Transformative and Inclusive Science for a Sustainable Future

GYA AGM and International Conference of Young Scientists

Washington D.C., United States
7-10 May 2024

GLOBAL YOUNG ACADEMY

new voices

NATIONAL ACADEMIES Sciences Engineering Medicine

Member Lightning Talks

Schedules and Book of Abstracts

8 May 2024, 14:45 – 16:15

Lightning Talks will take place in three parallel sessions.

Session speaker lists can be found on the next 3 pages, followed by abstracts, ordered alphabetically by surname.

Session 1 – Lecture Room

Session 2 – Members' Room

Session 3 – NAS 125

Lightning Talks Session 1 – Lecture Room

Moderator: Wasim Sajjad

Siok Yee Chan	Presbyphagia: What is the gap?
Natisha Dukhi	Burgers or Broccoli? Nutrition research should be one of the top priorities in South Africa
Tofik Ahmed Shifa	Green Hydrogen Production via Water Splitting
Jessica Menold	Facilitating Innovation: What can AI agents learn from human facilitators?
Alexia Nunez-Parra	Chilean Frontier Program for Young Scientists: building bridges for collaboration
Filippo Rossi	Biphasic porous structures formed by monomer/water interface stabilization with colloidal nanoparticles
Prabhat Singh	Fluorescence based sensors for Heparin: A widely used blood anti-coagulant
Mirjam Brusius	Preservation in the Age of Repatriation. Why are so many Western Museum Collections in Storage?
Himangana Gupta	Bridging Science and Policy for Integrated Action on Climate and Biodiversity
Mohammad Hosseini	Ethics Dumping in Global Research
Karma Sawyer	Equitable Building Decarbonization through Electrification
Lorena Coronado	Optical Tweezers: A tool to study the erythrocyte response to antimalarials
Mandira Lamichhane Dhimal	Nepal's commitment on climate change and health at COP26: Achievements and challenges
Monika Kędra	Linking benthic communities and biogeochemical cycling in marine coastal areas
Ganbaatar Khurelbaatar	How much does the achievement of SDG#6 cost us? vs. how much does the non-achievement of SDG#6 cost us?
Anina Schwarzenbach	Extremists of a feather flock together? Community structures, transitivity, and patterns of homophily in the US Islamist co-offending network
Inayat Ullah	Transformative Impact of Technology Integration into the Education System in Developing Countries
Shankar Kausley	Food Digital Twins: Move Towards a Sustainable Planet
Wasim Sajjad	Let's Quench the Quorum: A Novel Strategy to Tackle Biofilm Forming Multidrug Resistant Bacteria

Lightning Talks Session 2 – Members' Room

Moderator: Antonia Saktiawati

Carina Geldhauser	Carbon Emission Measurements and Reduction Strategies – what can Machine Learning contribute?
Oluwarotimi Williams Samuel	Advances in Novel Limb Function Rehabilitation and Assistive Technologies
Sabrina Assoumou	Addressing the rise in HIV cases among persons who use drugs during the US overdose crisis
Thao Thi Phuong Nguyen	Pioneering Interventions and Insights: Enhancing Physical and Mental Well-being in Post-Stroke Patients in Vietnam.
Hussam Khasawneh	Harnessing the Future: Green Hydrogen and Power-to-X (PtX) Technologies
Estrella Diaz	Being a researcher in Social Sciences and not dying trying
Christian Nkanga	Targeted Enteric Phage Therapy: An Innovative Approach to Enhancing Microbiome Health and Combatting Antimicrobial Resistance
Alma Hernández-Mondragón	Science and Policy: A broken bridge
Dipak Vitthal Pinjari	Pyrolysis: Sustainable Strategies to Reduce the Carbon Footprint
Myrtani Pieri	Eating for two: a universe within us
Ying Zhang	The Network that Supports the Hyperscale Social Networks
Hussain Wahedi	The "SIRTified" Skin Regeneration and Wound Healing
Carlo D'Ippoliti	Digital money and real incomes
Justine Germo Nzweundji	Revealing the Potential of Prunus Africana: Bridging Biotechnology and Policy for Sustainable Use
Lalit Khandare	Caste-Based Cultural Experiences of USA Immigrants from India
Chika Ejikeugwu	Soil microbiomes at risk
Noor Shaila Sarmin	Impacts of Land use land cover (LULC) change on the socioeconomics of local population in Gazipur, Bangladesh
Melina Florez-Cuadros	Change focus
Encieh Erfani	How a scientist can become a social activist
Antonia Saktiawati	How to prevent fungal infections related to climate change?

