., **Sci Rep** **12**, 16818 (2022).
4. *Structural and Elastic Properties of Empty-Pore Metalattices Extracted Via Nondestructive Coherent Extreme UV Scatterometry and Electron Tomography* – Joshua L. Knobloch et al., **ACS Appl. Mater. Interfaces** **14**, 41316–41327 (2022).
5. *Absorption of high-intensity, high-contrast femtosecond laser pulses by a dielectric solid* – Amitava Adak et al., **Plasma Phys. Control. Fusion** **63**, 094004 (2021).
6. *Measurement and control of optical nonlinearities in dispersive dielectric multilayers* – Guan Gui et al., **Optics Express** **29**, 4947-4957 (2021).
7. *Formation and evolution of post-solitons following a high intensity laser-plasma interaction with a low-density foam target* – David R. Blackman et al., **Plasma Phys. Control. Fusion** **63**, 074001 (2021).
8. *Micro-Optics for Ultra-Intense Lasers* – Hideaki Habara et al., **AIP Advances** **11**, 035214 (2021).
9. *Dependence of fast electron characteristics on the thickness of the nanocrystalline film target in intense, ultrashort laser-solid interaction* – Deep Sarkar et al., **Appl. Phys. B** **126**, 151 (2020).

10. *Two-plasmon-decay induced fast electrons in intense femtosecond laser-solid interactions* – Prashant Kumar Singh et al., **Physics of Plasmas** **27**, 083105 (2020).
11. *Probing thermal and acoustic dynamics of inverse silicon metallatices* – C. Bevis et al., **Microsc. Microanal.** **25** (Suppl 2), (2019).
12. *Observation of ex-situ microstructure relaxation of non-conventional misorientations post femtosecond laser shock exposure in cp-Ti* – Anuj Bisht et al., **Acta Materialia** **150**, 161-172 (2018).
13. *Magnetic turbulence in a table-top laser-plasma relevant to astrophysical scenarios* – Gourab Chatterjee et al., **Nature Communications** **8**, 1-5 (2017).
14. *Controlling femtosecond-laser-driven shock-waves in hot, dense plasma* – Amitava Adak et al., **Phys. Plasmas** **24**, 072702 (2017).
15. *Silicon nanowire based high brightness, pulsed relativistic electron source* – Deep Sarkar et al., **APL Photonics** **2**, 066105 (2017).
16. *Transition from Coherent to Stochastic electron heating in ultrashort relativistic laser interaction with structured targets* – G. Cristoforetti et al., **Scientific Reports** **7**, 1-8 (2017).
17. *Intense femtosecond laser driven collimated fast electron transport in a dielectric medium–role of intensity contrast* – Indranuj Dey, et al., **Optics Express** **24**, 28419-28432 (2016).
18. *Efficient transport of femtosecond laser-generated fast electrons in a millimeter thick graphite* – Amitava Adak et al., **Appl. Phys. Lett.** **109**, 174101 (2016).
19. *Probing ultrafast dynamics in a solid-density plasma created by an intense femtosecond laser* – Amitava Adak et al., **J. Phys.: Conf. Ser.** **688**, 012001 (2016).
20. *Efficient fast electron generation in an interaction of Intense, ultrashort laser with metal nanoparticle coated dielectric target* – Deep Sarkar et al., **J. Phys.: Conf. Ser.** **717**, 012077 (2016).
21. *Terahertz Acoustics in Hot Dense Laser Plasmas* – Amitava Adak et al., **Phys. Rev. Lett.** **114**, 115001 (2015).
22. *Controlling two plasmon decay instability in intense femtosecond laser driven plasmas* – Prashant Kumar Singh et al., **Phys. Plasmas** **22**, 113114 (2015).
23. *Contrasting levels of absorption of intense femtosecond laser pulses by solids* – Prashant Kumar Singh et al., **Sci Rep.** **5**, 1 (2015) 17870.
24. *Ultrafast dynamics of a near-solid density layer in an intense femtosecond laser-excited plasma* – Amitava Adak et al., **Phys. Plasmas** **21**, 062704 (2014).
25. *Ultrafast optics of solid density plasma using multicolor probes* – Prashant Kumar Singh et al., **Optics Express** **22**, 22320 (2014).
26. *High-resolution measurements of the spatial and temporal evolution of megagauss magnetic fields created in intense short-pulse laser-plasma interactions* – Gourab Chatterjee et al., **Rev. Sci. Instrum.** **85**, 013505 (2014).

27. *Direct observation of ultrafast surface transport of laser-driven fast electrons in a solid target* – Prashant Kumar Singh et al., **Phys. Plasmas** **20**, 110701 (2013).
28. *Enhanced transport of relativistic electrons through nanochannels* – Prashant Kumar Singh et al., **Phys. Rev. ST Accel. Beams** **16**, 063401 (2013).
29. *Efficient generation and guiding of megaampere relativistic electron current by silicon nanowires* – Prashant Kumar Singh et al., **Appl. Phys. Lett.** **100**, 244104 (2012).

