M.Sc. Program overview: Physics@IIT Delhi

Saswata Bhattacharya
MSc. Coordinator
Department of Physics, IIT Delhi

My coordinates:
Office: MS 544 / Lab: MS 543 [main academic building → take lift → Level 4]
Email: saswata@physics.iitd.ac.in
Phone: +91-11-2659-1359

M.Sc. curriculum overview

The Department of Physics offers two options to students.

Regular M.Sc. degree with a total of 74 credits

M.Sc. with Departmental specialization with a total of 80-86 credits.

Note: Google → Course of study + IIT Delhi → won't work since curriculum is updated in July 2025

Credit structure for regular MSc:

- Total Number of credits: 74
- Program core (courses): 44 credits (non-project)
- Program core (projects): 12 (6*) credits
- Program electives (PE): 12 credits
- Open Electives (OE): 6 credits

*If a student chooses course-intensive track with courses equivalent to Major Project-2 (0-0-12)

Credit structure for M.Sc with departmental specialization:

- Total Number of credits: 80-86
- Program core (courses): 44 credits (non-project)
- Program core (projects): 12 credits
- Program electives (PE): 12 credits
- Open Electives (OE): 6 credits
- Departmental Specialization (DS): 12 (6*) credits

*If a student chooses 2 OE courses from DS basket

Department Specialization (DS)

Department will offer M.Sc. (Physics) with Specialization in **five** of the following sub-domains of Physics, while a student can opt **only one** out of these five specializations:

a) **Photonics**

b) **Condensed Matter Physics**

c) **Theoretical Physics**

d) **Plasma Physics**

e) **High Energy Physics and Cosmology**

Semester wise plan for MSc. with 74 credits:

Sem.	Courses (Number, Abbreviated title, L-T-P, credits)						Lecture course	Contact h/week				Credits
								L	T	P	Total	
I	PYL5051 (3-1-0) 4 Classical Mechanics	PYL5053 (3-1-0) 4 Mathematical Physics	PYL5055 (3-1-0) 4 Quantum Mechanics - 1	PYL5057 (3-0-0) 3 Electronics	PYP5061 (0-0-8) 4 Laboratory-1	VEVXXXX (1-0-0) 1	5	13	3	8	24	20
Winter												
II	PYL5052 (3-1-0) 4 Electrodynamics	PYL5054 (3-1-0) 4 Statistical Mechanics	PYL5056 (3-0-0) 3 Quantum Mechanics - 2	PYL5058 (3-1-0) 4 Solid State Physics	PYL5060 (3-0-0) 3 Applied Optics	PYP5062 (0-0-8) 4 Laboratory-2	5	15	3	8	26	22
Summer												
III	PYL6061 (2-0-0) 2 Intro. to Computer Programming	PYD6063 (0-0-6) 3 Cornerstone Project	PYD6065 (0-0-6) 3 Major Project - 1	PE1 (3-0-0) 3	PE2 (3-0-0) 3	OE1 (3-0-0) 3	4 (6*)	11 (17)	0	12	23 (29*)	17 (23*)
IV	PYD6066 (0-0-12) 6 Major Project – 2 #	PE3 (3-0-0) 3	PE4 (3-0-0) 3	OE2 (3-0-0) 3			3 (5*)	9 (15)	0	12	21 (27*)	15 (21*)

Program core

PYL5051
PYL5052
PYL5053
PYL5054
PYL5055
PYL5056
PYL5057
PYL5058
PYL5060
PYP5061 (Laboratory-1)
PYP5062 (Laboratory-2)
PYL6061
PYD6063 (Cornerstone Project)
PYD6065 (Major Project-1)
PYD6066 (Major Project-2)
VEVXXXX (Professional Ethics)

Program Electives (PE) and Open Electives (OE)

For PE opt any PYL7XXX courses
For OE opt any PG level courses inside IIT Delhi

Projects during 3rd and 4th semesters

1. Cornerstone Project [PYD 6063, credit 3]: Make a team of 4/5 students and inform the plan to your project coordinator for approval.
2. Major project-I [PYD 6065, credit 3]: A team of two students (list of available projects will be notified by the project coordinator).
3. Major project – II [PYD 6066, credit 6]: In principle, continuation of major project –I but changes to a different topic is allowed. If anyone is opting for DS, then major project – II needs to be from the same field. Inform it to the project coordinator for approval.

Note: It's allowed to take a mini project [PYD 6158, credit 3] as PE. However this project is recommended to be completely different in nature than major projects of the concerned student.

