

## DEPARTMENT OF PHYSICS

### Key Performance indicators (6-14)

#### 6. Number of Hands on Experiment: Pre-support (2019-20)

Name of experiment
1. Fly Wheel - Moment of Inertia 2. Compound Bar Pendulum – Symmetric 3. Compound Bar Pendulum – Asymmetric
1. Spectrometer-A, D and n of a solid prism. 2. Spectrometer –Dispersive power and Cauchy's constants 3. Spectrometer Grating—Normal incidence- N & wavelength
1. Program to find the roots of a quadratic equation (both real and imaginaryroot) 2. Program to find the dot product and cross product of vectors 3. Program to plot the functions Sin x, Tan x and exponential x

Detailed list is attached

<http://www.snscivagirivarkala.com/document/Physics%20Hansds%20on%20expt.pdf>

#### 7. Number of Hands on Experiment: During or after support (2020-21)

Name of experiment
1. Spectrometer-A, D and n of a solid prism. 2. Spectrometer –Dispersive power and Cauchy's constants 3. Spectrometer Grating—Normal incidence- N & wavelength 4. Newton's Rings reflected system 5. Study of variation of refractive index of different salts with concentration using hollow prism

1. PN junction Diode (Ge & Si) characteristics-To draw the characteristic curves of a PN junction diode and to determine its ac and dc forward resistances.
2. Design and construction of different types of oscillators
1. Program to find the roots of a quadratic equation (both real and imaginary root)
2. Program to find the dot product and cross product of vectors

Detailed list is attached

<http://www.snscivagirivarkala.com/document/Physics%20Hansds%20on%20expt.pdf>

#### 8. Publications (Scopus indexed) /patents, if any.

<b>Pre-support 2019-20</b>	<p>1. Sajesh Sasidharan, " Nanostructured zinc aluminates: A promising material for cool roof coating", Journal of Science: Advanced Materials and Devices 4,(2019) 524-530, ISSN 2468-2179, date:20.10.2019, <a href="https://doi.org/10.1016/j.jsamd.2019.10.003">https://doi.org/10.1016/j.jsamd.2019.10.003</a></p> <p>2. Sajesh Sasidharan, " Perovskite titanates at the Nanoscale: Tunable luminescence by energy transfer and enhanced emission with Li<sup>+</sup> co-doping", Journal of Solid State Chemistry 288,(2020) 121449, ISSN: 0022-4596, Date: 16.05.2020, <a href="https://doi.org/10.1016/j.jssc.2020.121449">https://doi.org/10.1016/j.jssc.2020.121449</a></p> <p>3. Parvathi S. Babu, et al., White light emitting stannate pyrochlore based single phase phosphor CaLa<sub>1-x</sub>SnNbO<sub>7</sub> : x Dy<sup>3+</sup> for pc-white LED applications, Journal of Material Science Materials in Electronics, (2019), 30,16174-16183, ISSN No 09574522,1573482X, <a href="https://doi.org/10.1007/s10854-019-01986-7">https://doi.org/10.1007/s10854-019-01986-7</a></p>
<b>During/After support 2020-21</b>	<p>1. B.Jyothish, et al., Al- doped zinc ferrite nanoparticles : Preparation and evaluation of thermal, structural, morphological and anticancer properties, Journal of alloys and compounds :volume 863,15 may 2021,158352: <a href="https://doi.org/10.1016/j.jallcom.2020.158352">https://doi.org/10.1016/j.jallcom.2020.158352</a></p> <p>2. Sajesh Sasidharan "Solution combustion synthesis and luminescence dynamics of CaTiO<sub>3</sub>:Eu<sup>3+</sup>,Y<sup>3+</sup> nanophosphors", Journal of Luminescence 235 (2021) 118048, ISSN : 0022-2313, date: 09.03.2021, <a href="https://doi.org/10.1016/j.jlumin.2021.118048">https://doi.org/10.1016/j.jlumin.2021.118048</a></p> <p>3. K.C Preetha, Studies on structural, thermal, opto-electric and enhanced photoluminescence characteristics of newly synthesized ZrBiMo/ZrCeMo nanocomposites, Optik, Volume 241, September 2021, 167010 ISSN 0030-4026, <a href="https://doi.org/10.1016/j.ijleo.2021.167010">https://doi.org/10.1016/j.ijleo.2021.167010</a></p>