CONFERENCES/SEMINARS/MEETINGS

1. I was an **invited speaker** at ASILS 13, the Thirteenth Biennial Asian Symposium on Intense Laser Science to be held in India during December 15-18, 2024.
2. I was **invited** to participate in the Strong Plasma Radiation Interaction Group (SPRING-II) collaboration meeting – Organized by IIT Delhi on March 9-10, 2024.
3. I participated in Industry-Institute Interaction (III) – 2024 organized by IIT(ISM) Dhanbad on Feb 03, 2024.
4. I co-organized and attended the International conference on “Advances in Spectroscopic Techniques and Materials (ASTM-2024)” – Organized by department of Physics IIT(ISM) Dhanbad on 18 - 20 January, 2024.
5. I was **invited** to deliver a talk on Nobel Prize winning work in Physics for the year 2023 – Organized by School of Chemistry, Sambalpur University on 20th January 2024.
6. Participated in National Science Day 2023 celebration (lecture series and other events) organized by the Department of Physics, IIT(ISM) Dhanbad, Jan 2023 – Mar 2023
7. I participated in Industry-Institute Interaction (III) – 2023 organized by IIT(ISM) Dhanbad on Feb 04, 2023.
8. I was **invited** to visit TIFR Mumbai during Oct 12-14, 2022 for a seminar, collaborative discussions and setting up a research collaboration on areas of common interest. (This was really productive and will have impact in future FMP).
9. I have presented an **invited talk** on ‘The extreme laser-plasma interactions’ in one week faculty development programme on **Recent Trends in Optics and Plasma Physics** organized by Department of Physics and Materials Science and Engineering of Jaypee Institute of Information Technology, Noida, UP, India from 21st to 27th July 2022.
10. I was invited to TIFR Hyderabad for a seminar and meetings for research collaboration during Dec 1 to Dec 4, 2021.
11. I was an **invited speaker** in the National Webinar on **Recent Trends in Physics (RTP-2021)** in March 2021, organized by the Department of Physics, Central University of Tamil Nadu, Thiruvavur.
12. Charged Particle Radiography in High-energy-Density Laboratory Plasmas, Princeton University, January 25-28, 2021.
13. International Workshop on Laboratory Astrophysics with Intense Laser: Particle Generation And Application, 07 December -08 December 2020.
14. 9th EPS-QEOD Europhoton Conference, 30 August - 4 September 2020.
15. NSF-STC on Real-Time Functional Imaging Retreat, Berkeley, California Jan 16-18, 2019.

16. NSF-STC on Real-Time Functional Imaging site-visit, 2017 and 2018.
17. Workshop on Plasmonics and its Application, CU Boulder, 2016.
18. I was nominated and selected to attend – **Global Young Scientist Summit (GYSS2015), Singapore**. This was a great opportunity to interact with Nobel laureates in Physics, Chemistry, Physiology or Medicine, Fields medallists, Millennium Technology Prize and Turing Award winners.
19. Presented a poster titled as – *Dynamics of hot dense plasma excited by intense femtosecond laser* in the **International Conference on Ultrahigh Intensity Lasers (ICUIL) 2014** Oct 12-17, Goa (India).
20. Gave an oral presentation titled as – *Observation of THz oscillation of a dense layer in an intense femtosecond laser-generated plasma* in the **first workshop on High Energy Density Sciences in Asia (HEDS in Asia 2014)** held during January 19-22, 2014 in Korea.
21. Gave an oral presentation titled as – *Probing ultrafast dynamics in an intense femtosecond laser-matter interaction by pump-probe spectrometry and reflectometry* in the **National Symposium On Nonlinear and Complex Phenomena** held during January 7-9, 2014 in Jadavpur University, Kolkata.
22. Presented a poster titled as – *Probing ultrafast dynamics in intense-laser-generated solid-density plasmas* in the **Eighth International Conference on Inertial Fusion Sciences and Applications (IFSA2013)** held during September 8-13, 2013 in Nara, Japan.
23. Gave an oral presentation titled as – *Generation and macroscopic transport of fast electrons in ultra-intense laser solid interaction* in the conference –**Laser Driven Charged Particle Acceleration and Applications** at IIT Delhi held during April 5-7, 2013.
24. Presented a poster titled as – *Ultrafast dynamics in femtosecond laser-matter interaction* in the **National Laser Symposium (NLS-21)** at Bhabha Atomic Research Centre held during February 6-9, 2013.

AWARDS

1. Awarded **Start Up Research Grant (SRG)** by SERB, Gov. India, Dec 2022- Dec 2024
2. Awarded **Fellowship for Research Associate** by JILA, CU Boulder, USA [2016-2020]
3. Received **Best Poster Award** in the International Conference on Ultrahigh Intensity Lasers (**ICUIL**) 2014 Oct 12-17, Goa (India)–[Amitava Adak](#) *et al.*
4. Received **Best Poster Award** in the Eighth International Conference on Inertial Fusion Sciences and Applications (**IFSA**) 2013 September 8-13, Nara, Japan –[Amitava Adak](#) *et al.*
5. Received **Best Poster Award** in the National Laser Symposium (**NLS-21**) 2013 February 6-9, Bhabha Atomic Research Centre, India –[Amitava Adak](#) *et al.*
6. Awarded the **first prize** in the on-spot examination in Fourth **SERC School** on Laser produced Plasmas : Physics and Applications held during July 9 - 21, 2012 at Raja Ramanna Centre for Advanced Technology, Indore, India.

OTHER ACADEMIC RESPONSIBILITIES

1. Member of DAC
2. Member of DPGC
3. Faculty-in-charge of placement Physics
4. Faculty-in-charge M.Sc. Laboratory
5. Chairperson/Member of scrutiny committees
6. Acting as standing DPAC member Physics
7. Member of several DSCs
8. Member of various interview committees