

# Physics Annual Report

2015-2016

## POSTGRADUATE DEPARTMENT OF PHYSICS REPORT OF PHYSICS ASSOCIATION ACTIVITIES (2015-2016)

The Department has an active association. The president of the association is a faculty member. The current year Ms. Shibi Krishnan was the President of the association. The association conducts various academic programmes every year so that the students are exposed to lectures by eminent personalities in Physics. A brief report of the activities of the association is given below.

### UGC & KSTE Sponsored National Seminar

The National Seminar addresses the fundamental aspects of physics and applied physics with a view to generate a keen interest in the subject. It gives an exposure to some of the latest developments in the field of Physics; promote healthy competition among the young researchers to bring out their skills and competences and to translate their research findings to plan for industrial growth and Nation building.



(Inaugurated by Prof. S. Kabilan, Professor, Department of Chemistry, Annamalai University, Chidambaram, Tamilnadu. Dr.S.Kailasanath, Director, International School of photonics, CUSAT, Cochin (Keynote address); Dr. Varughese p. Daniel, Principal, St. Stephen's College; Mr. Jacob Thomas, H.O.D, Department of Physics; Dr. Ragesh Chandran, Convener, NSMTPR-2015.)



The function was inaugurated by Dr.S.Kabilan, Professor, Department of Chemistry, Annamalai University, Tamilnadu. The inaugural function started with the prayer song. It was followed by the welcome speech made by Dr. Achama George, Associate Professor, Department of Physics. A Presidential Address was made by Dr.S.Kabilan, Professor, Department of Chemistry, Annamalai University, Tamilnadu. It was followed by the Principal's Remarks by Dr. Varughese P. Daniel. Felicitations were done by Rev. Fr. Koshy N.J. (Local Manager, St. Stephen's College, Patahanapuram), Mrs.ShibiKrishnan, Assistant Professor, Department of Physics. A Keynote speech was made by Dr. Kailasnath, Director,

International School of Photonics, CUSAT, Cochin. He spoke on a topic “ Polymer Based Optical Fibre Devices.”

Modern research trends on various branches of Physics were discussed on the two days. Expert speakers from different research institutions across India gave presentations focusing on latest developments in their field of research. The speakers provided concrete arguments, experiences from other international and regional processes as well as presentations of technical instruments, intended to stimulate and encourage discussion between the seminar participants.

The Director of International School of Photonics, CUSAT, Cochin, Dr. M. Kailasnath opened the seminar with keynote address on “Polymer Based Optical Fibre Devices.” Other speakers were Dr. S. Kabilan of Annamalai University, Tamilnadu on “Cheminformatics in Modern Drug Discovery”; Dr. K. B. Jinesh of IIST, Trivandrum on “Revolution in data storage: Physics of advanced memory”, Dr. I. Hubert Joe of Mar Ivanious College, Trivandrum on ‘Recent trends in Raman Spectroscopy’, Dr. M. C. Santhoshkumar of NIT Trichy on “Recent advances in Metal oxide nanostructures and its applications; Dr. N. V. Unnikrishnan Nair, Professor, Emeritus, School of Pure and applied Physics, M. G. University on “The hunt for Blue LEDs”.

The Valedictory programme was chaired by Principal Dr. Varughese P Daniel. Mrs. Seena Sivasadas welcomed the dignitaries and audience. The Presidential Address was done by Dr. N. V. Unnikrishnan, Emeritus Professor, M. G. University, Kottayam followed by the Principal's Remarks. Felicitations were done by Mr. Jacob Thomas (Department of English) and Mr. Roy John (Department of Mathematics-Staff Secretary). This was followed by the Certificate distribution. Vote of Thanks was proposed by Dr. Ragesh Chandran (Convenor). The program ends with National Anthem.