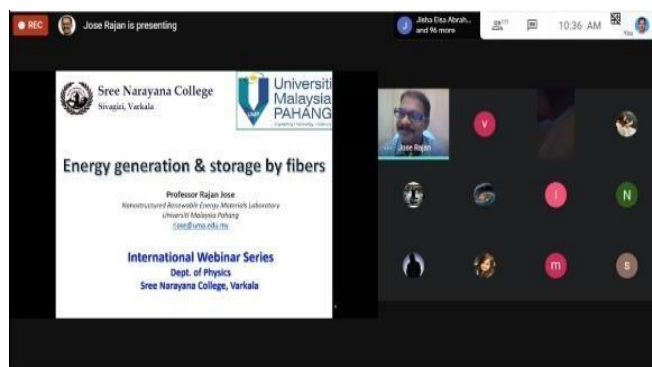
<b>8a) Other Publications</b> <b>2020-21</b>	B. Jyothish, et al., Effect of temperature on structural, morphological and bio properties of zinc ferrite nanoparticles. <a href="https://doi.org/10.13040/IJPSR.0975-8232.11(12).6391-01">https://doi.org/10.13040/IJPSR.0975-8232.11(12).6391-01</a>
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**9. Training received by faculty : NIL**

**10. Exhibitions / seminars / training courses conducted:**

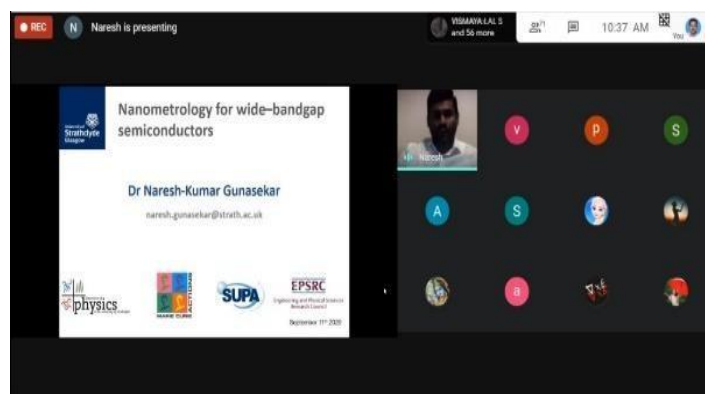
**Report of the invited talks: Lecture 1: 10.09.2020 : “ Energy Generation and Storage by Fibers”**

Prof. Rajan Jose (Faculty of Industrial Sciences and Technology, University of Malaysia, Pahang) graced the occasion by his presence. The session comprised of a talk on “Energy Generation and Storage by Fibers” followed by a discussion on the topic.



**Lecture 2: 11.09.2020 : “ Nano metrology for wide-bandgap Semiconductors”**

Dr. Naresh Kumar Gunasekar (Senior Research associate, Dept.of Physics, University of Strathclyde, John Andersin building, Glasgow, U.K) graced the occasion by his presence. The session comprised of a talk on “Nano metrology for wide-bandgap Semiconductors” followed by a discussion on the topic.



**Lecture 3: 05.12.2020 : Industry oriented hardware course basics and system components**

The webinar was hosted in the presence of Chief Guest Vidhu D; ZEANET. The webinar provided an opportunity to enrich the knowledge about computers and its uses. The talk included information on PC, basic features of PC, invention and later sophistication in the field of PC.

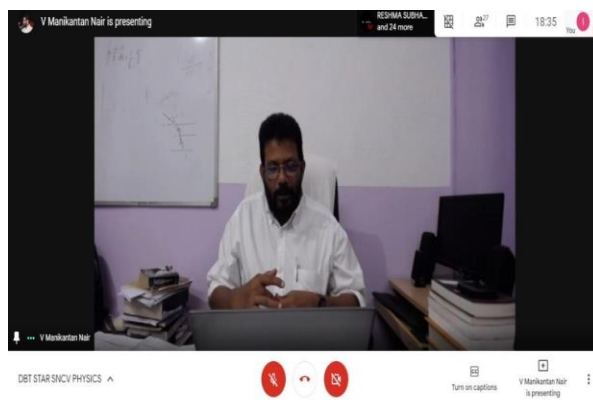


**Lecture 4: 16.02.2021 : Why Science?** The programme was hosted in the presence of Dr. R.Raveendran ( Emeritus Professor, UGC). He handled the session with his interacting method of communication skills on the topic Why Science? His speech included importance of science in life, how to create scientific approach, different scientific institutions across country and way to succeed life with the help of science learning.



