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Representative image of "Astrosat", Courtesy: ISRO

CEFIPRA

FORGING NEW BRIDGES

Newsletter of the Indo-French Centre for the Promotion of Advanced Research

EDITOR'S NOTE

The current issue comes amidst challenges and opportunities arising from the COVID-19 pandemic. There is growing speculation that this pandemic is much more complex than it was initially prophesied. Rapid diagnosis and equal access to safe & effective vaccine is the only way to conquer this pandemic. Multiple teams from Indian and French research institutions & pharmaceutical industries have designed potential vaccines, around 30 vaccine candidates in India are under various phases of development and 12 research teams in France are involved in COVID-19 vaccine development projects. COVAX, a global initiative led by the Coalition for Epidemic Preparedness Innovations (CEPI), Global Alliance for Vaccines and Immunization (GAVI), and the World Health Organization (WHO) are working with governments and major pharmaceuticals to ensure that vaccines are available to masses. This initiative has received significant financial funding from France and engagements from 172 nations including India. COVAX has the most diverse COVID-19 vaccine portfolio.

'Feluda', a low-cost testing method indigenously developed by Council of Scientific and Industrial Research (CSIR)-Institute of Genomics and Integrative Biology (IGIB), can detect the novel coronavirus accurately in less than 30 minutes. It is the world's first diagnostic paper based test to use a specially adapted Cas9 protein for successful detection of the virus. Whereas, in France, real time reverse transcription PCR Kit, 'GeneStore Detection Expert' was launched by GeneStore France. It can detect SARS CoV2 in less than 1 hour delivering 100% accurate result with exceptional sensitivity and specificity.

An Indo-French team of researchers led by Dr. Kanak Saha from the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune and Prof. Françoise Combes from Sorbonne University, Paris, discovered one of the farthest star galaxies in the Universe, estimated to be located 9.3 billion light years away from the Earth. Prof. Combes has been conferred with 'CNRS 2020 Gold Medal', one of the highest French scientific distinctions for this outstanding achievement and brilliant research career.

The other success stories emanated from collaborative efforts are in the area of Machine Learning for Network Analytics (MALENA), this DST, CEFIPRA and Inria project successfully addressed major strategic issues in network inference, network algorithms and network dynamic strategy. Another project (EMATs) concerning with aerospace sector was also impactful towards developing a thorough understanding of physics of the interaction of simple harmonic waves with adhesive lap joint and addressing how interfacial strength affects the propagation and sensor development.

We look forward to further strengthen this platform to bring together diverse aspects of Indo-French project outcomes along with CEFIPRA activities.

In such critical times, I wish all the readers to keep safe and healthy.

Dr. Purnima Rupal
Director, CEFIPRA

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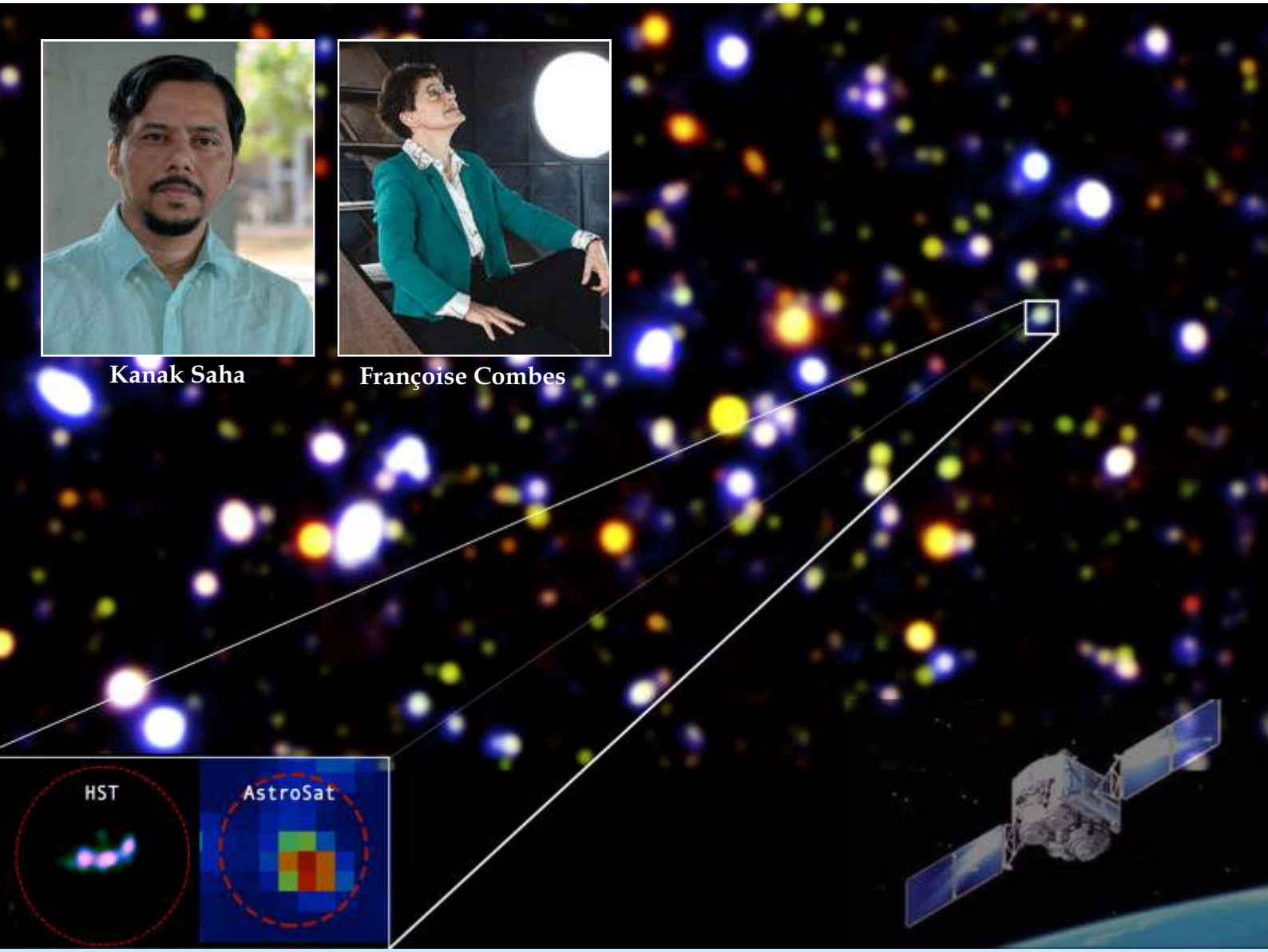
ASTROSAT DISCOVERS A Z=1.42 GALAXY EMITTING EXTREME-UV PHOTONS