## PROGRAMME SCHEDULE

### DAY 1: THURSDAY 05 NOVEMBER 2015

|                  |  |
|------------------|--|
| 9.00 am-10 am    | : Registration   |
| 10.00 - 11.00 am | : Inaugural session  |
| 11.00-11.15am    | : Tea Break  |
| 11.15 -12.30 pm  | : Keynote address<br>: <b>Dr. M. Kailasnath</b><br>(Director, International School of Photonics, CUSAT, Cochin)  |
| 12.30-1.00pm     | : Lunch Break  |
| 01.00-02.00pm    | : <b>Dr. S. KABILAN</b><br>(Annamalai University, Tamilnadu.)<br>"Cheminformatics in Modern Drug Discovery."   |
| 02.00-3.30pm     | : Invited Talk<br>: <b>Dr. K.B.Jinesh</b><br>(Assistant Professor, IIST, Thiruvananthapuram)<br>"Revolutions in data-storage: physics of advanced memory devices." |
| 3.30-3.45 pm.    | : Tea Break  |
| 3.45- 4.30 pm    | : Paper Presentation   |

### DAY 2: FRIDAY 06 NOVEMBER 2015

|                |  |
|----------------|--|
| 10.00-11.00am  | : Invited Talk<br>: <b>Dr. I. Hubert Joe</b><br>(Associate Professor, Mar Ivanios, Thiruvananthapuram)<br>"Recent trends in Raman spectroscopy." |
| 11.00-11.15    | : Tea Break  |
| 11.15- 12.30am | : <b>Dr.M.C.Santhoshkumar</b><br>(NIT Trichy)<br>"Recent advances in metal oxide nanostructures and their applications."                         |
| 12.30 -1.00pm  | : Lunch Break  |
| 1.00 -2.30 pm  | : Invited Talk<br>: <b>Dr. N.V. Unnikrishnan Nair</b><br>(School of Physics, M.G. University, Kottayam)<br>"The hunt for the blue LEDs"          |
| 2.30-2.45pm    | : Tea Break  |
| 2.45-4.30pm    | : Valedictory Session  |

### Chief Patron

**Very Rev. C.O. Joseph Ramban**  
(Manager, Mount Tabor Institutions)

### Patrons

**Rev.Fr.K.V.Paul**  
(Secretary,Mount Tabor Institutions)

**Rev.Fr.N.J.Koshy**  
(Local Manager)

**Dr. Varughese P. Daniel**  
(Principal)

### Organising Committee

**Chairman** : Prof. Jacob Thomas (HOD)

**Secretary** : Dr. Achamma George

**Convener** : Dr. Ragesh Chandran

**Co-Conveners** : Mrs. Shibi Krishnan  
: Mrs. Seena Sivasdas

### Executive Committee

Mrs. Omana Alex, Mrs. Rini Varghese,

Mrs. Suchitra. S, Ms. Anamika. L.

### Contact Address

**Dr. Ragesh Chandran**  
Convener, NSMTTPR-2015,  
Department of Physics,  
St.Stephen's College,  
Pathanapuram- 689 695  
Mobile No. : 9961056094  
Email: nsmtpr@gmail.com  
www.ststephenspathanapuram.ac.in/  
nsmtpr/

### Route

**Punalur**-Pathanapuram-Puthuval Jn.-College.

**Kottarakara**-Enathu/Mailam-Kaduvathodu.-College.

**Adoor**-Puthuval Jn.-College.

## NATIONAL SEMINAR ON MODERN TRENDS IN PHYSICS RESEARCH

### NSMTTPR-2015

NOVEMBER 5-6, 2015



Organized by  
DEPARTMENT OF PHYSICS

Sponsored by  
UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEWDELHI-110 002

&  
KSCSTE  
Sasthra Bhavan, Pattom, Thiruvananthapuram,  
Kerala - 695004



Venue: Seminar Hall  
ST.STEPHEN'S COLLEGE,  
PATHANAPURAM  
Email: ststephenspathanapuram@gmail.com  
Website:  
[www.ststephenspathanapuram.ac.in/nsmtpr/](http://www.ststephenspathanapuram.ac.in/nsmtpr/)  
Ph: 0475 2352385 / 2354385

## NSMTTPR Brochure

### About the College and Department

St.Stephen's College was founded in 1964 after the name of St.Stephen, the first martyr of Christianity. This College was the fulfillment of a long cherished desire of its founder, His Grace The Most Rev.Mar.Thoma Dionysius. The College was re-accredited B grade with CGPA 2.80 by NAAC in 2015. Now the College offers eight undergraduate courses, four Post graduate courses and a Research centre. The department of Physics stands as one of the best departments providing quality education in physics and emerged as a post-graduate department in the year 2001.

