

# Department of Physics

## Altaf Memorial Govt. Degree college Killam, Kulgam

### About us:

The department of physics was established in 2017 with a B.Sc. degree course. The department's overarching objective is to become an epicenter for physics academic achievements. To make it possible for the students to reach national prerequisites, we are striving to ensure their entire advancement. The completion of this undergraduate degree will offer graduates a foundational understanding of the fundamental ideas in physics, reinforced by multidisciplinary courses in mathematics and chemistry, and will enhance their fundamental comprehension of the theory themes combined with laboratory usage. The training also fosters a natural motivation to seek further study and research.

The department offers cutting-edge teaching strategies that are innovative. Weekly tutorials are offered to the students, who also participate in question-and-answer sessions. Aside from offering them study resources, they receive additional instructions on how to navigate online e-content and e-books.

With the objective to accommodate the prerequisites of learners, the department contains well-equipped labs and a library. According to the curriculum of the affiliated institution, the laboratories have been renovated. In the department presently, two lab assistants and one guest faculty member are employed. The department has its own laboratory that is furnished with the modern equipment and is located in the college's main building.

### Departmental Time Table for Academic Session 2023

S. No.	Semester	Name of Subject	Timing	Credits		Class Room	Teacher In charge
				Theory	Practical		
1	B.Sc. 4 <sup>th</sup> (Batch 2020)	Physics	1:20- 2:00 PM	4	2	06	Guest Faculty
2	B.Sc. 5 <sup>th</sup> (Batch 2021)	Physics	11:20- 12:00 PM	4	2	06	Guest Faculty
3	2 <sup>nd</sup> (Batch 2022)	Physics	02:40- 03:20 PM	4	2	04	Guest Faculty

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The following is the list of experiments that were performed for the entire UG course:

01	Newton's Ring
02	Planks Constant
03	Rydberg's Constant
04	Keter's Pendulum
05	Compound Pendulum
06	Electrical vibrator
07	Stewart and Gee's Apparatus
08	FET Characteristics
09	Bifilar Suspension Arrangement
10	Sonometer
11	e/m by Thomson's method
12	Characteristics of a Transistor
13	Meter bridge for unknown resistance
14	Variation of Current in LR and LC Circuits
15	LCR impedance analyzer
16	Rayleigh Bridge
17	Superposition and Max power Transfer Theorem's
18	Thevienim and Norton theorems'
19	Efficiency of Electric Kettle
20	Travelling Microscope

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### PROFORMA FOR BIO-DATA

Name	Dr. Nazir Ahmad	
Nationality	Indian	
Gender	Male	
Whether differently-abled	No	

#### 1. Primary objectives:

- The primary objective of my research is to synthesize materials in the form of single crystals using solution techniques.
- The focus is to develop novel-based multifunctional metal-organic complexes, by keeping their size, transparency, perfection and thermal stability under priority.
- We are looking for low-value dielectric constant ferroelectric materials, with  $\epsilon_r < 4$  for microelectronic industry.

#### 2. Academic Qualification

M.Sc	Physics from the University of Kashmir, Hazratbal Srinagar, J&K-India.
PhD.	Physics
PhD thesis title	Studies on crystal growth, characterisation and properties of Praseodymium malonate and tartrates of Lithium, Erbium and Praseodymium
Specialization	Experimental Solid state physics.
PhD. supervisors	<ol style="list-style-type: none"> <li>1. Prof M. M. Ahmad (Department of Physics, NIT Srinagar)</li> <li>2. Prof. P. N. Kotru. (Department of Physics &amp; Electronics, University of Jammu.)</li> </ol>
Institute/Organization/University	National Institute of Technology, Hazratbal Srinagar, J&K (India)
Year of Award	March 2017.
National Post-Doctorate fellow(NPDF)	Awarded by Department of Science & Technology, New Delhi, Govt. Of India from 2017-2019
Dr. D. S. Kothari Post Doc. Fellow	Awarded by University Grants Commission, New Delhi, Govt. of India, from 2019-2022.

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### 3. Experience

S. No.	Level	Period	Years/ months
2.	B. Tech level @ NIT Srinagar	From 2012-2017	5 years
3.	M.Sc. @ IUST Awantipura	7 months	May 2022- 31 Dec 2022.