**Lecture 5: 17.02.2021 : Elements of Statistical Mechanics**

The webinar was hosted in the presence of Dr. Manikandan Nair ( Principal-Rtd, Govt. College, Attingal). His speech included basics of statistical mechanics, micro and macro states, ensemble, phase space, derivations of different statistical approaches.



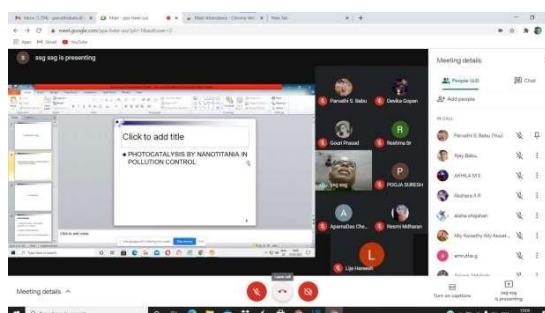
### **Lecture 6: 17.02.2021 : “What do postulates of Quantum Mechanics tell us?”**

The resource person for the invited talk was Dr.Renjith.R, Assistant Professor of Physics,Central Polytechnic College, Vattiyookavu, Thiruvananthapuram. He explained the topic in a simple way by touching the fundamentals of Classical Mechanics and Quantum Mechanics.



### **Lecture 7: 19.02.2021 : “Photocatalysis by Nanotitania in Pollution Control”**

The webinar on ‘Photocatalysis by Nanotitania in Pollution Control’ was inaugurated by Dr. Sugunan S., Emeritus Professor, Department of Applied Chemistry, Cochin University of Science



and Technology (CUSAT). The talk figured around the topic Photocatalysis and the role of Titanium Dioxide in Pollution Control.

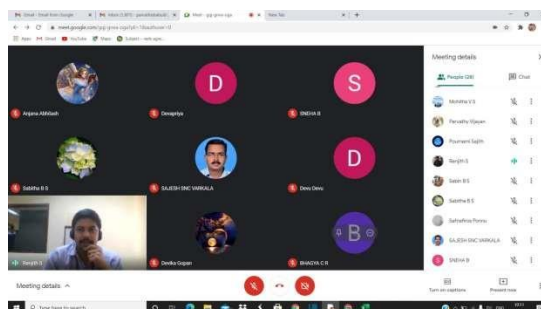
### **Lecture 8: 24.02.2021 : Super capacitors an Overview**

The invited chief guest Dr. R.B Rakhi, UGC-Assisstant Professor, Ramanujan Fellow, Department of Physics University of Kerala, Thiruvananthapuram delivered an excellent talk on the topic Supercapacitors. She gave a deep insight into the most promising energy storage device supercapacitors, which may fill the gap between secondary batteries and traditional batteries.



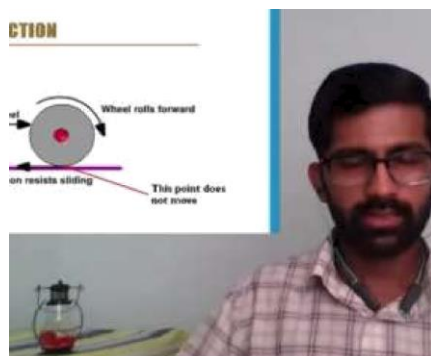
### **Lecture 9: 28.02.2021 : ‘Science and Humanity’**

The webinar on ‘Science and Humanity’ was inaugurated by Dr. Renjith S., Scientist B, Central Analytical Facility (CAF), DTQM, BMT Wing, Sree ChitraTirunal Institute for Medical Sciences and Technology (SCTIMST), Sattlemond Palace, Poojappura, Thiruvananthapuram.



### **Lecture 10: 09.03.2021 : “The Science of Road Safety”**

The chief guest Dr. Vaishakan Thampi D S, Assisstant Professor, M G College, Thiruvananthapuram delivered an excellent talk on the topic “The Science of Road Safety”. He gave a deep insight into the physics behind the motion of vehicles through examples. He expressed his views on how road accidents in India increase and how can reduce these accidents by knowing the physics behind the motion of vehicles.