Lightning Talks Session 3 – NAS 125

Moderator: Mareli Claassens

Lydia Rhyman	The Role of Computational Chemistry in the Sustainable Development Goals
Mohamed Mahmoud	Self-powered integrated solar-microbial electrochemical system for simultaneous green hydrogen production and wastewater treatment
Sandra Lopez-Verges	Serosurveillance in sloths looking for emerging zoonotic pathogens
Luisa Maria Viegas Becerra Urtiaga	BioDivA Lab: Fighting for (Bio)Diversity under an Intersectional and transdisciplinary approach
Aram Simonyan	Schematising factors constructing corruption-related descriptive and injunctive social norms
Fun Man Fung	Digital Futures of Learning: Transforming Education through International Collaboration
Mujtaba Ali Isani	Trust in Domestic Political Institutions Among People with Migration Background in Germany: The Significance of Discrimination
Manuel Fernandez-Gotz	The Deep History of Cities: Understanding Urban Pasts to Inform Sustainable Futures
Jane Yau	Games, Climate Emergency and Transformation
Santosh Kumar Gupta	Lanthanide Doped Inorganic Crystals for Solid State Lighting and Photon Upconversion
Mariel Lavieri	Personalizing monitoring of patients with chronic conditions
João Borges	Bioinspired Supramolecular Polymeric Biomaterials: from Molecular Design to Interactions with Living Systems
Shaoshan Liu	The Role of Autonomous Machine Computing in Shaping the Autonomy Economy
Laura Zimmermann	Measuring Labor Trafficking Prevalence
Wilson Alavia Medina	Sustainable Mining for a green digital future
Hanjo Hamann	Don't Sign Away Your Copyright!
Flavio Carvalhaes	WealthTalks, the (re)production of wealth inequality in everyday talk
Éva Dékány	Why should you care about grammar?
Mareli Claassens	Implementing infectious disease research studies from the bench to the community in rural southern Africa

Wilson Alavia-Medina

Universidad Alberto Hurtado, Chile

Sustainable Mining for a green digital future

Low carbon economy and digital transformation are relevant for sustainable development. However, to reach them are required critical and strategic minerals which current obtaining processes impact on the environment and society. Sustainable development of the mining industry is essential to reduce these impacts. This means optimizing resource use, minimizing waste, protecting the environment, improving safety, and fostering better relationships with communities. Digital technologies and collaborative approaches can play a key role, helping to reduce the environmental footprint of mining operations, improve worker safety, create new economic opportunities, and promote dialogue with communities. By embracing these advancements responsibly, the mining industry can contribute to a more sustainable future for all.

Sabrina Assoumou

Boston University/Boston Medical Center, United States

Addressing the rise in HIV cases among persons who use drugs during the US overdose crisis

The US overdose crisis has had a substantial national impact including over 100,000 fatal drug overdoses in 2022 and an estimated $800 billion in annual cost related to opioid use disorder (OUD). The overdose crisis is driving a surge of human immunodeficiency virus (HIV) infections among persons who inject drugs (PWID). Despite recent improvements in the annual national rate of new HIV infections in the United States, the proportion of new cases attributed to injection drug use has risen to approximately 20% in states like Massachusetts. A critical need therefore exists to expand evidence-based measures to prevent HIV among PWID.

My lab's long-term goal ¬is to improve HIV and opioid use disorder outcomes among persons who use drugs. I am currently funded by the NIH to lead a 5-year R01 study to determine the efficacy of a theory-informed technology-supported peer-based intervention (CHORUS+) aimed at improving the initiation and adherence to an evidence-based measure, HIV preexposure prophylaxis (PrEP) which involved taking a medication to prevent HIV acquisition. CHORUS+ also involves treatment for OUD as well as social support to address social determinants of health such as housing and employment. A critical component of CHORUS+ is also the provision of HIV self-testing at participant enrollment into the study for expedited PrEP initiation, an approach not widely explored for PWID. When we have completed the study aims, we will have established the efficacy of CHORUS+ and potentially expanded to toolbox of options to address the rise of HIV during the overdose crisis.