### 4. Achievements and awards:

JRF	On the project entitled "Effect of swift heavy ion irradiation on electrical & magnetic properties of $RFe_{1-x}Ni_xO_3$ , where R= rare earth materials" at NIT Srinagar.
Thesis Award	Best PhD Thesis Award; received from the Director, NIT Srinagar.
National level awards	I was honoured with two National awards from DST and UGC, Govt. of India, New Delhi.
Development of the crystallographic structure of Gd malonate accepted by Cambridge Crystallographic Data Centre.	CCDC No. : 993567 Compound Name: Gd Malonate. Formula: $(Gd_2C_9 H_{18}O_{18})_n$ Unit Cell Parameters: a= 17.0983(11), b =12.2173(11) c= 11.1080(11); C2/c
Development of the crystallographic structure of Praseodymium malonate accepted by Cambridge Crystallographic Data Centre	CCDC No. : 3234567 Compound Name: Praseodymium Malonate. Formula: $Pr_2C_9 H_{18}O_{18}$ Unit Cell Parameters: a 38.5189(17) b 36.1174(6) c 36.1174(6) 2/c.
Development of the crystallographic structure of Rubidium Hydrogen tartrate accepted by Cambridge Crystallographic Data Centre	CCDC No. : 2153168 Compound Name: Rb hydrogen tartrate. Formula: $Rb_2C_4 H_4O_6$ Unit Cell Parameters: a 7.6516(4) b 7.9175(5) c 10.9926(5) P212121, P212121

### 5. Research Publications:

S. No	Author's	Title	Name of Journal
1	Nazir Ahmad, M. M. Ahmad, P. N. Kotru	Crystallographic, optical and dielectric properties of gel grown praseodymium malonate single crystals	Royal Society of Chemistry (RSC) Advances.
2	Nazir Ahmad, M. M. Ahmad, P. N. Kotru	Single crystal growth by gel technique and characterization of lithium hydrogen tartrate	Journal of Crystal Growth
3	Nazir Ahmad, P. N. Kotru	Metal-Organic Coordination Complexes Serve the Electronic	Journal of Electronic materials

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		Industry as Low-Value Dielectric Constant Ferroelectric Material	
4	Nazir Ahmad, M. M. Ahmad, P. N. Kotru	Ferroelectric, Thermal, and Magnetic Characteristics of Praseodymium Malonate Hexahydrate Crystal.	Journal of Electronic materials
5	Nazir Ahmad, P. N. Kotru	Ferroelectricity in metal tartrates, a review	J. of Ferroelectricity
6	Nazir Ahmad, M. M. Ahmad, P. N. Kotru	Investigation on erbium tartrate hexahydrate crystals grown in silica gel and its characterisation	J. of sol gel science and technology.
7	Nazir Ahmad, G. M. Bhat P. N. Kotru	Optical, dielectric and ferroelectric characteristics of gel grown erbium tartrate hexahydrate crystals	Journal of Electronic materials
8	Nazir Ahmad, F. A. Mir, P. N. Kotru	Growth, structural, optical and transport properties of potassium hydrogen tartrate crystals.	Eur. J. of Applied physics.
9	Nazir Ahmad, G. M. Bhat P. N. Kotru	Ferroelectricity in metal tartrates, a review	J. of Ferroelectricity.
10	Nazir Ahmad, G. M. Bhat, F. A. Mir, Seeman Rubab	Scanning electron microscopic studies on spherulites of gel grown erbium tartrate.	Published as a book chapter at DNA Publisher and Distributers under the ISBN No. 978-81-945174-7-4
11	Nazir Ahmad, Ajay Singh, F. A. Mir.	"Effect of swift heavy ion irradiation on electrical & magnetic properties of $RFe_{1-x}Ni_xO_3$ , where R = Gd, Ce, Sm	Journal of physics and chemistry of solids
12	D. Kumar, Nazir Ahmad, V. K. Jaha, R. Saini, M. S. Shekhawat.	Various polarisation mechanisms involved in ionic crystals	American Institute of Physics Proceedings.

### 6. Research Articles under Review:

1	Nazir Ahmad, G. M. Bhat, G. B. Vakil	Crystallographic, optical, dielectric and Ferroelectric characteristics of Rb hydrogen tartrate single crystals.	Journal of Materials science, Materials in Electronics	Review submitted
2	Nazir Ahmad, G. M. Bhat, G. B. Vakil	Rubidium hydrogen tartrate; a low value dielectric material for the microelectronic industry.	Materials Science and Engineering-B	Review submitted

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3	Nazir Ahmad	Gel encapsulation Technique, an approach to grow defect free crystals for microelectronic industry	Journal of applied Physics	Under review.
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### 7. Research articles/ invited talks presented in International Conferences:

1. 2<sup>nd</sup> international conference on condensed matter and applied physics, organised by Govt. Engineering collage Bikaner, Rajasthan; 24-25 November-2017.  
Title: Optical and dielectric properties on Gel Grown Lanthanide (cerium) tartrate single crystal.  
"Awarded with Certificate of Appreciation"
2. 6<sup>th</sup> International conference on New fortunes of Engineering, Science Management and humanities. Venue: Auditorium of Institute of Electronics & Telecommunication Engineers, Sector 30\_B, Chandigarh Punjab on 9<sup>th</sup> Dec. 2017  
Title: Dielectric behaviour of metal coordinated organic ligand serve the industry as insulation material. Awarded with Best oral presentation
3. 1<sup>st</sup> international conference on Recent Trend developments in science, Humanities & Management on 20<sup>th</sup> March-2018 organised by Amar Singh college , Cluster University Srinagar with Conference world Got best paper presentation.
4. International Symposium on functional materials energy and biomedical application at Chandigarh, from 13-15<sup>th</sup> April-2018  
Title: single crystal versus polycrystalline of the same composite.
5. 3<sup>rd</sup> international conference on condensed matter and applied physics, organised by Govt. Engineering collage Bikaner, Rajasthan; 24-25 November-2017.  
Title: Lessigang rings and their applications in terms of time/space and width laws.
6. 7<sup>th</sup> International conference on Nanotechnology for better living, organised by the Department of Physics, NIT Srinagar from 7-11 September 2021. Title of the invited talk: Rubidium hydrogen tartrate; a low-value dielectric material for electronic industry.