### Overview

The Seminar addresses the fundamental aspects of physics and applied physics with a view to generate a keen interest in the subject. It gives an exposure to some of the latest developments in the field of Physics; promote healthy competition among the young researchers to bring out their skills and competences and to translate their research findings to plan for industrial growth and Nation building. On behalf of the Management, Staff and Students of St.Stephen's College, Pathanapuram, we request your esteemed presence and participation to make the programme a grand success.

### Topics for Deliberation

- > Advances in Materials & New Materials
- > Organic materials & Biomaterials
- > Spectroscopy & Ultrasonics
- > Polymers & Polymer composites
- > Carbon Nanomaterials & Graphenes
- > Crystallography & Thin films
- > Micro/Nanoelectronic devices
- > Drug design & Drug delivery
- > Spintronics & MEMS Devices
- > Computation, Simulation & Modeling
- > Solar Energy & Energy Storing Devices
- > Sensors & Actuators.

### Call for Abstracts/Papers

The participants desirous to present paper in the seminar are requested to send the abstract by Email to [nsmtpr@gmail.com](mailto:nsmtpr@gmail.com). Abstract should be neatly typed in MS Word – Times New Roman, Font Size: 12, single spacing and single column. The manuscript of all accepted papers and invited talks will be published as Proceeding of the Seminar.

### National Advisory Committee

- > Prof. V.K.Rastogi, Editor, Asian Journal of Physics.
- > Dr.N.V.Unnikrishnan, Professor (Emeritus), School of Pure and Applied Physics.
- > Dr.Vijayamohan K. Pillai, Director, CSIR-CECRI, Tamilnadu.
- > Dr. Shivaji Sadale, Shivaji University, Maharashtra.
- > Dr.G.Suresh, Annamalai University, Tamilnadu.
- > Prof. Kuriakose Joseph, Former HOD, Department of Physics.

### Registration

Teachers / Scientists - Rs.500/-  
Research Scholars - Rs.100/-  
UG & PG Students - Rs. 100/-

### Travel & Accommodation

All registered delegates making presentation will be paid 2<sup>nd</sup> sleeper class to and fro train fare or bus fare. Accommodation will be arranged at their own expense, in local hotels, guest house or hostels only on request.

### Dates to Remember

Submission of Abstract : **10.10.2015**  
Intimation of Acceptance: **11.10.2015**  
Full Paper Submission : **15.10.2015**

### PRE-REGISTRATION FORM

## NATIONAL SEMINAR ON MODERN TRENDS IN PHYSICS RESEARCH

Name: .....

Designation: .....

Affiliation / Institution: .....

Address: .....

E-mail: .....

Telephone/ Fax: .....

Contributing a Paper .....(Yes/ No)

Manuscript of the paper enclosed.....(Yes/ No)

### Details of the Registration

D.D. / Cheque No .....

Dated: .....

Issuing Bank: .....

Branch: .....

Date: ..... Signature

(Registration fee may be sent as DD drawn in favor of "Principal, St. Stephen's College" payable at Pathanapuram. NEFT facility can be used. Account No. 57020335146, IFSC-0000072, MICR-691009154. Spot registration is also available.)



Invited Talk by Dr. Santhoshkumar, NIT, Trichy, Tamilnadu



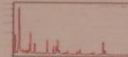
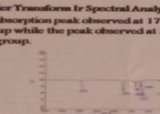
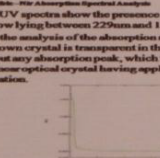
Invited Talk by Dr. Hubert Joe, Mar Ivanious college, Trivandrum