### **Lecture 11: 31.03.2021 : Hands on training programme in C++**

The programme was arranged in motive of sharing knowledge and practical experience of Miss. Niranjananadh V.S, Php developer, Hiworth solutions, Techno Park, Thiruvananthapuram. She inspired the audience by lively interacting on topics such as C++ (Including theory and hands-on session).



**11. Books / Journals subscribed from grants:** list of books and journals subscribed have to been attached.

Website Link : [http://www.sncsivagirivarkala.com/Physics%20-%20List of Books and Journal.php](http://www.sncsivagirivarkala.com/Physics%20-%20List%20of%20Books%20and%20Journal.php)

**12. Outreach activities:** Nil

**13. Colleges mentored to apply for DBT star College grants :** Nil

**14. Invited Lectures :** 2

Detailed Report

Website Link : [http://www.sncsivagirivarkala.com/Physics\\_DBT-Detailed\\_Report.php](http://www.sncsivagirivarkala.com/Physics_DBT-Detailed_Report.php)

**Key Performance indicators (6-14)**

**6. Number of Hands on Experiment: Pre-support (2019-20)**

Name of experiment
1. Fly Wheel - Moment of Inertia 2. Compound Bar Pendulum – Symmetric 3. Compound Bar Pendulum – Asymmetric
1. Spectrometer-A, D and n of a solid prism. 2. Spectrometer –Dispersive power and Cauchy’s constants 3. Spectrometer Grating—Normal incidence- N & wavelength
1. Program to find the roots of a quadratic equation (both real and imaginaryroot) 2. Program to find the dot product and cross product of vectors 3. Program to plot the functions Sin x, Tan x and exponential x

Detailed list : [https://www.sncsivagirivarkala.com/physics\\_6.php](https://www.sncsivagirivarkala.com/physics_6.php)

#### 7. Number of Hands on Experiment: During or after support (2021-22)

Name of experiment
1. Study of variation of refractive index of different salts with concentration using hollow prism
2. Design and construction of different types of oscillators

Detailed list : <https://www.sncsivagirivarkala.com/physics%207.php>

#### 8. Publications (Scopus indexed) /patents, if any.

<b>Pre-support 2019-20</b>	1. Sajesh Sasidharan, " Nanostructured zinc aluminates: A promising material for cool roof coating", Journal of Science: Advanced Materials and Devices 4,(2019) 524-530, ISSN 2468-2179, date:20.10.2019, <a href="https://doi.org/10.1016/j.jsamd.2019.10.003">https://doi.org/10.1016/j.jsamd.2019.10.003</a>
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	<p>2. Sajesh Sasidharan, " Perovskite titanates at the Nanoscale: Tunable luminescence by energy transfer and enhanced emission with Li<sup>+</sup> co-doping", Journal of Solid State Chemistry 288,(2020) 121449, ISSN: 0022-4596, Date: 16.05.2020, <a href="https://doi.org/10.1016/j.jssc.2020.121449">https://doi.org/10.1016/j.jssc.2020.121449</a></p> <p>3. Parvathi S. Babu, et al., White light emitting stannate pyrochlore based single phase phosphor CaLa<sub>1-x</sub>SnNbO<sub>7</sub> : x Dy<sup>3+</sup> for pc-white LED applications, Journal of Material Science Materials in Electronics, (2019), 30,16174-16183, ISSN No 09574522,1573482X, <a href="https://doi.org/10.1007/s10854-019-01986-7">https://doi.org/10.1007/s10854-019-01986-7</a></p>
<b>During/After support 2021-22</b>	<p>1. K.C Preetha et al., Photocatalytic degradation of methylene blue using novel flower-like zirconium bismuth molybdate thin film, grown by temperature-assisted CBD method, Journal of Materials Science: Materials in Electronics, Volume 32, 22035–22045, August 2021 <a href="https://doi.org/10.1007/s10854-021-06664-1">https://doi.org/10.1007/s10854-021-06664-1</a></p> <p>2. K.C Preetha et al., Studies on structural, thermal, opto-electric and enhanced photoluminescence characteristics of newly synthesized ZrBiMo/ZrCeMo nanocomposites, Optik, Volume 241, September 2021, 167010 ISSN 0030-4026, <a href="https://doi.org/10.1016/j.ijleo.2021.167010">https://doi.org/10.1016/j.ijleo.2021.167010</a></p> <p>3. K.C Preetha et al., Synthesis and characterization of ZrO<sub>2</sub>/Bi<sub>2</sub>MoO<sub>6</sub> heterostructured thin films for optoelectronic and photocatalytic applications. Appl. Phys. A 128, 20 (2022). <a href="https://doi.org/10.1007/s00339-021-05161-w">https://doi.org/10.1007/s00339-021-05161-w</a></p> <p>4. K.C Preetha et al., Study on the structural, optical and dielectric properties of lead tin sulphide nanocrystals. Pramana - J Phys 95, 174 (2021). <a href="https://doi.org/10.1007/s12043-021-02200-2">https://doi.org/10.1007/s12043-021-02200-2</a></p> <p>5. Sajesh Sasidharan Solution combustion synthesized</p>

