

**SEMINAR NO: 16**

**NAME\_OF THE DEPARTMENT:** PHYSICS

**TITLE OF THE SEMINAR:** INTERNATIONAL WEBINAR ON MATERIAL SCIENCE

**DATE:** 23-09-2020 to 25-09-2020

# **International Webinar on Material Science**

**23,24 &25 September 2020**



*Organized by*

**Department of Physics  
St John's College Anchal**



# ST. JOHN'S COLLEGE

MAR GREGORIOS NAGAR, ANCHAL, KERALA, INDIA

RE-ACCREDITED WITH A GRADE BY NAAC

## INTERNATIONAL WEBINAR ON "MATERIAL SCIENCE"

23, 24 & 25  
September 2020

ORGANISED BY

Department Of Physics  
in association with

**IQAC**

ST. JOHN'S  
COLLEGE  
ANCHAL



SPONSORED BY

DBT STAR COLLEGE SCHEME, GOVT. OF INDIA

### ORGANIZING COMMITTEE:

**Dr. Bright K C**  
(Head of the Department)

**Dr. Praveen S G**  
(Convener)

**Dr. Sreeja R**  
**Mr. Varun S V**

### ADVISORY COMMITTEE:

**His BEATITUDE MORAN MOR BASELIOS CARDINAL CLEEMIS CATHOLICOS**  
(Chief Patron)

**Rev. Fr. Johnson G**  
(Principal)



Join us on Google Meet



For registration [Click here](#) or Scan QR Code

"E-CERTIFICATES WILL BE PROVIDED FOR REGISTERED PARTICIPANTS"

physics@stjohns.ac.in

www.stjohns.ac.in

+91 8547492267, +91 8281387475



# ST. JOHN'S COLLEGE

RE-ACCREDITED WITH A GRADE BY NAAC

MAR GREGORIOS NAGAR, ANCHAL, KERALA, INDIA

## INTERNATIONAL WEBINAR ON "MATERIAL SCIENCE"

Organised by Department of Physics in association with IQAC  
and sponsored by DBT Star College Scheme, Govt. of India

### PROGRAMME SCHEDULE

#### INAUGURAL SESSION (23 /09 /2020)

- 10.00 am : Prayer Song
- 10.03 am : Welcome address  
*Dr. Bright K C (HOD)*
- 10.05 am : Inaugural address  
*His Beatitude Moran Mor Baselios Cardinal Cleemis Catholicos (Chief Patron)*
- 10.15 am : Felicitation  
*Rev. Fr. Johnson Puthuvellil (Principal)*
- 10.20 am : Vote of thanks  
*Dr. Sreeja R*

#### TECHNICAL SESSION I (23 /09 /2020)

- 10.30 am  
Speaker : *Dr. Renjith Kumar K M*  
Topic : Magnetic frustration: When magnetism meets geometry

#### TECHNICAL SESSION II (24 /09 /2020)

- 04.00 pm  
Speaker : *DR. UROŠ JAGODIČ*  
Topic : Formation of topological defects in systems with non-trivial geometry

#### TECHNICAL SESSION III (25 /09 /2020)

- 09.00 am  
Speaker : *Dr. AneeshPrabhakaran*  
Topic : Ion mobility mass spectrometry for structural characterization

#### TECHNICAL SESSION IV (25 /09 /2020)

- 02.00 pm  
Speaker : *Dr. Pavan Kumar Naik*  
Topic : Introduction to superconductivity and recent developments
- 03.00 pm : Feedback from participants
- 03.10 pm : Vote of thanks  
*Dr. Praveen S G (Convener)*

NB: All times mentioned here are in Indian Standard Time(IST).



## SPEAKERS



**DR. S PAVAN KUMAR NAIK**

**23<sup>rd</sup> SEPT, IST 10:30 AM - 11:30 AM**

TOKYO UNIVERSITY OF SCIENCE  
JAPAN

### INTRODUCTION TO SUPERCONDUCTIVITY AND RECENT DEVELOPMENTS

Superconductivity is the flow of electric current with no loss and exhibiting perfect diamagnetism in certain materials as temperatures cool down to its characteristic critical temperatures. Based on these, they hold great potential for several engineering applications such as high current transmission cables, superconducting electromagnets, magnetically levitating trains, levitating platforms, magnetic resonance imaging, nuclear magnetic resonance, trapped field magnets, friction-free flywheel, energy storage, motors etc. I will outline the fascinating history of superconductivity, starting with its discovery, classification, physical properties and various phenomena. In this talk, I will also introduce the recent developments of high temperature superconducting materials growth techniques, and their properties useful for various practical applications, especially for generating high magnetic fields.