India's first multi-wavelength satellite, which has five unique X-ray and ultraviolet telescopes working in tandem, AstroSat, has detected extreme-UV (EUV) light from a galaxy, called AUDFs01, 9.3 billion light-years away from Earth. At the time, our universe was forming stars at its peak rate. Such EUV radiation has enough energy (greater than 13.6 eV) to ionize a hydrogen atom by liberating its electron from the nucleus's influence. The EUV photons emitted by galaxies like AUDFs01 could play a crucial role in reionizing the early universe soon after the Cosmic Dark Age.

After the Big Bang, the universe was hot plasma composed of particles such as protons, neutrons, electrons, etc. As the universe started to cool, the protons and neutrons began combining into ionized atoms of hydrogen and some helium. These ionized atoms of hydrogen and helium attracted electrons, turning them into neutral atoms, allowing light to

Kanak Saha

Françoise Combes



Combined four-colour image of the AstroSat Uv Deep Field (AUDF). Red and green colours from Hubble Space Telescopes (HST) while cyan and dark blue are from AstroSat. AUDFs01 is in the square box. Highlighted images in the boxes below are from HST and AstroSat. Image Credit: Kanak Saha (IUCAA).

travel freely for the first time since this light was no longer scattering off the free electrons. The universe was no longer opaque! But there were no stars, and no galaxies, and the universe was dark. The dark phase lasted from about 400 thousand years to about a few hundred million years since the Big Bang.

The Cosmic Dark Age ended when the first stars and galaxies started forming. The energy pouring out from them ionized the hydrogen and helium, splitting the atoms back again in protons and electrons - this is the epoch of reionization. Today, most of the matter between galaxies and us are indeed in this state.

Astronomers have been looking for sources that reionized the early universe. The usual suspects have been the first astronomical objects, especially the small newborn galaxies. But observing ionizing radiation from these sources is next to impossible. The probability that a fraction of EUV photons escaped the host galaxy and caught by a telescope on Earth is practically zero. These photons will be absorbed by the gas within the galaxy or the gas surrounding the galaxy or the matter between the galaxy and us. As a result, only a handful of such sources are discovered to date, some at redshift less than 0.4 and others between 2.5 and 3.5.

The redshift gap from 0.4 to 2.5 remained barren until the wide-field UltraViolet Imaging Telescope (UVIT) onboard AstroSat made its first discovery of AUDFs01 at redshift 1.42. AUDFs01 became the first example of a galaxy leaking ionizing radiation at 600 Å. This wavelength regime is crucial to understand models of stellar population, especially the massive, hot stars in early galaxies, and AUDFs01 offers the first observational constraint in this regard. In other words, the galaxy is not only bridging the gap between the low and high redshift regime at present, but it is also the beginning of a whole new exploration of star-forming galaxies at EUV wavelength.

AUDFs01 is also the first example of a leaking galaxy with clumpy morphology. This galaxy has four clumps and, perhaps, typical of star-forming galaxies in this redshift range. It was a challenging task to confirm their membership to the galaxy, thanks to the HST grism observation, which we utilized to make a two-dimensional mapping that, in turn, allowed to do so.

A large part of the time was spent making the AstroSat Uv Deep Field south (AUDFs) in the far-UV and near-UV filters of UVIT. This involved testing the pipeline at various development stages, carefully rejecting the cosmic ray affected frames, and finally, the astrometric correction. The last part was a crucial step. AUDFs01 is a small, low-mass galaxy. In the far-UV band, its magnitude is $\sim$ 26 AB mags, and the galaxy's angular size is about one arcsec, which corresponds to 2.4 sub-pixel of UVIT. This required astrometric accuracy at the sub-pixel level or less. With the current data, we reached an astrometric precision of $\sim$0.3 arcsec. Such a precision helped us then mapping the UVIT sources with HST archival data in optical and infrared bands in the same patch of the sky. The current version of the AUDF-south (AUDFs) can be used to detect a number of such EUV galaxies from redshift 1 and 2 (when cosmic star-formation rate had its peak) and thus, AstroSat may allow us to refine our scenario of cosmic reionization.

This project has been accomplished via a collaboration of astronomers from different countries with complementary expertise. Of them, Prof. Combes and myself are connected by CEFIPRA thread. One of the goals of our project (CEFIPRA 5804-1) is to understand how galaxies grow their stellar mass in the high-redshift universe. This requires an estimation of the recent star-formation rate and mass of the gas reservoir in the galaxy. We could use AstroSat's far-UV observation to estimate the recent star-formation rate, but we did not have a pointed observation of AUDFs01 with ALMA. It was during June 2019, when this project was in its peak pace, I took the opportunity to visit Prof. Combes using CEFIPRA's funding. We discussed several issues regarding gas and dust content in AUDFs01. Prof. Combes, an expert on gas physics in galaxies, obtained an upper limit on the gas mass based on the noise in ALMA 1mm observation using archival data on the same patch of the sky and calibration of continuum dust emission to gas mass. Later, the gas mass derived from our SED analysis was found to agree with the upper limit from derived from ALMA data. The inputs from Prof. Combes have been invaluable throughout the project.

We have been granted time for another set of observations by ISRO (with myself as the principal investigator and Prof. Combes as one of the co-investigators) with far-UV of the same field to make the current AUDF-south even deeper.