	<p>highly luminescent <math>\text{CaTiO}_3\text{:Gd}_2\text{O}_3\text{:Eu}^{3+}</math> perovskite nanophosphors for WLED applications, Journal of Science: Advanced Materials and Devices, October 2021, ISSN:2468-2284E-ISSN:2468-2179, <a href="https://doi.org/10.1016/j.jsamd.2021.11.002">https://doi.org/10.1016/j.jsamd.2021.11.002</a></p>
<p><b>8a) Other Publications/Conference presentations</b></p> <p><b>2021-22</b></p>	<ol style="list-style-type: none"> <li>1. K.C Preetha et al, An investigation on the Quantum Confinement Behavior of Copper Tin Sulphide Quantum Dots by Absorption Spectrophotometry, Proceedings of International Conference on “GREEN MATERIALS AND RENEWABLE ENERGY” ICGMRE, Sri Venkateswara College of Engineering, Kanchipuram, Tamil Nadu, India, June 2021</li> <li>2. K.C Preetha et al, Wet chemical synthesis and characterization of a novel mixed metal tungstate of zirconium and bismuth for opto-electronic applications, Proceedings of International Conference on “GREEN MATERIALS AND RENEWABLE ENERGY” ICGMRE, Sri Venkateswara College of Engineering, Kanchipuram, Tamil Nadu, India, June 2021</li> <li>3. Sajesh Sasidharan et al., 'Effect of <math>\text{Gd}^{3+}</math> ions on the optical properties of perovskite titanate phosphor', International Conference on ‘Recent Trends and Hurdles in Physical Science Research’(ICRTHP) at Department of Physics, Christ Nagar College, Maranalloor, Thiruvananthapuram on 27-28th October, 2021</li> <li>4. Dr Raji R, Visible light sensitive Plasmonic Photocatalytic activity of <math>\text{TiO}_2\text{:Au}</math> nanoparticles in the International Conference on Recent Trends and Hurdles in Physical Sciences Research (ICRTHP) organized by Christ Nagar College, Thiruvananthapuram on 27-28 December 2021</li> <li>5. Dr Raji R, Sunlight driven Photocatalytic activity of <math>\text{TiO}_2\text{:Au}</math> nanostructures in the International conference on Energy, Environment and Health (INFOFEST 2021)</li> </ol>

	organized by Sree Ayyappa College, Eramallikara on 31 December 2021
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## 9. Details of training received by faculties

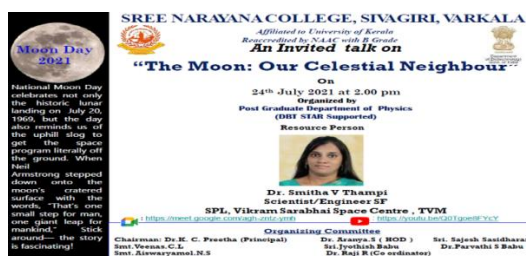
Detailed list : [https://www.snscivagirivarkala.com/Annexure\\_II.php](https://www.snscivagirivarkala.com/Annexure_II.php)

## 10. Report of the seminars/training : 7

### 1. Reading week celebration: “ഭൂതികം” BHAUDHIKAM <https://youtu.be/KcI5heXVTrE>

Reading day is celebrated every year on June 19 in honour of P.N. Panicker, the father of India's library movement. As a part of this reading week, the students of Physics department shared their thoughts and experience of the books they have read in the form a video presentation, BHAUDHIKAM (ഭൂതികം). The video was published on 4th July 2021.