### 8. National-level conferences and workshops:

- National Conference on "Recent Trends in Materials Science Research" organised by NIT Srinagar from 3-5 Sept. 2012.
- National conference on "Nanomaterial's and Devices", 3-5 Oct. 2013, organised by Dept. of Physics, NIT Srinagar.
- One-Day IUAC Acquaintance programme on Frontiers in Accelerator-based Physics, jointly organised by the Dept. of physics, university of Kashmir and IUAC, New Delhi on 24<sup>th</sup> June-2014 held at the university of Kashmir
- 11<sup>th</sup> JK science congress-2015, Scientific, social & Economic dimensions of Climate change" organised by University of Kashmir-2015.



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- National conference on Advances in Materials and Materials Processing, organised by dept. of Metallurgical and Materials Engineering held at NIT Srinagar from 22-23 May-2015.  
Title: Ferroelectric and thermal characteristics of gel grown praseodymium malonate crystals.
- National conference on Microscopy and advances in Material Science, 2-4<sup>th</sup> Nov.- 2015, organised by Crystal growth and materials research Lab, Dept. of Physics & Electronics, University of Jammu. Title: Crystallographic and dielectric properties on praseodymium malonate single crystals.
- National Research Scholars Conclave on Innovation and Recent Trends in Science and Technology, 2- 3, April 2016, organised by NIT Srinagar.
- UGC sponsored national seminar on growth points in physics organised from 21-23<sup>rd</sup> October-2017 by Dept. of Physics, University of Kashmir.  
Title: Growth, crystalline perfection and characterisation of R(C<sub>3</sub>H<sub>4</sub>O<sub>6</sub>); R=Pr, single crystals.
- One day national conference on recent innovations in Science, technology and Engineering held at NIT sgr with conference World on 16<sup>th</sup> Dec. 2017.  
Title: studies on crystal growth characterisation and properties of some metal coordinated organic ligands.
- National conference on Role of Saha in growth of physics, 6<sup>th</sup> Oct-2018, organised by Dept. of Physics, NIT Srinagar.

### 9. Virtual Conference and workshops:

1. Indian Institute of Information Technology, Design & Manufacturing, Kurnool have organised a webinar on "Industry institute interaction on optical & Electrical Modelling & Simulation for Organic semiconductor devices using SETFOS SW" on 25<sup>th</sup> Nov. 2020.
2. International virtual conference on Advanced Materials for Energy & Environmental Applications organised by Dept. of Chemistry, school of science and Humanities, BIST, BIHER, sponsored by TNSCST & in association with INHA University, South Korea & RSC South Indian chapter during 3- 4 Dec. 2020.
3. International webinar on "Need of Research & Innovations for Social Welfare" organised the Physics division- Department of science & Humanities, Faculty of Engineering, Academy of Higher Education, Coimbatore, India on 23<sup>rd</sup> Dec. 2020.
4. National level workshop on recent trends & Opportunities in Physics on 10-17<sup>th</sup> of April 2021, organised by Dept of Physics, school of advanced Sciences, VIT-AP University, Andhra Pradesh, India.
5. International eworkshop on Science & Technology of Emerging Materials organised by dept. of science and Humanities, Chettinad College of Engineering & Technology on 19-21 April 2021.

### 10. Research Areas:

1. Studies on crystal Growth, characterisation and Properties of Materials.
2. "Effect of swift heavy ion irradiation on electrical & magnetic properties of rare and alkaline earth materials

### 11. Expertise in Techniques for sample preparation:

- Solution Growth Techniques.
- Solid state reaction Technique.

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### 12. Expertise in Characterisation Techniques:

- SEM, Single crystal and Powder XRD, FTIR,
- High-resolution X-ray diffraction.
- Optical studies:  
UV-VIS-NIR, Photoluminescence, Birefringence, NLO, Refractive Index
- Four probe method using impedance analyser for transport studies like Dielectric/ Dielectric anisotropy. Electrical Conductivity.
- Mechanical Studies: Micro hardness using Vickers Hardness tester. Piezoelectric studies,
- Thermal- TGA/DTA/DSC.

The applicant has published more than a dozen research articles as first as well as corresponding author in prestigious journals such as Elsevier, Science Direct, AIP, and the Royal Society of Chemistry London, some of which have an impact factor of more than 4, with 64 citations reported till 2020.

### Contact Details:

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