During my trip to France, I also met a few other collaborators who are co-author in this paper and gave a talk in the European Week of Astronomy and Space Science (EWASS) 2019. I was also a co-organizer of a special session called "Extragalactic UV astronomy: Challenges and Future prospects" at the same conference. I appreciate the support I have received so far from CEFIPRA.

Reference:
K. Saha et al., Astrosat detection of Lyman continuum emission from az1.42 galaxy, Nat. Astron. (2020). https://doi.org/10.1038/s41550-020-1173-5

Team members:

Kanak Saha, Shyam Tandon & Abhishek Paswan (all from IUCAA, India); Anshuman Borgohain (Tezpur University, India); Anne Verhamme, Charlotte Simmonds & Daniel Schaerer (all from Geneva Observatory, Switzerland); Francoise Combes (Observatoire de Paris, LERMA, France); Michale Rutkowski (Minnesota State University-Mankato, USA); Bruce Elmegreen (IBM Research Division, USA); Debra Elmegreen (Dept. of Physics and Astronomy, Vassar College, USA); Akio Inoue (Waseda Research Institute for Science and Engineering, Japan); Mieke Paalvast (Leiden Observatory, The Netherlands)

ELECTRONIC MEDIA COVERAGE:


THE TIMES OF INDIA

Extreme UV light from galaxy detected by AstroSat can give important clue on Dark Ages: DST

NEW DELHI: India's first multi-wavelength satellite AstroSat has detected extreme-UV (EUV) light from a galaxy 9.3 billion light-years away from Earth, uncovering an important clue on how the Dark Ages of the


EET INDIA

Scientists Uncover Clue of How First EUV Light Appeared

Article By : PIB Delhi

Category : Communications 2020-10-06 (0) Comments

There are indeed many compelling stories of profound science resulting from India's active international collaborations in the frontier areas with over 40 countries: Prof Ashutosh Sharma, Secretary, DST


Research Matters

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FOX EXCLUSIVE

Outrageous UV Light from Galaxy Recognized by AstroSat Can Provide Significant Insight on Dark Ages: DST

By Shweta Ranjan Saturday, 3 October 2020, 14:04 EDT


AstroSat discovers tell-tale signs of cosmic evolution from a young, dynamic galaxy

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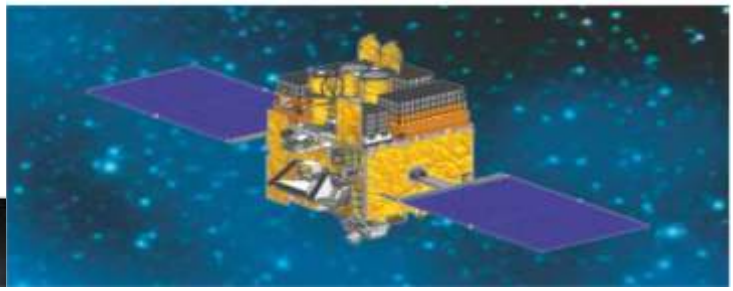
Bengaluru Aug 24, 2020, (Research Matters):



ADHESIVE BOND INSPECTION TECHNIQUE DEVEL OPMENT USING ELECTROMAGNETIC ACOUSTIC TRANSDUCER (EMATS) FOR AEROSPACE COMPANY

People from IITM Principal Investigators

Prabhu Rajagopal
Professor,Department of
Mechanical engineering
Indian Institute of Technology, Madras

Krishnan Balasubramaniam
Professor,Department of
Mechanical engineering
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In a Nutshell

Adhesively bonded joints are extensively used in the aerospace and automobile industry. Compared to other mechanical joining techniques, they offer advantages such as ease of bonding, high strength to weight ratio, uniform stress distribution, crash resistance, etc. Bonded structures are often prone to defects which are classified depending on where they occur as (1) cohesive defects, i.e., weakness in the adhesive layer (2) adhesive defects or poor adhesion, which happens at the interface between adhered and adhesive. Adhesive defects, also termed as imperfect bonding in general, can occur in the form of a partial bond, kissing bond, slip bond, depending on the nature of contact at the interface. Since these structures are prevalent in safety-critical applications, compromise of interface quality leads to premature failure, and hence assessing the integrity of the bonding is crucial. Particularly, detecting weak bonds is challenging since the task here is to identify defects confined in the interface layer whose thickness is of the order of a micrometer. A survey of the current state of the art in industrial practice, as well as relevant literature, shows that there is an urgent need as regards NDE methods for the characterization of the adhesive bonding of structures. Hence, the EMAT based Shear Horizontal (SH) wave technique is proposed for the inspection of adhesive bonds. SH waves are employed because the data measured using the shear component of vibration can be directly correlated to the shear strength of the bonded joints

Role of Center for nondestructive evaluation, Indian Institute of Technology, Madras

The objective of this project is to develop a guided wave based method to inspect the stiffness of an adhesively bonded structure. The current project is a collaboration between the Indian Institute of Technology Madras (IITM), Indian Institute of Science Bangalore, University of Bordeaux, France, and Ariane Group, France. The role of IITM is to develop.

1. Development of Multiphysics EMAT model
2. 3D finite element model for Shear Horizontal wave propagation in aluminum and composite lap joint
3. Design and Development of Electromagnetic Acoustic transducer (EMATs)
4. Experimental validation on aluminum and composite samples provided by Ariane group

Outcome

1. Finite element modeling: Development of 3D-multiphysics model

Milestone development from IITM is the implementation of a three-dimensional multiphysics model for the visualization of shear horizontal wave in a lap shear joint. The model incorporates the EMAT transduction, the physics of which is solves in the electrodynamic module. The force calculated is coupled to the elastodynamic model to solve for wave propagation. Moreover, the model also includes the spring stiffness boundary condition to model various levels of interfacial adhesion, including kissing bonds. From FE models, insights were gained on the effect of interfacial adhesion condition on wave propagation. Finally, a method for inverse calculation and determining the interfacial stiffness is developed.