### 2. The Moon: Our Celestial Neighbour



The P G Department of Physics, Sree Narayana College, Sivagiri, Varkala organized an invited talk on “The Moon: Our Celestial Neighbour” on 24th July 2021 at 2.00 pm as part of Moon Day. The session was hosted in the presence of invited guest, Dr. Smitha. V Thampi, Scientist, SPL, VSSC, Thiruvananthapuram.

### 3. Introduction to Python Programming

<https://youtu.be/I9ste8qm31A>

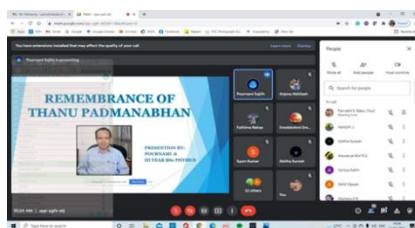
The Post Graduate Department of Physics, Sree Narayana College, Sivagiri, Varkala funded by DBT STAR Scheme conducted a webinar on “Introduction to Python Programming” on 26.08.2021 at 11.00 am in association with IQAC. The webinar was hosted in the presence of Dr. Prem Sankar C (Lecturer on contract, University of Kerala & co-founder of Waggle Lab, an academic start-up).

#### 4. Online Science Quiz Competition 2021-“Curiosity”

On the occasion of 102nd birth anniversary of Dr. Vikram Ambalal Sarabhai, Department of Physics of Sree Narayana College, Sivagiri, Varkala organized an Online Science Quiz Competition 2021-“Curiosity” in association with IQAC. The quiz competition was conducted on 27.08.2021 at 10 am in the online mode.

#### 5. “Remembering Prof. Thanu Padmanabhan” and Science Education in India

The Post Graduate Department of Physics in association with the IQAC, Sree Narayana College Sivagiri Varkala, conducted a programme on “Remembering Prof. Thanu Padmanabhan” and Science Education in India.



#### 6. National Science Day Celebrations

‘P.G. Department of Physics’ conducted ‘National Science Day – 2022 Celebrations - ‘LUMIERE SCIENTIA’-in our college with the support of ‘Academy of Physics teachers Kerala. As per the schedule we have conducted online inter colligate quiz competition on the topic “Inventions of Physics” on 26th February 2022 at 6:00 PM. On 28th February 2022, One day seminar on ‘The nuclear energy: The need, The perception and Reality’ was inaugurated by Shri. A.V. Satheesh, Scientific Officer, Nuclear Power Plant, Kudamkulam.



In the afternoon session, Department of Physics organized a science exhibition on in our laboratory, wherein students showcased static and working models which can be used for learning various scientific concepts for children of nearby schools and our students. Students had made still models, working models, charts and posters to present their topics..

#### 7. Trendz Seminar: “How do we determine what is true?”

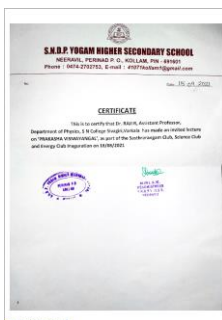
As part of Trendz Seminar Series, Post Graduate Department of Physics and IQAC of Sree Narayana College, Sivagiri,Varkala in association with Department of Future Studies, University of Kerala organized an Invited Talk supported by Department of Bio-Technology ,Govt.of India on 23.03.2022

at 10.30 am in the Seminar Hall. Topic for the invited talk was “How do we determine what is true?”.

**11. Book/ Journal subscribed from grants: Nil**

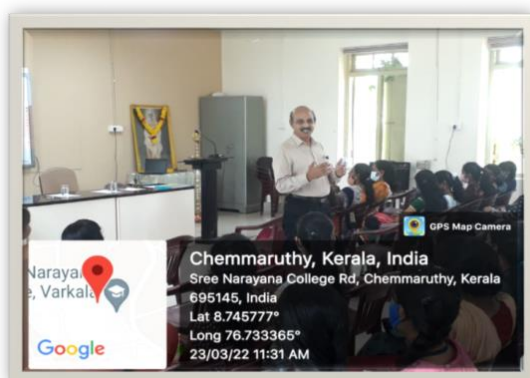
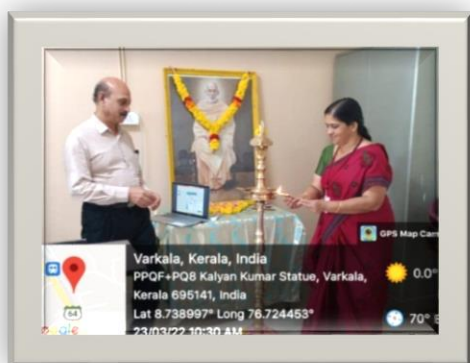
**12. Outreach Activities: 1**

Dr Raji R: invited talk on “PRAKASHA VISMAYANGAL” organized by SNDPYHSS, Neeravil, Kollam as part of Science Club, Energy Club inauguration.



