Goa University

Discipline of Physics

School of Physical and Applied Sciences

Report on Guest lecture by Prof. P. C. Deshmukh

1. Title of the program	Attosecond dynamics in atomic photoionization - The Nobel Prize in Physics 2023
2. Date and Time	29-10-2025, 9.30 - 10.30 am
3. Mode of conduct (Physical/Online)	Physical
4. School	School of Physical and Applied Sciences (SPAS)
5. Collaborating Agency/School/Directorate	N/A
6. Detail of the Resource Person (Brief biodata)	Prof. P. C. Deshmukh is RV Chair Professor at the RV University, Bengaluru. Concurrently, he is the Convener and Mentor of the Center for Atomic, Molecular, and Optical Sciences and Technologies (CAMOST), which is a joint initiative of the IIT Tirupati and the IISER Tirupati, and also the Chief Technology Advisor to the Vivekananda Institute of Professional Studies, New Delhi. His recent book Quantum Mechanics – Formulation, Methodologies, and Applications is expected to be very well received, just as his previous book Foundations of Classical Mechanics was. Both of these books are published by the Cambridge University Press. About two

	hundred of his video-lectures, covering four full-fledged courses, are available on the internet. These have been published by the NPTEL and SWAYAMPRABHA. He has taught undergraduate and graduate courses, and guided graduate research, at the IIT-Madras for over three decades, and also at the IIT Mandi, Georgia State University Atlanta, University of Western Ontario at London, Canada, and at the IIT Tirupati and the IISER Tirupati. He has mentored a significant number of undergraduate students, Ph.D. students, Post-Doctoral Research Fellows, and young colleagues. His research group is one of the leading contributors to relativistic many-body studies of attosecond dynamics in atomic photoionization processes.
7. Number of Faculty attended	10
8. Number of Student attended	15
9. No. of external students/faculty/other participants	3
10. The objectives of the Program	• Familiarize the students with 2023 Nobel Prize in Physics topic attosecond dynamics • Opportunity to listen and interact with eminent scientist and speaker, Prof. P. C. Deshmukh • To get update with current trends in attosecond dynamics
11. Description of the Program/activity/event	Movement of an electron wave-packet in atoms and molecules takes place in a very short time, of the order of an attosecond (10-18 sec). We will visit some exciting aspects of attosecond dynamics to celebrate the 2023 Nobel Prize in Physics awarded to Pierre Agostini, Ferenc Krausz and Anne L'Huillier, who "demonstrated a way to create extremely short pulses of light that can be used to measure the rapid processes in which electrons move or change energy". The attosecond pulses enable measurement of the

	Eisenbud-Wigner-Smith scattering time delay in atomic photoionization. No such delay was considered by Einstein in his interpretation of the photoelectric effect. That this is measurable at all in photoionization seems puzzling, since the photoelectron does not have independent existence prior to photoabsorption – just as an electron does not exist prior to nuclear b-decay. We shall resolve this issue invoking fundamental symmetries in the standard model. A few exciting results from the works of the 2023 Nobel laureates will be used to illustrate state of the art applications of attosecond physics.
12. Benefit/Key outcomes of the Program	The speaker described attosecond dynamics from basics to recent developments in the field. He has also discussed recent methodologies developed to extract the information on atomic dyanamics with his own research results as well as in publications. Students were excited to get updated on the topic and resulted in interactive session with many questions from students and faculties.

Signature:

Name of coordinator: Dr. Venkatesha Hathwar

Designation: Programme Director, Physics

Signature:

Dean of SPAS: Prof. Ramesh V. Pai

Seal of the School

School of Physical and Applied Sciences
Goa University

SCHOOL OF PHYSICAL AND APPLIED SCIENCES

GOA UNIVERSITY

SPECIAL LECTURE ON

"Attosecond dynamics in atomic photoionization - The Nobel Prize in Physics 2023"

Prof. P.C. Deshmukh

School of Computer Science & Engineering, RV University, Bengaluru Center for Atomic, Molecular, and Optical Sciences & Technologies IIT Tirupati & IISER Tirupati, Tirupati Vivekananda Institute of Professional Studies, New Delhi

Date: 29th October 2025 **Venue: Room No. AG-34**

Time: 9:30 am : 10:30 am

Abstract: Movement of an electron wave-packet in atoms and molecules takes place in a very short time, of the order of an attosecond (10-18 sec). We will visit some exciting aspects of attosecond dynamics to celebrate the 2023 Nobel Prize in Physics awarded to Pierre Agostini, Ferenc Krausz and Anne L'Huillier, who "demonstrated a way to create extremely short pulses of light that can be used to measure the rapid processes in which electrons move or change energy". The attosecond pulses enable measurement of the Eisenbud-Wigner-Smith scattering time delay in atomic photoionization. No such delay was considered by Einstein in his interpretation of the photoelectric effect. That this is measurable at all in photoionization seems puzzling, since the photoelectron does not have independent existence prior to photoabsorption – just as an electron does not exist prior to nuclear b-decay. We shall resolve this issue invoking fundamental symmetries in the standard model. A few exciting results from the works of the 2023 Nobel laureates will be used to illustrate state of the art applications of attosecond physics.

About the speaker: **Prof.** P. C. Deshmukh is RV Chair Professor at the RV University, Bengaluru. Concurrently, he is the Convener and Mentor of the Center for Atomic, Molecular, and Optical Sciences and Technologies (CAMOST), which is a joint initiative of the IIT Tirupati and the IISER Tirupati, and also the Chief Technology Advisor to the Vivekananda Institute of Professional Studies, New Delhi. His recent book Quantum Mechanics – Formulation, Methodologies, and Applications is expected to be very well received, just as his previous book Foundations of Classical Mechanics was. Both of these books are published by the Cambridge University Press. About two hundred of his video-lectures, covering four full-fledged courses, are available on the internet. These have been published by the NPTEL and SWAYAMPRABHA. He has taught undergraduate and graduate courses, and guided graduate research, at the IIT-Madras for over three decades, and also at the IIT Mandi, Georgia State University Atlanta, University of Western Ontario at London, Canada, and at the IIT Tirupati and the IISER Tirupati. He has mentored a significant number of undergraduate students, Ph.D. students, Post-Doctoral Research Fellows, and young colleagues. His research group is one of the leading contributors to relativistic many-body studies of attosecond dynamics in atomic photoionization processes.

Attendance Sheet

Special lecture by Prof. P.C. Deshmukh at SPAS

Date : 29-10-2025, 9.30 am - 10.30 am

1. Venkatesha Hathwar,
2. R. S. Hyam
3. Sudhir Cherukulappurath
4. Bholanath Pahari
5. Juhi Mayekar
6. Errisha. J. Franco.
7. Tejas Alawani
8. Prasad Puttappa
9. Nandesh
10. Neha Phadte
11. Shahinoor Jiwani
12. Shubhankar Bandekar
13. Myron Azavedo
14. Rukma Sinari
15. Rasmita Bamanikar
16. Ramesh v Pai
17. Sutapa k. Das
18. Bhargav. K Alavani
19. Sr. Cleus Fernandes
20. Tanaya M. Talkar
21. Reshma Raut Dessai
22. Najmeh Dehkordi
23. Diksha N. Karmalkar
24. Namita Rane
25. Samuel D'souza