João Borges

University of Aveiro, Portugal

Bioinspired Supramolecular Polymeric Biomaterials: from Molecular Design to Interactions with Living Systems

Nature provides us with an unprecedented source of fascinating supramolecular systems that are inherently responsible for supporting and orchestrating the biological processes that sustain life on Earth. Those include the molecular motor proteins, the cell membrane, the DNA double-helical structure or the native extracellular matrix of tissues and organs. Such complex and intrinsically dynamic supramolecular landscapes have inspired the supramolecular design of artificial biofunctional materials to recreate the complex structural composition, fibrous architecture and functional dynamic nature of living systems and, ultimately, pursue advanced regenerative therapies.

In this talk emphasis will be given to the supramolecular design of a library of bioinspired self-assembling multicomponent biomaterials by resorting to polysaccharides, peptides, and nucleic acids to be used in the biomedical arena. In particular, the rational design and development of chemically programmable and dynamic supramolecular polymeric hydrogels, hydrogel-based bioinks and layer-by-layer nanobiomaterials will be presented. Moreover, their potential to be used as platforms for controlled drug/therapeutics delivery and as bioinstructive matrices to elucidate cell-biomaterial interactions and stimulate cell-signaling pathways that are pivotal in tissue engineering and regenerative medicine will be discussed.

Mirjam Brusius

German Historical Institute London, United Kingdom

Preservation in the Age of Repatriation. Why are so many Western Museum Collections in Storage?

Western Museums put only a fraction of their collections, sometimes as little as 1 %, on display. This leaves out millions of objects that have been gathered but seldom or perhaps never been shown, including many objects and human remains from colonial contexts. It presents the museum as an organized and stable space, in which only museological ‘results’ are visible, not the intermediate stage of their coming into being. As a result, important historical and semantic aspect of these collections are eliminated from our views and discussions. As real estate prices are raising in the metropolises, collections are increasingly moving further out of cities to remote aircraft hangars and former mines and thus into deep storage, where they might not be as easily accessible. This raises fundamental questions about Western preservation practices: Are museums committed to preserving these collections forever, and if so, why and for whom? Is this justified as communities of origin in the Global South are rethinking questions of ownership? Museum storage thus not only re-enacts and perpetuates imperial possession but also challenges Western museums to rethink questions around repatriation, restitution and repair. Focussing on the abundance of objects and vast backstage areas of the museum opens up new approaches in heritage and curatorial practice: How can we rethink museums and their storerooms as support systems not only for community-led

grassroots efforts but also more equal partnerships with the Global South in the age of repatriation? And what if not everyone wants their properties back?

Flavio Carvalhaes

Federal University of Rio de Janeiro, Brazil

WealthTalks, the (re)production of wealth inequality in everyday talk

My research explores the production and reproduction of wealth by examining how common citizens discuss wealth and inequality in everyday conversations. Together with scholars from Germany, England, USA, Botswana and South Africa I run the project WealthTalks to analyze the prevalence, content, structure, and argumentation patterns of wealth and inequality discussions in online and offline conversations in these five countries. We investigate how these discussions differ among individuals, situations, and broader social contexts. Our comparative study of the Global South and Global North, as well as the role of race in shaping the conversation on wealth inequality, will be particularly enlightening. Ultimately, we will assess how these conversations impact people's perceptions of inequality and their attitudes towards wealth redistribution. The project uses empirical research to answer its questions in two ways. First, we gather a large number of transcripts of everyday conversations on wealth and inequality in five countries. Our data comes from social media debates, focus groups, and public dialogues. This allows us to study these conversations in detail and understand how they change based on the situation. We then use the insights from this research to run online experiments where we test how different frames and argument sequences affect people's beliefs and attitudes about wealth inequality and redistribution. WealthTalks aims to allow citizens to discuss socially acceptable wealth inequality levels and conditions for equality. Identifying patterns that normalize wealth inequality enables the development of counter-frames and rhetorical interventions empowering citizens to confront wealth inequality.

Siok Yee Chan

Universiti Sains Malaysia, Malaysia

Presbyphagia: What is the gap?