**24<sup>th</sup> SEPT, IST 02:00 PM - 03:00 PM**

**DR. RANJITH KUMAR K M**

LABORATOIRE NATIONAL DES CHAMPS MAGNÉTIQUES INTENSES, LNCMI/CNRS  
FRANCE

### MAGNETIC FRUSTRATION: WHEN MAGNETISM MEETS GEOMETRY

Magnetic frustration, which arises from the competing interactions between the spins, has been at the center of intense experimental and theoretical investigations for many years. It has been proven to be a fruitful guideline to find exotic ground states and novel quantum phenomena. One of the important manifestations is the formation of the quantum spin liquid (QSL) ground state, which is a highly entangled and degenerate spin state without any symmetry breaking even at zero temperature. Search for and understanding these new states of matter is an open challenge for the condensed matter physics research



**DR. UROŠ JAGODIČ**

**24<sup>th</sup> SEPT, IST 04:00 PM - 05:00 PM**

DEPARTMENT OF CONDENSED MATTER PHYSICS. JOŽEF STEFAN INSTITUTE, JAMOVA  
SLOVENIA

### FORMATION OF TOPOLOGICAL DEFECTS IN SYSTEMS WITH NON-TRIVIAL GEOMETRY

This work comprises three parts. In the first part, we study the formation of topological defects surrounding colloidal particles of various geometries immersed in liquid crystals. The impact of extreme geometry, such as a fractal, on the number of topological defects formed around the particles is studied. We print hollow prisms with fractal base of several iterations to study this effect. In the second part, we study the thermal properties of thin nematic layers as they are fast cooled through the phase transition. For this purpose we develop an experimental technique allowing us to measure the time dependence of the temperature inside the liquid crystalline sample cell with the liquid crystal medium acting as a fast thermometer. In the third part, we develop and use a femtosecond incoherent illumination system and a stroboscopic imaging technique to study the formation of nematic ordering as the liquid crystal is cooled. This allows us to study the process with nanosecond resolution, which is at least six orders of magnitude faster than previous observations. Due to the random nature of the isotropic nematic phase transition we study the process by stroboscopic imaging. We combine the data from the observation of the fast cooling through the phase transition with the temperature measurements to determine the supercooling of the isotropic phase for up to 500  $\mu$ s or in terms of temperature up to 10°C below the phase transition.

**25<sup>th</sup> SEPT, IST 09:00 AM - 10:00 AM**

**DR. ANEESH PRABHAKARAN**

BRUKER DALTONIK GMBH GERMANY  
A SUBSIDIARY OF BRUKER CORP. USA

### ION MOBILITY MASS SPECTROMETRY FOR STRUCTURAL CHARACTERIZATION

The demand for chemical characterization of materials are fast growing because it needs thorough knowledge of structural and chemical properties in the field of material science, nanotechnology, drug development, virology etc. There are many analytical techniques existing now for the study and characterization of materials (including organic). Mass spectrometry is one of the highly sensitive and accurate technique to analyze the molecules ejected from surfaces. Recently, a sister technique called Ion Mobility Spectrometry is used in tandem with Mass Spectrometers for detailed characterization, whereas both techniques are orthogonal, the information obtained from both techniques provide a detailed information of the samples under study. Herein, I present the fundamental concepts and recent developments in Ion Mobility Mass Spectrometry.



## **Report on Seminar and Invited Talk**

The St. John's College, Anchal, Physics Department hosted the International Webinar on Material Science. Dr. PRAVEEN S G, Assistant Professor, Department of Physics, St. John's College, Anchal, organized and called the entire program with the help of Drs. K.C. Bright, Sreeja R, and Varun S V. The event began with a prayer song. Dr. K. C. Bright, the head of the physics department at St. John's College in Anchal, then formally welcomed everyone and introduced the guests to the attendees. The group heard a presidential address from Principal Rev. Fr. Johnson Puthuvellil. The manager and patron of St. John's College, His Beatitude Moran Mor Basalios Cardinal Cleemis Catholicos, gave the seminar its start. In accordance with the schedule provided above, the knowledgeable presenters discussed current developments in materials science and had productive conversations with the audience. The program concluded with a vote of gratitude from the convener, Dr. PRAVEEN S. G., an assistant professor in the Physics Department. A total of 120 students were participated in the entire program.

The complete presentation was broadcast on St. John's College, Anchal's Physics Department's YouTube page. The URL is provided below.

<https://www.youtube.com/@departmentofphysicsstjohns348/featured>

Dr.PRAVEEN S G

Dr.Bright K C

**(Convener /Coordinator)**

**The Head, Department of Physics**