2. Sensor development and experiment

Further, the experiments were performed on samples provided by the Ariane group, France, who is the industrial collaborator in this project. The samples were subjected to different surface treatments to vary the level of adhesion. Experiments were conducted using the EMAT probe designed and developed in the center for nondestructive evaluation (CNDE), IITM, which is shown in Figure 1. The parameter for sensor development was optimized using the FE model. From the experimental results, the strength of the given samples was quantified rather than merely classifying it as good, weak, or bad bonds.

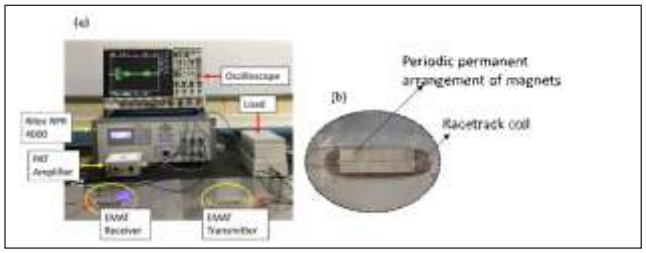


Figure 1 (a) Photograph of the experimental set-up to launch and receive SH waves in aluminium-epoxy- aluminium lap shear joint using PPM-EMAT (b) PPM-EMAT developed in CNDE-IITM

Visible output

1. Awards:

The work done at CNDE, IITM was presented in 45th annual review of progress in quantitative nondestructive evaluation, Burlington, Vermont, USA, July 2018, and was awarded **3rd Place** at the **annual student poster competition** for the poster entitled 'Interfacial Adhesion (Kissing Bond) Detection using Shear Horizontal (SH) Waves

Authors: Dileep Koodalil, David Barnoncel, Prabhu Rajagopal, Krishnan Balasubramaniam

2. Journal publication:

Dileep Koodalil, David Barnoncel, Prabhu Rajagopal, Krishnan Balasubramaniam, " Detection of interfacial weakness in a lap-shear joint using shear horizontal guided waves.", NDT & E International, Volume 112,2020,102248, ISSN 0963-8695, https:// doi.org/10.1016/j. ndteint. 2020.102248.

Opportunities and Impact

Under the project, Dileep Koodalil Ph.D. Scholar from CNDE, IITM visited I2M, University of Bordeaux, France, for one month (20, November-20, December 2017). The discussions ensued with the French side during the visit helped the Ph.D. scholar to clear some of the roadblocks faced, especially in the modeling side.

Dileep Koodalil (Left),Ph.D Scholar, CNDE IITM with Prof. Michel castiangs (Center), I2M Universty of Bordeaux and Sridhar Puliyakote (Right), Ph.D Scholar, I2M Universty of Bordeaux, during his visit to Universty of Bordeaux in 2017.

MACHINE LEARNING FOR NETWORK ANALYTICS

Vivek S. Borkar
Indian Institute of Technology Bombay

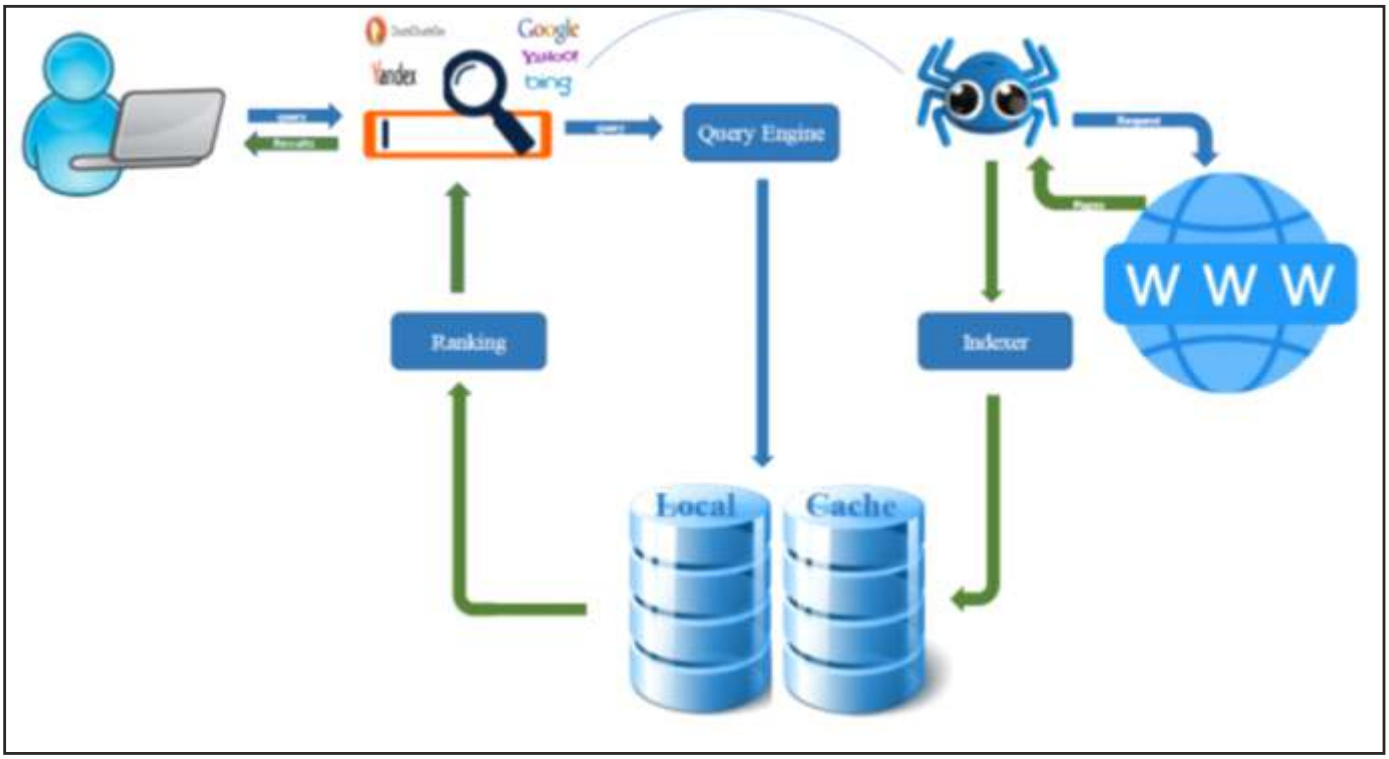
Konstantin Avrachenkov
Inria
Sophia Antipolis