Prebyphagia is a condition associated to ageing that reduced in ability of bolus control, preparation and thus causing difficulties in swallowing. It will cause delay in opening of the upper and lower oesophageal sphincters and peristalsis dysfunction. Prebyphagia is a geriatric syndrome that 15-70% more likely to occur in those who are> 65 years old. Dysphagia in this population often lead to safety and efficacy and medication adherence issues. A study reported the additional cost of $4510 were incurred for patients with dysphagia as compared to those without dysphagia on elderly Bonilha et al, 2014. There are reported risk factor of prebyphagia which include history of intubation, use of nasogastric tube, connective tissue disorder as well as neurologic cause. neurogenerative disease such as stroke, dementia or Parkinson disease are reported to be coexist frequently with dysphagia. To date there is no guideline exist in the management of prebyphagia.

Often time, recommendation of management remains focusing on secondary causes such as stroke. Worse still there is misconception on the cause of dysphagia being psychological, so it is cited as one of the major contributions in overlooking the burden of dysphagia in this population (Hai-Yang Feng et al. 2023). In this sharing, I would like to deliver the possible solution we proposed to this condition using the local ingredient-red palm oil, in Malaysia hand in hand with my expertise in electrospinning in producing oro-dispersible film. The dispersible feature resolves the prebyphagia issue among the elderly alongside with supplementation of RPO that is supplementing antioxidant, Pro- Vitamin A, and Tocotrienol rich fraction will serve as foundation of neuroprotective effect of this dosage form. It could improve compliance, product adherence and most importantly prevent the neurodegenerative among the elderly patients.

Mareli Claassens

University of Namibia, Namibia

Implementing infectious disease research studies from the bench to the community in rural southern Africa

Funding was received from the European and Developing Countries Clinical Trials Partnership (EDCTP) to implement a research study looking at the interaction of three pandemics, namely Covid-19, tuberculosis (TB) and HIV/AIDS, in the Omaheke Region of Namibia and around Gabarone in Botswana. Participants were included if they were diagnosed with Covid-19 by the healthcare system, and followed-up to their households to screen members for Covid-19, TB and HIV infection. In addition, attendees of primary healthcare facilities were screened for all three infections independent of their reason for attending the facility. We aimed to look at the secondary infection rate of Covid-19 in households of Covid-19 cases, and at the impact of TB and HIV co-infection on Covid-19 outcomes. For the household component, we included around 66 Covid-19 cases and 144 household members. For the healthcare facility component, we included around 1555 participants. Interesting results included the number of active TB cases found in the healthcare facility component (N=35), which gives a prevalence of 3%. During the study period, we set up field sites in four different areas in Namibia and Botswana, including the implementation of point-of-care testing (specifically chest ultrasound and HIV rapid tests) and data capturing, and the cold-chain reported transport of samples to reference laboratories. Respiratory samples were sequenced for SARS-CoV-2 in Namibia and for Mycobacterium tuberculosis in Germany. Respiratory microbiome samples were shipped to Germany. We worked closely with our respective Departments of Health to strengthen existing health systems, and ensured that newly diagnosed TB, HIV and Covid-19 cases were referred for initiation of care.

Lorena Coronado

INDICASAT AIP, Panamá

Optical Tweezers: A tool to study the erythrocyte response to antimalarials

Malaria is one of the most prevalent infectious diseases in humans. The parasite that causes the disease, Plasmodium, invades the RBCs, thus changing the natural biomechanical properties of the cell. Implementing optical tweezers technology for drug response detection in malaria would be important since by studying changes in the deformability of the cell membrane we could know if they are at risk of causing anemia or significant decreases in hemoglobin levels in the cells of treated patients.
The goal of this study was to determine the possibility to use optical tweezers elasticity measurement as a biomarker for antimalarial treatment response. Research findings indicate that when Plasmodium strains where susceptible to antimalarials drugs there is an increase in rigidification of cell membrane, although the uninfected cells in parasite infected culture become more elastic. These means that the bystander effect on the rigidification of uninfected cells during parasite infection is counteracted by the effect of drugs avoiding the emergence of a hemolytic event by premature sequestration of healthy red blood cells by spleen that normally takes place during parasite infection and leads to a possible hemolytic anemia.

Éva Dékány

Hungarian Research Center for Linguistics and Eötvös University, Hungary

Why should you care about grammar?