Important points to note while opting for courses

1. If the student maintains a minimum CGPA of 8.0, then she/he has an option to choose a course-intensive track with courses equivalent to Major Project-2. Else, the student will take Major Project-2, in the project-intensive track.

2. For getting M.Sc. (Physics) with Specialization, the student is required to earn **additional 12 credits** (over and above the 74 credits for general M.Sc. (Physics) degree) by completing the **four additional courses** from **any** one of the above **five** Departmental Specialization (DS) baskets. The additional four DS courses **must be different** from the PC and PE courses.

3. To lessen the total credit burden for getting the M.Sc. with Specialization, the student **can take the two OE courses from a DS basket**. In that case, the student would be required to earn the remaining 6 credits by taking two more courses from the DS from the same DS basket. Such student would get the M.Sc. with Specialization by completing a total of **80 credits** only. (However, if the OE courses are not taken from any of the DS baskets, the student must complete all the four courses from any of the five DS baskets to get the M.Sc. with Specialization. For such students, the total credit requirement for M.Sc. with Specialization will be **86 credits**.)

4. Further, for M.Sc. with Specialization, the **Major Project-2 must be from the same field of the concerned DS**. While taking the Major Project-2, this needs to be specified by the student and provisionally approved by the Program Coordinator. (However, no such constraint will be there as regard to Major Project-1).

List of Department Specialization (DS) courses:

Course #	Course Title	Credit
PYL7051	OPTICAL SOURCES, PHOTOMETRY AND METROLOGY	3-0-0
PYL7052	LASER SYSTEMS AND APPLICATIONS	3-0-0
PYL7053	OPTICAL SYSTEMS DESIGN	3-0-0
PYL7055	BASIC OPTICS AND OPTICAL INSTRUMENTATION	3-0-0
PYL7056	FOURIER OPTICS AND HOLOGRAPHY	3-0-0
PYL7047	NON-LINEAR OPTICS	3-0-0
PYL7057	STATISTICAL AND QUANTUM OPTICS	3-0-0
PYL7058	ADVANCED QUANTUM OPTICS AND APPLICATIONS	3-0-0
PYL7590	COMPUTATIONAL OPTICAL IMAGING	3-0-0
PYL7060	BIOMEDICAL OPTICS AND BIO-PHOTONICS	3-0-0
PYL7161	LIQUID CRYSTALS	3-0-0
PYL7162	STATISTICAL OPTICS AND OPTICAL COHERENCE THEORY	3-0-0
PYL7070	ULTRA-FAST OPTICS AND APPLICATIONS	3-0-0
PYL7071	GREEN PHOTONICS	3-0-0
PYL7072	PLASMONIC SENSORS	3-0-0
PYL7080	DIFFRACTIVE AND MICRO OPTICS	3-0-0
PYL7190	INTEGRATED OPTICS	3-0-0
PYL7091	FIBER OPTICS	3-0-0
PYL7093	PHOTONIC DEVICES	3-0-0
PYL7195	OPTICS AND LASER ENGINEERING	3-0-0
PYL7292	OPTICAL AND QUANTUM ELECTRONICS	3-0-0
PYL8058	ADVANCED HOLOGRAPHIC TECHNIQUES	3-0-0
PYL8079	SELECTED TOPICS IN APPLIED OPTICS	3-0-0
PYL8191	FIBER OPTIC COMPONENTS AND DEVICES	3-0-0
PYL8192	GUIDED WAVE PHOTONIC SENSORS	3-0-0

DS basket of
'Photonics'

List of Department Specialization (DS) courses:

Course #	Course Title	Credit
PYL7001	PHYSICAL FOUNDATIONS OF MATERIALS SCIENCE	3-0-0
PYL7002	PHYSICS OF SEMICONDUCTING DEVICES	3-0-0
PYL7003	ELECTRONIC PROPERTIES OF MATERIALS	3-0-0
PYL7004	SCIENCE AND TECHNOLOGY OF THIN FILMS	3-0-0
PYL7105	NANOSTRUCTURED MATERIALS	3-0-0
PYL7107	CHARACTERIZATION TECHNIQUES FOR MATERIALS	3-0-0
PYL7120	APPLIED SUPERCONDUCTIVITY	3-0-0
PYL7121	ADVANCED SOLID-STATE PHYSICS	3-0-0
PYL7122	SEMICONDUCTOR ELECTRONICS	3-0-0
PYL7123	VACUUM SCIENCE AND CRYOGENICS	3-0-0
PYL7124	FOUNDATIONS OF SPINTRONICS	3-0-0
PYL7125	SURFACE PHYSICS AND ANALYSIS	3-0-0
PYL7126	SEMICONDUCTOR DEVICE TECHNOLOGY	3-0-0
PYL7127	ENERGY MATERIALS AND DEVICES	3-0-0
PYL7139	COMPUTATIONAL TECHNIQUES FOR SOLID STATE MATERIALS	3-0-0
PYL7140	ADVANCED THEORY OF CONDENSED MATTER	3-0-0
PYL7143	GROUP THEORY IN PHYSICS	3-0-0
PYL7150	TOPOLOGY IN CONDENSED MATTER PHYSICS	3-0-0