Two domains of scientific activity that have seen an explosive growth in recent years are machine learning and network science. The former seeks data driven algorithms for inference, made feasible as never before by the ease of acquisition and availability of data, as also by the vastly enhanced computing power. Network science likewise became a major theme with arrival of extremely large emergent networks such as internet, World Wide Web, social networks, Internet of Things (IoT), etc. This project was positioned at the interface of the two with an aim of developing the necessary algorithmic tools for data driven inference and optimization on and for networks. Several disparate themes were covered, the major strands of which are outlined below.

In network inference, a Markov Chain Monte Carlo based scheme was developed for the problem of inferring the source of a rumour or infection under incomplete timing information. A popular notion of a central node in a network is the Jordan centre, whose persistence properties under changes in graph topology were studied. In clustering with advice, the objective is to cluster a collection of objects (e.g., customers at a supermarket) into finitely many clusters based on queries to an `oracle'. A scheme is developed to do so with low query complexity and good performance guarantees. Also analyzed was partial clustering into a few large clusters by mapping the problem to a sequential detection problem. Another effort was directed towards comparing regeneration based schemes for estimating network averages with reinforcement learning schemes for the same. This is very useful for collecting statistics or to conduct respondent-driven surveys in social networks. The proposed methods are particularly well designed to target hard-to-reach subpopulations.

A problem of great interest in social network research is that of influencing opinion dynamics with budget constraints. For finite time horizons, the regimes where it is optimal to influence early on or towards the end of the horizon were characterized in increasingly complex models, depending on parameters that reflect flexibility or inflexibility of the population. Another work analyzes the problem of maintaining the average opinion above a certain threshold. Opinion dynamics often leads to herding, a popular formalism for which is urn processes on graphs with reinforcements from neighbouring nodes. Asymptotic behavior of these models was analyzed. In a different strand of work, reinforcement learning ideas were applied to opinion shaping by mapping it to a classical shortest path problem. Finally, a recent work proposes and analyzes a model of graph-constrained dynamic social choice which represents well the social choice dynamics at an e-commerce web site or task outsourcing in image processing tasks. In such applications the agent is constrained in his next choice to choices `nearby' to the current one. An `annealing' scheme that slowly accentuates the relative importance of choices is shown to ensure asymptotic optimality.

For content replication and request routing in a distributed caching system consisting of a central server and multiple caches deployed close to the end-users, each with limited storage and service capabilities, the performance of the optimal caching policy with locally optimal storage policy was analyzed analytically and via simulations. Following up on our earlier work on optimal scheduling of web



crawlers for fetching ephemeral data, data driven reinforcement learning algorithms were developed to learn the theoretically derived `Whittle index policy' in absence of full knowledge of underlying processes. The figure shows the underlying schematic. Similar algorithms were proposed for heterogeneous wireless networks (HetNets).

New directions that have been initiated include age-of-Information (AoI), a metric which measures the freshness of information available at the intended destination in IoT. AoI-aware scheduling algorithms were designed with provable performance guarantees under a variety of network models, information settings and time-horizons. Another direction has been distributed optimization on networks, where a Markov sampling based distributed variant of the Alternating Direction Method of Multipliers (ADMM) algorithm popular in machine learning was proposed. A stochastic game with partial information motivated by blockchain systems was analyzed in a simple case, where agents compete for the first solution to a difficult problem and only the first one to solve the problem receives the reward. Dynamic stochastic games with partial information are a notoriously difficult subject and any progress in this direction is very much appreciated by the research community. Google's Personalized PageRank (PPR) was analyzed on the Erdos-Rényi (ER) random graph containing a denser planted ER subgraph, by using a tractable mean-field model. These results help understand regimes of applicability of PPR for local graph clustering and its limitations. Additionally, optimization of the damping factor, the rate of restart of the random walker from the set of seed nodes, was analyzed, and Google's original choice of 0.85 was found to be close to optimal.

The team consisted of the PIs Vivek Borkar (IIT Bombay) and Konstantin Avrachenkov (INRIA Sophia Antipolis), with co-PIs Eitan Altman (INRIA Sophia Antipolis), Nikhil Karamchandani (IIT Bombay), Sharayu Moharir (IIT Bombay) & Neeraja Sahasrabudhe (IISER Mohali).

DEVELOPMENT OF LOOP HEAT PIPES: AN INDUSTRY-ACADEMIA COLLABORATIVE EFFORT

During the years 2011 to 2014 Prof. Sameer KHANDEKAR, Professor, Department of Mechanical Engineering, Indian Institute of Technology Kanpur, India, together with Prof. Jocelyn BONJOUR, Professor and Director - CETHIL Bât. Sadi Carnot INSA de Lyon, France had successfully completed a scientific project entitled "Thermo-hydrodynamics of phase-change induced oscillating Taylor bubble flows" with CEFIPRA support under its Collaborative Scientific Research Programme (CSRP). This project aimed at understanding thermo-hydrodynamic transport and response of interfacial flows in micro-mini-scale geometries under different boundary conditions, as applicable to heat pipes, by using state-of the art experimental techniques of High Speed Videography (HSV), Infra-red thermography (IRT) and Particle Image Velocimetry (PIV).