Language is a human-specific ability; it allows us to use a finite set of building blocks (words) to construct and infinite number of sentences. All languages have grammar: rules for structuring and combining sounds, words, phrases and sentences, and interpreting utterances. This makes grammar a unique window on the human mind. The science of linguistics investigates which properties are shared by all grammars, and what the points of cross-linguistic variation are. For instance, all languages have nouns and verbs, but not all seem to have adjectives. Sorting out the shared and the variable properties leads to a better understanding of who we are as a species. To investigate what is common to all languages, we need to study as many of them as possible. Today about 7000 languages are spoken (in 195 countries). According to Ethnologue, only around 7% are institutional (used in government, trade, or education), 50% are stable and 43%, about 3000 languages, are endangered. According to Simons (2009), the current rate of language loss is one every 40 days, but the rate is accelerating. Half of the languages spoken today may be extinct by the end of the century. Given how much we can learn about the human mind from studying the combinatorial properties of grammar, the preservation of linguistic diversity is paramount; its importance is comparable to that of cultural diversity and, in the natural world, biological diversity. We should all do our outmost on the personal, institutional, national and international levels to prevent language death.

Estrella Diaz

University of Castilla-La Mancha, Spain

Being a researcher in Social Sciences and not dying trying

Throughout this presentation, I aim to offer a comprehensive vision of my expertise discipline (marketing and tourism), encompassing its current landscape, emerging trends, and future directions. Whether you are a member of the Global Young Academy, an esteemed alumni, or a newcomer intrigued by my field, my goal is to provide valuable insights that resonate with each of you. Together, we'll explore my main achievements, projects, cutting-edge research, and potential pathways within my academic career. By the end of my talk, I hope to leave the audience inspired and equipped with a deeper understanding of the exciting possibilities that lie ahead in our shared journey of discovery and innovation.

Carlo D'Ippoliti

Sapienza University of Rome, Italy

Digital money and real incomes

In this speech I will discuss the potential impact of the central banks of major economies issuing CBDCs (central bank digital currencies). Unlike private crypto-currencies, CBDCs are money in every sense. In the near future, firms and citizens could potentially open “deposit accounts” directly with the central bank. This implies the creation of a new tool for conducting monetary policy (potentially in a new market), as well as blurring the typical responsibilities of governments (fiscal policy) and central banks (monetary policy). Using a model calibrated on the eurozone economy before covid hit, I consider some scenarios of how a “digital euro” could be issued. We find that issuing a CBDC by expanding the central bank’s balance sheet can have a durable impact on aggregate income, but it might reduce the demand for bank deposits, and even more crucially, for bank loans. It thus has a greater potential than traditional monetary policy, but it creates challenges for financial stability. In terms of distribution of income, I find that CBDCs tend to increase the wage share of GDP at the expense of financial rents.

Natisha Dukhi

Human Sciences Research Council, South Africa

Burgers or Broccoli? Nutrition research should be one of the top priorities in South Africa

Natisha is a diligent young scientist in South Africa, who is a passionate leader in Nutrition and interdisciplinary research that has afforded her national and international recognition. Despite this, South Africa is still undergoing a nutrition transition, characterized by a shift to highly refined diets high in fat, salt and caloric sweeteners and low in fibre in rapidly growing economies. Data from

national surveys are now considered old, with an urgent need for new data to inform policies. Natisha has conceptualized and designed highly relevant studies that serves to inform policy on the current state of malnutrition in adolescents. Over the past few years, she has extended this to research in BRICS countries, affording her national and international funding. She has conceptualized and developed a novel mHealth intervention study for the prevention of overweight and obesity in adolescents and this resulted in her becoming a recipient of the prestigious Gro Brundtland Award for her contribution to the fields of public health and sustainable development. Due to her experience in nutrition research, in 2021 she was selected as a 6-panel reference group member for the Social and Behavioural Change Communication (SBCC) strategy on obesity, supporting the National Department of Health towards the national obesity strategy in South Africa. She was also nominated and selected for Early Career Membership for the American Society for Nutrition. Her research continues to advocate for nutrition to become a priority in the country and produce high-quality data for future interventions, strategies, and policies.