DS basket of ‘Condensed Matter Physics’

List of Department Specialization (DS) courses:

Course #	Course Title	Credit
PYL7111	INTRODUCTION TO NONLINEAR DYNAMICS	3-1-0
PYL7121	ADVANCED SOLID-STATE PHYSICS	3-0-0
PYL7139	COMPUTATIONAL TECHNIQUES FOR SOLID STATE MATERIALS	3-0-0
PYL7140	ADVANCED THEORY OF CONDENSED MATTER	3-0-0
PYL7141	QUANTUM FIELD THEORY 1	3-0-0
PYL7142	QUANTUM FIELD THEORY 2	3-0-0
PYL7143	GROUP THEORY IN PHYSICS	3-0-0
PYL7144	HIGH ENERGY PHYSICS AND STANDARD MODEL	3-0-0
PYL7145	ADVANCED TOPICS IN QUANTUM FIELD THEORIES	3-0-0
PYL7146	INTRODUCTION TO STRING THEORY	3-0-0
PYL7049	QUANTUM INFORMATION AND COMPUTATION	3-0-0
PYL7150	TOPOLOGY IN CONDENSED MATTER PHYSICS	3-0-0
PYL7167	ATOMIC AND MOLECULAR PHYSICS	3-0-0
PYL7169	NUCLEAR AND PARTICLE PHYSICS	3-0-0
PYL7171	RELATIVITY AND GRAVITATION	3-0-0
PYL7172	EXTRAGALACTIC ASTRONOMY AND COSMOLOGY	3-0-0
PYL7185	ADVANCED STATISTICAL MECHANICS	3-0-0
PYL7186	NON-EQUILIBRIUM STATISTICAL MECHANICS WITH INTERDISCIPLINARY APPLICATIONS	3-0-0
PYL8000	NUMERICAL AND COMPUTATIONAL METHODS IN RESEARCH	3-0-2

DS basket of
'Theoretical Physics'

List of Department Specialization (DS) courses:

Course #	Course Title	Credit
PYL7128	PLASMA PHYSICS	3-0-0
PYL7129	ADVANCED PLASMA PHYSICS	3-0-0
PYL7130	PLASMA THEORY AND SIMULATIONS	3-0-0
PYL7174	PLASMA BASED RADIATION	3-0-0
PYL7175	MHD AND FLUID PLASMAS	3-0-0
PYL7176	COLD AND PROCESS PLASMAS	3-0-0

DS basket of
'Plasma Physics'

List of Department Specialization (DS) courses:

Course #	Course Title	Credit
PYL7141	QUANTUM FIELD THEORY 1	3-0-0
PYL7142	QUANTUM FIELD THEORY 2	3-0-0
PYL7143	GROUP THEORY IN PHYSICS	3-0-0
PYL7144	HIGH ENERGY PHYSICS	3-0-0
PYL7145	ADVANCED TOPICS IN QUANTUM FIELD THEORIES	3-0-0
PYL7146	INTRODUCTION TO STRING THEORY	3-0-0
PYL7151	ASTRONOMY AND ASTROPHYSICS I	3-0-0
PYL7152	ASTRONOMY AND ASTROPHYSICS II	3-0-0
PYL7169	NUCLEAR AND PARTICLE PHYSICS	3-0-0
PYL7171	RELATIVITY AND GRAVITATION	3-0-0
PYL7172	EXTRAGALACTIC ASTRONOMY AND COSMOLOGY	3-0-0

DS basket of
'High Energy Physics and Cosmology'

MSc. Laboratory

MSc. Laboratory Coordinator

Prof. Deepak Kumar
krdeepak@physics.iitd.ac.in
Phone: 011 2659 1345

SOMVIR
Deputy Technical Officer, M. Sc.
Phone: 011 2659 6554

MOHAN SINGH
Sr. Laboratory Assistant, M.Sc
Phone: 011 2659 6554

TARJAN KUMAR BHARTI
Jr. Technical Assistant, M.Sc.
Phone: 011 2659 6554

M.Sc. Laboratory-I
PHP 561: 1st SEMESTER
Electronics General & Design Experiments:

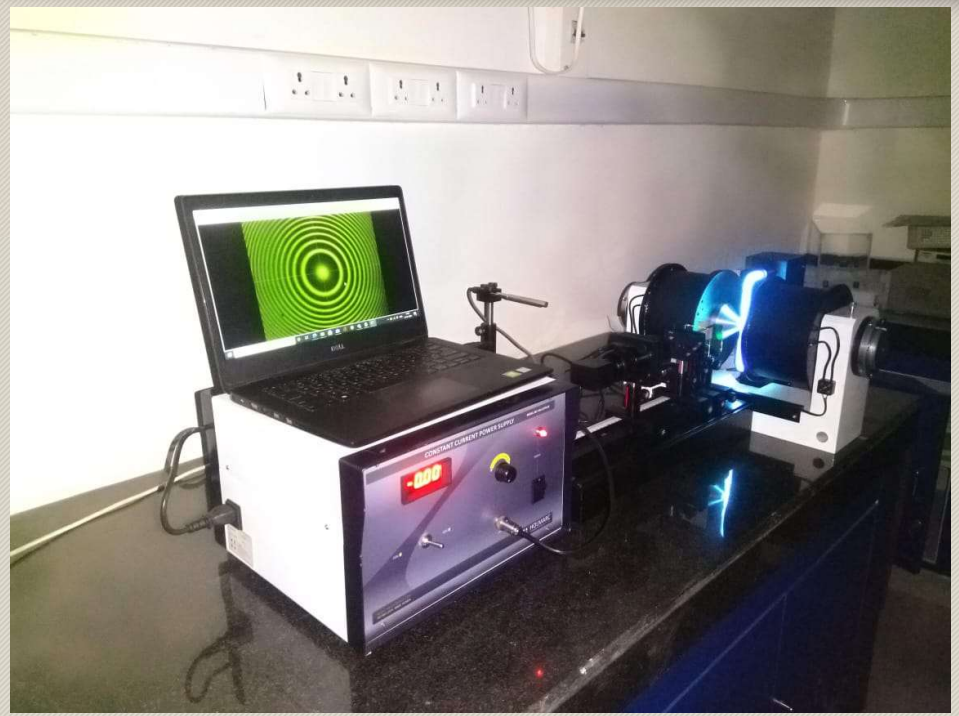

Material Synthesis Room


Electronics & General Experiment Hall

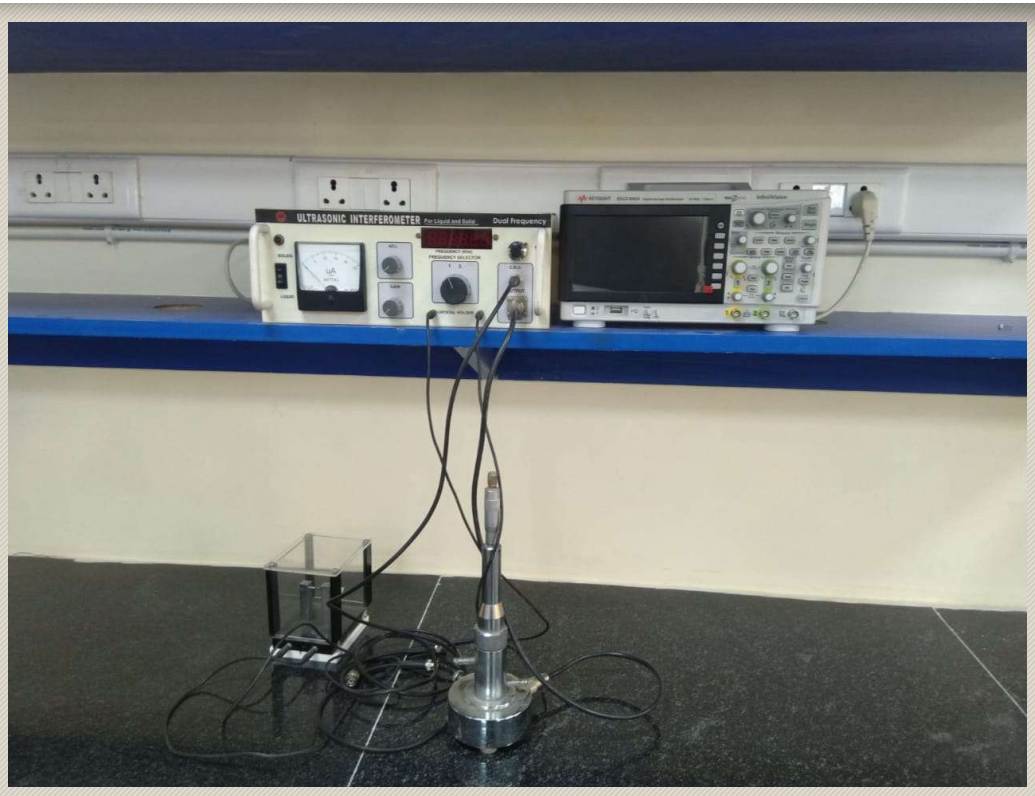

Optics Room


Main hall

Zeeman Effect Experiment Setup



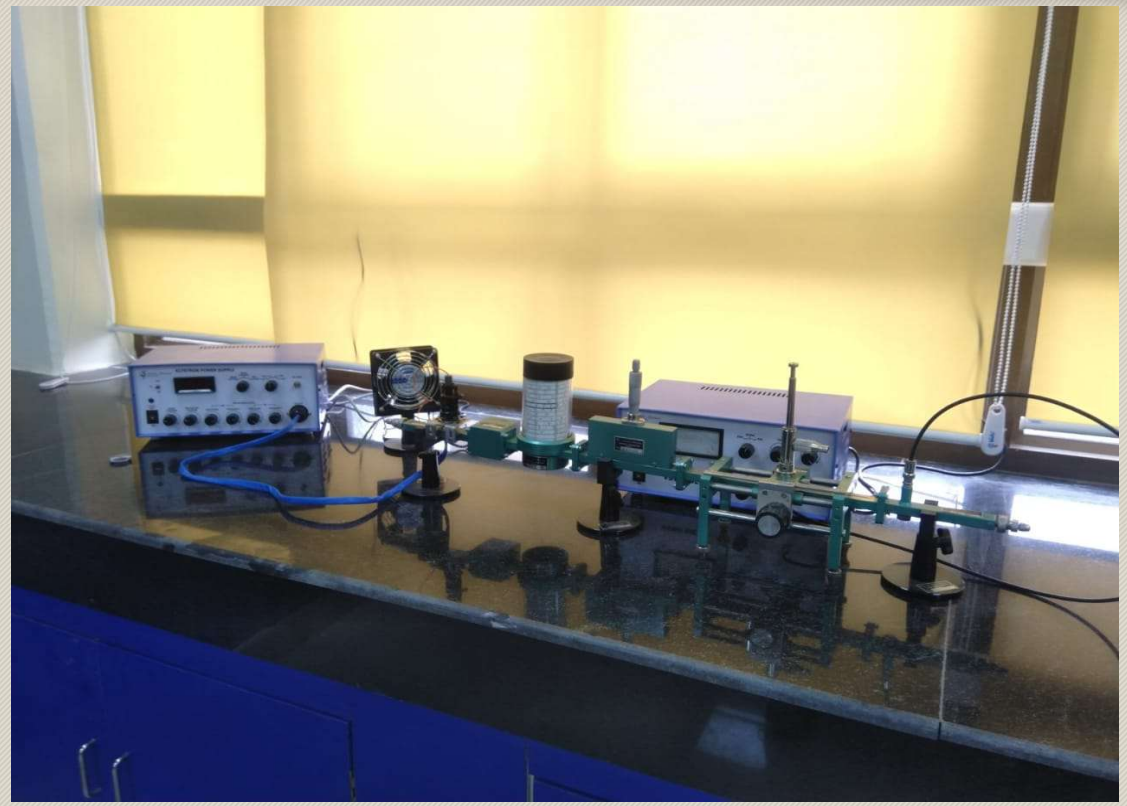
Ultrasonic Interferometer Experiment Setup



Fume Hood

Gun Diode Experiment Setup

Klystron Experiment Setup



Check List for Immediate job to start with!

- Collect Course Registration details (Contains user id, password)
- Students who have not received the Entry no. so far, do also contact physics office or [drpgsr@admin.iitd.ac.in] immediately.
- Do get yourself introduced with moodle of IIT Delhi by visiting https://moodle.iitd.ac.in/login/index.php as the course materials will be uploaded here.
- Figure out your Medical booklet, Electronic Data capture for regular/temporary ID card.
- Please collect all other information related to a. Library b. Security c. Student Counselling Service d. ERP and CSC Resources e. ETSC from IIT Delhi website.
- Just google with respective keywords+IIT Delhi, you should get it.

Welcome to the Department!
Have a wonderful time at Physics@IIT Delhi!

THANKS!