Following up on the outcome of this scientific study, which produced excellent publications on understanding of the thermo-physics of Taylor flows as applicable to Pulsating Heat Pipes, a new follow-up proposal was submitted by the two academic collaborators; however, this time with industrial partners from both India (M/s Golden Star Technical Services Pvt. Ltd., Pune) and France (Thales Group, Valence). This new project aimed at design and development of another excellent passive thermal management device, called as Loop Heat Pipes, for terrestrial and avionics applications, enabling indigenous technology development, harnessing available joint scientific and engineering knowledge base available with the partners, and facilitating product commercialization. The project was recommended for support under the Industry Academia Research and Development Programme (IARDP) of CEFIPRA in April 2017.

Loop heat pipes (LHPs) are passive thermal management systems that can ensure transport heat from a source to a sink at extremely low thermal resistance. Their operating principle is based on the evaporation and the condensation of a fluid, as detailed in Figure 1. Capillary pumping forces are exploited to ensure passive fluid circulation. This guarantees their inherent ability to operate against gravity and leads to very high heat transport capability, as compared to conventional heat transfer systems. LHPs can be mechanically much more flexible than their competing systems, which is a vital quality for adaptation to a variety of operating environments.

The porous wick structure in the evaporator is the cardinal element responsible for the efficient operation of an LHP. The crux of this technology lies in designing the porous wick, which is generally bi-porous in nature, made of metals such as nickel, titanium, and off-late, also of copper. Worldwide, only a few industrial establishments have the capability to manufacture specialized LHP wicks and systems. Also, there are a restricted number of end-users, usually belonging to the space industry. There is thus a huge economic perspective and implication if this technology can spread to other domains - especially in commercial aircrafts, where need for efficient electronic cooling systems are very high. The percolation of LHP technology is thwarted due to unavailability of reliable and cheap processes of manufacturing the most critical component i.e., the porous wick structure. The LHP capillary wick manufacturing poses several challenges as it requires a strict control on its properties such as porosity, permeability, wettability, thermal conductivity and contact resistance. The industry-academia project was envisaged in this background.

During the execution of project, industrial capability was build-up for manufacturing specialized LHP wicks as per design guidelines and specifications of the industrial partners (nominal power 60 W with maximum power of 100 W, with start-up load of 10 W). Working LHP thermo-mechanical demonstrators with specified high performance flat plate and cylindrical wick structures (both mono-porous and bi-porous; flat and cylindrical designs of copper and nickel) were fabricated and tested, as shown in Figure 2. One post-doctoral, one doctoral and two master level students were also trained in the art.

Academia-industry interaction for translational and developmental research demonstrated through this project, poses several challenges. The operational time scales, and associated demands on work execution in academia and industry are quite distinct. In addition, the problem statements and definitions at each work package level needs to be broken down into targets which are measurable and executable by human resources available at each end. Such product development projects also require complementary resources and demands high level of mutual coordination. During the execution of this project, both, the academic

partners immensely benefitted from the available expertise with the industrial partners and vice-versa. While capabilities of mathematical modeling, instrumentation and material characterization were readily available at the academic institutions, skilled technicians, manufacturing hardware, jigs and fixtures were easily available with the industrial partners. In addition, the students could visit the industrial partner establishments and benefit by working in those environments. Due to the capability generated by the execution of this project, the Indian academic partner has now ventured into exploring another application of LHPs in thermal management of Light Emitting Diodes, while the Indian industrial partner has now the capability of producing metallic porous wicks, not only for LHPs, but for other related products too. The participating partners profusely thank CEFIPRA/IFCPAR for providing such an interactive platform for Indo-French partnerships to flourish.

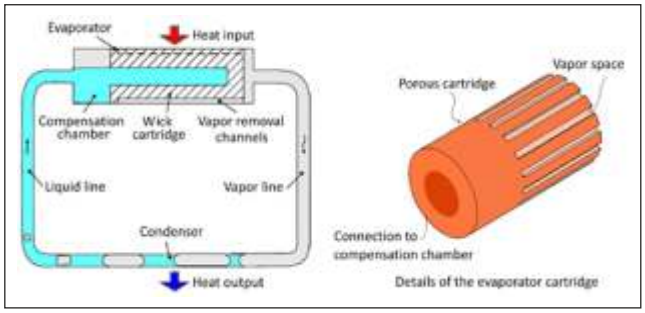


Figure 1: (a) Schematic diagram of a Loop Heat Pipe and (b) details of a typical cylindrical evaporator porous wick structure, which constitutes the cardinal element responsible for LHP operation

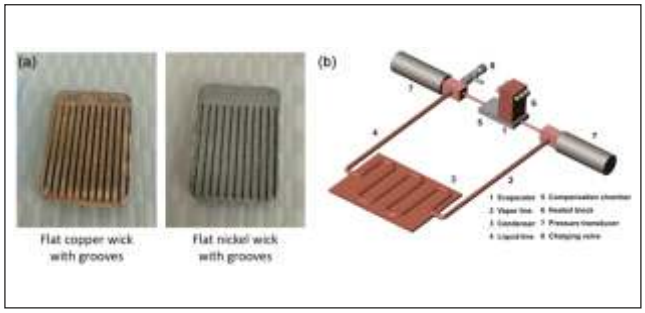


Figure 2: (a) Examples of flat plate copper and nickel wicks manufactured during the project (b) Schematic of the LHP demonstrator.

Project partners:

Academia:

From India:
Prof. Sameer Khandekar
Department of Mechanical Engineering
IIT Kanpur, India.

From France:
Prof. Jocelyn Bonjour
Director, CETHIL,
INSA Lyon
Villeurbanne, France.

Industry:

From India:
Mr. Siddharth Y. Paralikar
Chief Executive Officer (CEO)
Golden Star Technical Services Pvt. Ltd., Pune, India

From France:
Mr. Claude Sarno
Head of Design,
Thermal Systems Packaging
Thales Avionics (THALES),
Valence, France

DEBRIEFING SESSION FOR RAMAN-CHARPAK FELLOWS BATCH 2018

The Debriefing Session for the Raman-Charpak Fellows of batch 2018 was virtually organized on 02 July, 2020. Various experts, representatives of funding agencies, 12 Raman-Charpak fellows along with CEFIPRA officials attended this session. It was mentioned that during this COVID-19 Pandemic, CEFIPRA was in regular contact with 16 Indian students and 2 French Students who were working in France and India respectively.