Chika Ejikeugwu

Helmholtz-Zentrum für Umweltforschung (UFZ), Germany

Soil microbiomes at risk

Manure application to agricultural soils affects soil bacterial activity and is a potential driver for the spread of antibiotic resistance genes (ARGs) in soil bacterial communities. Manure usually contains antibiotic mixtures, the effects of which are largely unexplored, because most studies focus on the effects of single compounds. We investigated how binary antibiotic mixtures compared to single compounds affect soil microbial activity and the abundance of ARGs in different soils. Standard soils differing in their chemical and physical characteristics were spiked with veterinary antibiotics from three different classes: tetracyclines, sulfonamides, and fluoroquinolones. In addition to single compound application, also binary mixtures were added. Effects on bacterial activity were assessed spectrophotometrically by respiration measurements and the analysis of ARG abundances. We successfully setup soil microcosms in 96 deepwell plates that allowed the measurement of CO2 evolution by the application of the MicroResp method using an indicator plate containing cresol dye. Initial screening of different concentrations showed a strong concentration dependency, and our results also indicate that antibiotic mixture effects differed from single compounds. Further verification of the exact mechanisms of the effects of antibiotic mixtures on soil bacterial communities and identification of the hosts of the ARGs will shed light on the ecological risks of antibiotic mixture inputs to soil health and, potentially, to human health through the spread of antibiotic resistance in agricultural settings globally.

Encieh Erfani

Mainz University, Germany

How a scientist can become a social activist

I will talk about my story of how a decision changed my path from a cosmologist to a social activist and advocate for academic freedom.

Manuel Fernandez-Gotz

University of Edinburgh, United Kingdom

The Deep History of Cities: Understanding Urban Pasts to Inform Sustainable Futures

Cities are a defining feature of our modern world, with over half of the planet's population currently living in urban contexts. However, cities have a deep past that goes back in time over 5,000 years. Looking at this long-term history can place current concerns within a wider framework, allowing lessons to be learned about past cases of urban success and sustainability, but also collapse. This lightning talk will highlight how archaeology has made enormous advances in the study of early cities, and how this research can provide valuable insights for present and future cities. In particular, I will highlight three main themes: the diversity of urban forms across space and time; the role of neighborhoods as the spatial expression of social interactions in built environments; and the impact of climate change on both high-density and low-density urban systems.

Melina Florez-Cuadros

Universidad Peruana Cayetano Heredia, Peru

Change focus

As young scientists, we are exposed to the pressure of building a career straight forward after graduation. But, what happen if that is not happening to you? We are facing lack of funding and well paid jobs in a hypercompetitive job market. People with more than 10 years of postdoctoral experience is becoming a trend, stopping them of creating roots, settle, have a family. In addition, women encounter gender bias on a daily basis and have a bigger load of responsibilities at home. Many of these situations were the perfect ingredients for a recipe that resulted in a change of my professional focus. I would like to share my personal and professional experience that bring me here, in front of you as a member of the GYA.

Fun Man Fung

National University of Singapore, Singapore

Digital Futures of Learning: Transforming Education through International Collaboration

The scientific landscape is evolving at an unprecedented pace, demanding a revolution in science education. This talk delves into how we can leverage the power of technology to create engaging, effective, and accessible learning experiences for the next generation of scientists. Further, I will discuss the importance of international partnerships in science education, fostering cross-cultural learning and exchange of best practices. Initiatives like science diplomacy can connect students globally, inspiring them to tackle shared challenges and collaborate on innovative solutions.

Carina Geldhauser

TU Munich, Germany

Carbon Emission Measurements and Reduction Strategies – what can Machine Learning contribute?

The global pursuit of ambitious carbon emission reduction objectives has led to the formulation of targets at various scales, including regional, national, and international levels. These goals underscore the urgent need to monitor and mitigate CO2 emissions, thus necessitating reliable and frequent time series of CO2 measurements, so that the progress towards emission reduction targets can be assessed and measures can be adjusted.
Reliable, frequent CO2 measurements are imperative for evaluating progress towards emission reduction goals. Currently, the lack of comprehensive, localized CO2 measurements necessitates reliance on national data downsampling or extrapolation from sparse ground measurements, hindering effective climate action monitoring and assessment of their efficacy.
To address this challenge, we conduct a pilot study that encompass multimodal data collection and analysis for CO2 emissions, using data from recently launched satellites specialized satellites, like the Orbital Carbon Observatory (OCO-2). In this lightning talk, we won‘t have the time to delve into the technical details or the challenges of data calibration in complex tropospheric condition as e.g. in Western Europe, but we can present the main message:
Through the integration of machine learning models, we advocate that the satellite measurements may be successfully extrapolated to the municipality-level, and therefore the allocation of regional CO2 budgets is within reach for policy makers.