**13. Colleges mentored to apply for DBT STAR college grants: Nil**

**14. Invited Lectures: 1**



As part of Trendz Seminar Series, Post Graduate Department of Physics and IQAC of Sree Narayana College, Sivagiri, Varkala in association with Department of Future Studies, University of Kerala organized an Invited Talk supported by Department of Bio-Technology, Govt. of India on 23.03.2022 at 10.30 am in the Seminar Hall. Dr. Aranya. S (Head of the Department, Physics) gave the welcome speech. Dr. K.C. Preetha, Principal of this college delivered the Presidential Address.

**Detailed Report**

[https://www.sncsivagirivarkala.com/Physics\\_Detailed\\_report\\_DBT\\_Programmes\\_2021-22.php](https://www.sncsivagirivarkala.com/Physics_Detailed_report_DBT_Programmes_2021-22.php)

**Key Performance indicators (6-14)**

6. Number of Hands on Experiment: Pre-support (2019-20)

Name of experiment
1. Fly Wheel - Moment of Inertia
2. Compound Bar Pendulum – Symmetric
3. Compound Bar Pendulum – Asymmetric
1. Spectrometer-A, D and n of a solid prism.
2. Spectrometer –Dispersive power and Cauchy’s constants
3. Spectrometer Grating—Normal incidence- N & wavelength
1. Program to find the roots of a quadratic equation (both real and imaginaryroot)
2. Program to find the dot product and cross product of vectors
3. Program to plot the functions Sin x, Tan x and exponential x

List: [https://www.sncsivagirivarkala.com/physics\\_6.php](https://www.sncsivagirivarkala.com/physics_6.php)

#### 7. Number of Hands on Experiment: During or after support (2022-2023)

Name of experiment
1. study to determine the refractive index of air and different liquids with the Newton’s ring apparatus.
2. Determination of Planck’s constant using Photoelectric Apparatus
3. Determination of magnetic susceptibility of paramagnetic substance using Quinck’s method
4. Synthesis of Nanoparticles.
5. Design and construction of different types of oscillators
6. Microprocessor

etailed list : <https://www.sncsivagirivarkala.com/physics%207.php>

Publications (Scopus indexed) /patents, ifany. Nil

#### 8. Details of training received by faculties

Detailed list : [https://www.sncsivagirivarkala.com/Annexure\\_II.php](https://www.sncsivagirivarkala.com/Annexure_II.php)

Report of the seminars/training : 6

#### 1. Seminar “Flexible and PrintedElectronics for Strategic and Societal Applications”





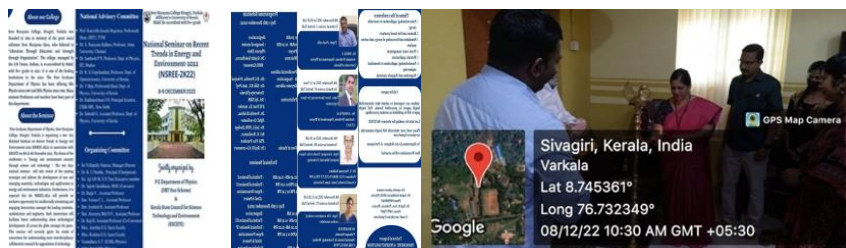
As part of Trendz Seminar Series, Post Graduate Department of Physics and IQAC of Sree Narayana College, Sivagiri,Varkala organized an Invited Talk supported by Department of Bio- Technology (DBT) Govt.of India on 15.11.2022 at 11.00 AM in the Seminar Hall.

## 2. “ A Hands-on training on LED Fabrication”

A hands on training on LED Fabrication was organized by P G Department of Physics in association with Department of Optoelectronics, University of Kerala, Kariavattom supported by Department of Bio-Technology (DBT), Govt. of India on 30/11/2022 at the MSc Lab.