### Oral and Poster Presentations





**GROWTH AND CHARACTERIZATION OF SINGLE CRYSTAL L-SERINE**  
 RENITHA T & D. SATAN, St. STEPHENS COLLEGE, BISHOPMOORE COLLEGE, MYSURU, KARNATAKA

| ABSTRACT   | RESULT   | CONCLUSION   |
|--|--|--|
| <p>L-serine is an organic compound under an amino acid category. It is one of the naturally occurring protogenic amino acids. L-serine exists in a zwitterionic form, the molecule can combine with anionic, cationic and overall neutral constituents. This Project deals with the Growth and Characterization properties of the single crystal L-Serine. Single crystal of L-Serine, an organic nonlinear optical material have been synthesized by slow evaporation technique at room temperature. Various spectroscopic techniques were used for the crystal characterizations. The prepared crystal's powder X-ray diffraction pattern, FT-IR spectra and UV spectra were analyzed in this chapter. Through the PXRD (Powder X-Ray Diffraction) pattern, the structure of crystal was identified and through the medium of FT-IR spectra, the functional groups of crystal were identified. Crystal's optical properties were also studied using the graph of UV spectra. The UV-vis-NIR absorption spectra showed that L-Serine single crystal was transparent in the entire visible region with a lower cut-off at 229nm, making it a potential candidate for NLO applications.</p> | <p>The powder X-ray diffraction pattern for the grown single crystal L-Serine as shown in the fig.9. The appearance of sharp and strong peaks confirms good crystallinity of the grown sample.</p>  <p>Fourier Transform Infrared Spectral Analysis<br/>         The absorption peak observed at <math>1742.4\text{ cm}^{-1}</math> reported to <math>\text{COO}^{-2}</math> group while the peak observed at <math>519.84\text{ cm}^{-1}</math> is attributed to <math>\text{CH}_2</math> group.</p>  <p>UV-Visible-NIR Absorption Spectral Analysis<br/>         The UV spectra show the presence of a wide transparency window lying between 229nm and 1000nm with <math>\lambda_{\text{min}}=229\text{nm}</math>. From the analysis of the absorption spectrum, it is evident that the grown crystal is transparent in the entire visible region without any absorption peak, which is key requirement for any nonlinear optical crystal having applications in second harmonic generation.</p>  | <p>In conclusion, bulk size transparent single crystals of L-Serine were successfully synthesized by a slow solvent evaporation method at ambient environment. Powder XRD analysis and they agree well with the reported values. The presence of various functional groups of the grown crystal was confirmed by FTIR. The UV-vis-NIR absorption spectra showed that L-Serine single crystal was transparent in the entire visible region with a lower cut-off at 229nm, making it a potential candidate for NLO applications.</p>   |
| <p><b>METHODS</b></p> <ul style="list-style-type: none"> <li>• Powder X-Ray Diffraction Analysis</li> <li>• Fourier Transform Infrared Spectral Analysis</li> <li>• UV-Visible-NIR Absorption Spectral Analysis</li> </ul>   |  | <p><b>REFERENCES</b></p> <ul style="list-style-type: none"> <li>• E.V. Bokhryeva a,b,*, H. Sowa c, I. Yu. V. Seryotkin d, T.N. Dvornishchikov a,b, H. Abuhaba c, V. Cherepanov e, V. Dmitriev f - Pressure-induced phase transitions in crystalline L-serine studied by single-crystal and high-resolution powder X-ray diffraction.</li> <li>• S.I. Zulfinger Ali Ahamed i, G. R. Dhillip i, L. Manoj i, P. Rajkumar h, R. Deva Prasad Raj - Growth and characterization of a new NLO material, L-serine sodium nitrate. FOTONICS LETTERS OF POLAND, VOL. 2 (4), 183-185 (2010), Science Direct.</li> <li>• S. Jarmucha, I. Reva a, P.R. Carey b, R. Fausto - Infrared and Raman spectroscopic characterization of the hydrogen-bonding network in L-serine crystal. Vibrational Spectroscopy 43 (2007) 395-404, Science Direct.</li> <li>• D.S. Choudhary, J. Zyss, Nonlinear optical properties of organic molecules and crystals (Academic Press 1987).</li> </ul> |

A Poster from the Poster Presentation



Presidential Address by Prof. N.V. Unnikrishnan Nair (Prof. Emeritus, M.G. University, Kottayam)





Valedictory function



Issuing best presentation certificates



Vote of thanking by Dr. Ragesh chandran, the Convener, NSMTPR-2015

## Extension Activity

### **Awareness class on energy conservation through reduced consumption of electricity**

Department adopted the Thirumangadu Residents Association for conducting the extension activity. Every year department provides an awareness class on “How to reduce the consumption of electricity.” Energy audit of the residents of this association was done every month during the year. LED bulbs were distributed among them. This year the programme was on August 2015.