Himangana Gupta

United Nations University - Institute for the Advanced Study of Sustainability (UNU-IAS), Japan

Bridging Science and Policy for Integrated Action on Climate and Biodiversity

Climate change and biodiversity are inherently linked and recognized as crucial priorities for global action. While biodiversity provides various ecosystem services to mitigate and build resilience to climate change, biodiversity loss is accelerating climate change and negatively impacting human well-being. However, until recently, biodiversity was largely left out of mainstream climate change discourse, which resulted in high trade-offs. For example, a skewed focus on forestry-based solutions for mitigation through promotion of fast-growing or exotic trees resulted in maladaptation. Therefore, there is a strong political effort to enhance synergies and minimize trade-offs between these two agendas. This requires bridging the science–policy gap by leveraging existing institutional infrastructure and governance mechanisms. It has the potential to deliver multiple benefits for climate mitigation and adaptation, ecological security, and achieving the SDGs. This can possibly be achieved through (i) Fostering evidence and science-based policymaking at the national level; (ii) Promoting integrative and adaptive approaches that can reduce trade-offs; (iii) Generating synergy indicators and integrating them into governance and financing mechanisms; (iv) Creating a safe-for-biodiversity carbon marketplace that goes beyond the safeguard approach. There are several governance mechanisms that can enhance synergies while reducing trade-offs. These include ecosystem-based adaptation (EbA); other effective area-based conservation measures (OECMs); reducing emissions from deforestation and forest degradation (REDD+) and rights-based approaches. More recently, these approaches are seen as Nature-based Solutions. As these mechanisms further evolve, dynamic and tailor-made baselines adapted to the circumstances of the region may be adopted, which could avoid leakage, double counting, and unreliable estimation of emission reductions.

Santosh Kumar Gupta

Bhabha Atomic Research Centre, India

Lanthanide Doped Inorganic Crystals for Solid State Lighting and Photon Upconversion

The hunt for energy-efficient solid-state materials for lighting and other display applications took an enormous pace in the past few decades owing to many fold increases in global energy demand. Solid state lanthanide ion doped phosphors have come up as the material of choice for these purposes due to their unique and unrivalled features like longer excited state lifetime, high photo-luminescence quantum yield, well-defined narrow spectral pure emission, higher photostability and environmental benignness. These materials are meant to meet the various needs of this century, which is riding on rapid advancement in optoelectronic devices. This talk will discuss some of the most widely used lanthanide ions from the perspective of activator and a sensitizer in doped materials and possible transitions within their energy levels. Here, we will also discuss the effect of various hosts on the optical emission properties of lanthanide ions and their application in solid state lighting and up-conversion.

Hanjo Hamann

EBS University of Business and Law, Germany

Don't Sign Away Your Copyright!

There are two worlds of publishing: The medieval one and the modern one. The medieval world was one where labor was divided: Content creators created content, publishers published it. Law was quite inconvenient because it protected the content creators, who were not the ones distributing their own work and protecting it against plagiarism etc. Hence content creators and publishers signed contracts wherein the content creators transferred any and all of their rights to a publisher, who then took "good care" of these rights until 70 years after the creator's death. As a reward (and incentive) for this stewardship, the publisher was allowed to extract all the revenue they could generate, minus some royalties (which in academic publishing were always rather symbolic). This exchange meant that not even the creator themselves, or their children, or their children's children were allowed to use their work without the publisher's permission. Such was the medieval world of publishing. Now there is a modern world of publishing, where digital media allow virtually anyone to publish virtually anything with virtually unlimited reach. Creators still need publishers because of their marketing expertise and their access to retail platforms. But this narrowly focused expertise is simply a service that content creators buy from a publisher; it no longer warrants an all-encompassing general kind of stewardship. Thus the modern world of publishing is one where creators retain their (copy)rights, but give a non-exclusive license to publishers in order to perform their service. There is no longer any reason to sign away copyrights until 70 years after the author's death. I will briefly show how to do this in practice.