## 3. National Seminar on Recent Trends in Energy and Environment-2022(NSREE-2K22)



The National Seminar on Recent Trends in Energy and Environment-2022 (NSREE-2K22) was jointly organized by the Post Graduate Department of Physics and IQAC, Sree Narayana College, Sivagiri, Varkala in association with Kerala State Council for Science Technology and Environment (KSCSTE) supported by Department of Bio-Technology(DBT), Govt. Of India on 8th & 9th December 2022.

## 4. Industrial Visit at Kudankulam Nuclear Power Plant on 11/1/2023

The PG department of physics is arranged an industrial visit at Kudankulam Nuclear Power Plant at Tamil Nadu for the final year degree students on 11/1//2023.



## 5. Night sky observation camp “Beyond the Skies:Chasing wonders”



The night sky observation camp “Beyond the Skies: Chasing wonders” was conducted on 23.01.2023 at 4.30PM in association with Amateur Astronomers Organization supported by Department of Bio- Technology (DBT), Govt. of India. **Science Exhibition on 24/02/2023**



As part of the National Science Day celebrations 2023, the PG Department of Physics in association with Chemistry, Botany and Zoology organizes a Science Exhibition at college on 24 february 2023 from 9.30 am to 12.30 pm.

## 6. World Environmental day celebrations 5/6/2023



As part of World Environmental Day celebrations, PG department of physics organizes various programmes includes poster presentations and planting of saplings in the college premises.



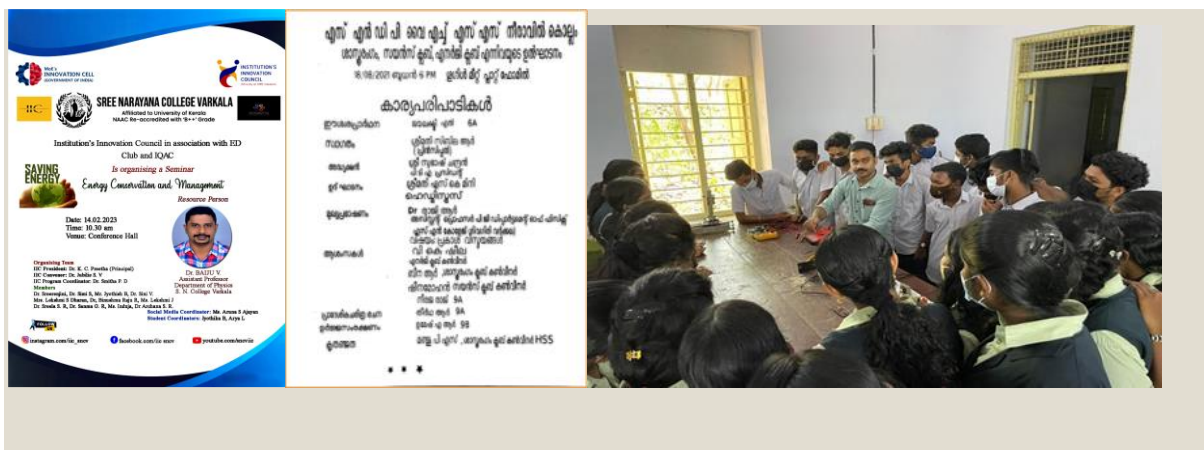
Detailed report:

<http://www.sncsivagirivarkala.com/report.php>

**Books/ Journals subscribed – Nil**

## **12.Outreach activities:**

Br Baiju V: Invited talk on 'Energy Conservation & Management' on 14.02.2023 organized by Institution's Innovation Council in association with ED club and IQAC, S N College, Sivagiri, Varkala.



**13. Colleges mentored to apply for DBT star College grants : Nil**

**14. Invited Talk :** Dr. S. Narayana Kalkura (Professor- UGC-BSR FACULTY FELLOW Crystal Growth Centre Anna University) a made an invited talk on the topic “Emerging Trends in the Nature Inspired Materials Technology” on 9/12/2022. Dr. Rakhi R.B. (Principal Scientist, Material Science & Technology Division CSIR-NIIST, TVPM) made an invited talk an invited talk on “The wonderful world of carbonnanotubes” on 9/12/2022