The Experts congratulated Department of Science and Technology (DST), French Embassy & CEFIPRA for putting up this Programme for young minds of two countries & for its success in strengthening Indo-French Collaborations. They also highlighted that excellent quality of applications received every year and how significant efforts were put in by the Expert Committee for selecting the best applicants.

They also mentioned their participation in the previous Debriefing Sessions which has been really fruitful in terms of taking suggestions and improving the programme.

The representatives of the Funding agencies highlighted the importance of the Programme for the both countries and the role it has played in strengthening the Indo-French Collaborations. They appreciated the role of CEFIPRA for effectively managing the Programme since 2013.

Bienvenue!

CEFIPRA welcomed Mr. Emmanuel Lebrun-Damiens and Dr. Nicolas Gherardi, the new Counsellor and Deputy Counsellor for Education, Science & Culture, Embassy of France in India and Country Director and Deputy Director, French Institute in India.

Mr. Emmanuel Lebrun-Damiens served as the Consul General of France in San Francisco, USA (2016-2020). He pursued political studies in Strasbourg before moving on to the Ecole Nationale d'Administration and becoming part of the Ministry of Foreign Affairs right after the onset of the new century. He has also worked in New Zealand and New York.

Dr. Nicolas Gherardi worked as the Attaché for Scientific and Academic Cooperation at Consulat Général de France, Guangzhou, China (2016 to 2020). He received his M.Eng degree in electronic and optical processes from Orleans University, France, and PhD degree in plasma physics from Toulouse University, France, in 1996 and 2000, respectively.

CEFIPRA looks forward to working closely with both of them in its journey to further strengthening the joint Science Technology & Innovation activities between France & India.

Mr. Emmanuel Lebrun-Damiens
Counsellor, Education, Science & Culture, Embassy of France and Country Director,
French Institute in India

Dr. Nicolas Gherardi
Deputy Counsellor, Education, Science & Culture, Embassy of France and Country Deputy Director,
French Institute in India

Au Revoir! Prof. Adèle Martial-Gros

CEFIPRA wishes the very best to Prof. Adèle Martial-Gros, the former Deputy Counsellor for Education, Science & Culture, Embassy of France in India & Country Director, French Institute in India for her next assignment in Cambodia as Representative Head of the French National Research Institute for Sustainable Development, IRD. CEFIPRA truly appreciates her efforts and contribution towards strengthening the Indo-French Cooperation in S&T.

L'adieu au Prof. Adèle Martial-Gros, Former Deputy Counsellor for Education, Science & Culture, Embassy of France and Country Deputy Director, French Institute in India

CEFIPRA FACILITATED SAFE RETURN OF RAMAN CHARPAK FELLOWS AMIDST COVID-19 PANDEMIC

"Firstly I would like to thank CEFIPRA for selecting me for the Raman Charpak fellowship 2019. Initially, the duration of my stay was scheduled from 13 Jan 2020 to 14 July 2020. During this period WHO declared COVID-19 as a pandemic due to which I got stuck at my place of residence in France.

After sometime, "Vande Bharat Mission" was initiated by Government of India to evacuate the Indian citizens stranded abroad. CEFIPRA informed me about this mission and provided me the financial support to reserve flight ticket before the completion of my fellowship tenure to return my home safely. Also, CEFIPRA supported me time to time whenever I needed it during this whole journey. This situation could be really hard for me if I was not financially supported by CEFIPRA. So, I am highly thankful to CEFIPRA for supporting me during this grim situation.

Vipin Kumar
IIT Mandi , India

Professor Mohamed Djemai
Université Polytechnique Hauts-de-France LAMIH, CNRS UMR 8201 Laboratory of Industrial and Human Automation, Mechanics and Computer Science, Famars

My name is Rakesh Kumar. I am working as a senior research fellow in the Department of Mathematical Sciences, IIT (BHU), Varanasi-221005. I was selected to visit Inria, Lille, France, for three months under the Raman-Charpak mobility/fellowship programme 2019. My tenure of the visit was from 02 March 2020 to 02 June 2020. Unfortunately, I had to return India by special flight arranged under Vande Bharat Mission on 26 May 2020 due to COVID-19 pandemic.

I am genuinely thankful to CEFIPRA for helping me in getting the flight reservation and my safe return to India. I would also like to pay my sincere regards to Kunal sir who always helped me when I was in trouble during the visit.

Rakesh Kumar
Department of Mathematical Sciences, IIT (BHU), Varanasi-221005

Prof. Denis Efimov
Inria Lille-Nord Europe Research Center
Science Park of Haute Borne 40, Villeneuve de Ascq

I was selected as a Raman Charpak (RC) Fellow (RCF-IN-00136) under CEFIPRA student mobility/fellowship programme and started my tenure at the Observatoire de Paris, Meudon from January 2020. Everything was going on well till mid-March and suddenly after that COVID-19 pandemic halted the global functioning. When my office got closed due to this grim situation, I started working from my place of stay in France with my host professors and with my Indian supervisor for next two months, subsequently my RC fellowship tenure got completed.

There were no flights from Paris to India, as all the international airports were shut down. CEFIPRA reached out to me and granted me an extension of tenure for one more month.

It was the time of anxiety, loneliness and uncertainty to go back to my home country during which CEFIPRA helped me. The Centre was in direct contact with Indian Embassy in Paris for our safe return to India. CEFIPRA informed me that there is one special flight under “Vande Bharat Mission” of Indian government by end of May, they asked me to register for that. CEFIPRA was in continuous touch with every one of us via emails and phone calls. I registered for the “Vande-Bharat Mission” flight and got my reservation. Finally I reached home safely on 03 June. I will always be highly grateful for this kind cooperation by CEFIPRA during the tough time in France and I thank everyone for making this difficult time smooth for me.

Reetika Joshi
Senior Research Fellow Department of Physics, D.S.B Campus
Kumaun University, Nainital, Uttarakhand 263 001, India

Prof. Guillaume Aulanier
Observatoire De Paris, Lesia, Meudon Cedex, France

Being a young researcher in the field of energy storage, visiting one of the advanced laboratories away from India was a dream for me. I was extremely happy when I came to know that I have been selected for Raman-Charpak fellowship in the year 2020. This moment made me feel special as this was my first international assignment for which I would like to express my sincere thanks to CEFIPRA for giving me this wonderful opportunity to visit France as a Raman-Charpak fellow. In addition, I acknowledge my sincere thanks to the entire CEFIPRA team, especially Dr. Purnima Rupal (Director), Mr. Ganesan and Mr. Kunal, for their constant and timely support and guidance from my departure to arrival. Raman-Charpak fellowship enabled me to spend five months at University of Paris under the supervision of Prof. Sylvain Franger, where I have learned so many technical aspects in electrochemical energy storage systems. In short, the experience was extremely helpful for me. More importantly, the interactions with other fellow colleagues working in this field and other relevant fields provided me a platform to understand the different perspective of my current area of interest as well as the advancement on the new battery chemistries.

Despite the fact that the lab got closed for almost two months due to the COVID-19 Pandemic, the kind of support, which I had received from CEFIPRA and my Host institution, was amazing. I am truly thankful to CEFIRPA for the wonderful guidance to fly back to INDIA through Vande Bharat mission. More importantly, CEFIPRA had taken complete care of me during this transition. Starting from the registration in Vande Bharat mission, swift approvals for my every request, guidance regarding quarantine stay and travelling to home down. Following their guidance, I safely landed at Chennai Airport on 19 June 2020. After a week of quarantine at Chennai (COVID-19 test was conducted twice by the government of Tamilnadu and found to be negative), I continued the second week of self-quarantine at my home. Even though my stay in France was for short time only but it was really a wonderful experience and I sincerely acknowledge CEFIPRA, Campus de France, Indian embassy, and Air India for making my first abroad visit a memorable one. I am expressing my heartfelt thanks to my host supervisor (Prof. Sylvain Franger, University Paris Sud) for accepting me and the guidance and help being rendered from his side throughout this journey. Finally yet importantly, I would like to express my sincere gratitude to my Ph. D supervisor (Prof. N. Kalaiselvi, Director, CSIR-CECRI) for her constant support, help and guidance.

Mullaivananathan Vadivazhagan
CSIR-CECRI

Dr. Sylvain Franger
ICMMO/ERIEE, CNRS unit no 8182, Orsay, France

ANNOUNCEMENTS

PRIDE-CEFIPRA AWARD
CEFIPRA Outstanding Project Award/PRIx Du projet Exceptionnel (PRIDE)

CEFIPRA

Aim

PRIDE-CEFIPRA AWARD is instituted to recognize outstanding scientific contribution of Indian and French Principal Investigators (PIs) for their pioneering collaborative research work under the Indo-French Centre for the Promotion of Advanced Research (IFCPAR/CEFIPRA) supported projects.

Nature of the Award

PRIDE-CEFIPRA Award will be conferred every year annually. Each project has two awardee and will carry a certificate of recognition by two Co-Chairs of CEFIPRA and cash prize equivalent to INR 1 lakh to Indian Scientist & Euro 1500 to French Scientist.

Selection Process

The Prize is for Indo-French Scientists / Researcher working under CEFIPRA supported projects under following two schemes Collaborative Scientific Research Programme (CSRP) and Industry-Academia Research & Development Programme (IARDP). PIs can be from different universities, academic/ research institutions of higher learning, having a regular position in government recognized universities, academic/ research institutions having CSRP or IARDP project. The outstanding works done under the projects will be evaluated by Scientific Council (SC) and Industrial Research Committee (IRC) of CEFIPRA during the final review. For this award, the decision of Scientific Council & Industrial Research Committee shall be final.

CALL FOR PROPOSALS
under CSRP - thematic research

(Deadline for submission of Proposals 15 Jan, 2021)

CEFIPRA supports research groups through high quality collaborative research projects in advanced areas of basic and applied science to nurture scientific competency in India and France. For upcoming cycle the call is launched for the thematic research specifically addressing important societal challenges.

Eligibility to apply

Principal Collaborators and Joint Collaborators (Indian & French) should have permanent position in an Indian or French University/R&D Institution. They should meet national level eligibility criteria with respect to the operation of grants and age of retirement.

Funding support for the proposals

- Manpower (PhD/Post-doctoral/Master students positions for French Partners; JRF/SRF/RA/Master students for Indian Partners)
- Purchase of consumables
- Travel (International & domestic)
- Equipment (only to Indian Partners : Minor equipment and accessories which are essential for the project with a limit of max. of 10% of total approved budget of the project (max. 20.000Euros))

Thematic areas:

Host-Microbe interactions in Health, Water & Agriculture

- There should be significant novelty in the Host-Microbe interactions aspect of the proposal.

Habitability of the Earth & Planets

The topic includes, but is not limited to, the investigation of

- the past and present environmental conditions on planetary bodies,
- the effects of global warming on the environments, geochemical cycles and biosphere,
- the geological record to assess the fate, diversity and evolution of the biosphere over geological times, and relations between major extinctions, diversifications and environmental changes
- the composition, structure and dynamics of the inner and outer envelops of the Earth and planets over geological time, with emphasis on modelling initiatives
- the intrication between geology, geodynamics, geochemical cycles, hazards and natural resources.

Marine Biology and Ecology

- Marine Biology and Ecology

Chemical & Synthetic Biology

- Synthetic organic chemistry and biotechnology to create tools for studying and manipulating biological processes.
- It encompasses molecular pharmacology, single-molecule biophysics, synthetic biology for engineering of molecular tools (with the exclusion of system biology).

CEFIPRA

For further information, please contact:
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