Alma Hernández-Mondragón

Cinvestav, México

Science and Policy: A broken bridge

At the intersection of science and policy, a significant gap has emerged, hindering the effective implementation of evidence-informed policies. This presentation will explore the challenges and opportunities we face in attempting to bridge this divide, highlighting current efforts to build capacities and train specialists who can act as catalysts for change. This necessitates the formation of specialists within our research centers and universities. By addressing this fracture, we not only strengthen the integrity of the decision-making process but also enhance our ability to achieve the Sustainable Development Goals (SDGs), benefiting society, the planet, and future generations.

Mohammad Hosseini

Northwestern University, United States

Ethics Dumping in Global Research

Parallel with an increase in global and multinational collaborations over the last decades, research groups have tried to minimize costs or speed up the research process by adopting various strategies. One such strategy is to partner with researchers and institutions across the globe, some of which are based in low- and middle-income countries (LMICs). In some partnerships, specific problematic tasks are outsourced to institutions from LMICs. Primary intention of outsourcing problematic tasks might be to exploit weaker regulatory systems and limited oversight in LMICs, thereby facilitating research that would be heavily scrutinized (in high income countries), speeding up approval process or lowering costs of research. While ethics dumping could make research seemingly more efficient, it disproportionately affects vulnerable populations and erodes trust in science. Exploited regions and communities will be unlikely to trust researchers and collaborate with them in the future.
In this short presentation I aim to provide a short update about the project on ethics dumping that is being conducted by the Trust in Science workgroup. We received the Sasha Kagansky grant for this project and have already hired an intern to start the project on January 1st 2024. As part of the submitted project, we proposed to conduct a survey among GYA members who could report instances of ethics dumping in their countries. We would like to use this short opportunity to promote our project and the survey.

Mujtaba Ali Isani

Quaid-e-Azam University, Pakistan

Trust in Domestic Political Institutions Among People with Migration Background in Germany: The Significance of Discrimination

Regardless of their individual backgrounds, people with migration backgrounds across Europe face marginalization and exclusion based on being seen as an out-group with a different culture, religion, or race as well as restrictions in accessing economic and political opportunities. This paper hypothesizes that experiencing discrimination from people who identify themselves as without a migration background should reduce trust in domestic institutions. Experiencing discrimination might make them more skeptical of the political context they are living in and the political institutions of this context which are seemingly unable to prevent or protect them from discrimination. To test the hypotheses, the paper uses data from the National Discrimination and Racism Monitor (NaDiRa), which includes questions on trust in institutions such as police, judiciary and the parliament as well as experiences of discrimination, and has over 14,000 participants of migration background. The preliminary results show that actually people with migration background actually have higher trust in domestic institutions then people without migration background. However, if people with migration background have experienced discrimination with government institutions their trust in institutions is not significantly different from people without a migration background. The results evidence that long-term integration – that also reaches out to identity- and

discrimination-related problems of immigrants – is strongly needed to sustain higher levels of institutional trust.

Shankar Kausley

Tata Consultancy Services Ltd., India

Food Digital Twins: Move Towards a Sustainable Planet

Over one-third of the food produced in the world for human consumption every year, which amounts to approximately 1.3 billion tonnes, gets misplaced or wasted. This is equivalent to an economic loss of about 1.2 trillion USD annually. Additionally, this causes an increase of 8% carbon footprint annually. This wastage occurs in different segments of the supply chain such as farms, warehouses and silos, logistics, retails and processing units. Additionally, a significant amount of food wastage is also experienced at the consumer end. The concerned stakeholders are trying multiple options to reduce this waste.
Real-time monitoring of food quality has emerged as a viable solution that can benefit all stages of the food supply chain, starting from farmers to end consumers like us. It helps reduce significant economic losses which occur due to food spoilage and wastage while retaining quality and nutritional value. A novel integrated ‘Food digital Twin‘ platform is developed to estimate and predict the food quality. This incorporates: Hybrid models (AI/ML/physics-based) built on non-invasive sensory and offline lab data simulating all possible supply chain scenarios. These act as soft sensors in the real-time prediction of food quality. The ‘Food Digital Twin’ platform enables all the stakeholders of the food supply chain to make decisions dynamically regarding altering supply chain logistics and storage conditions, for repurposing and minimizing food spoilage and wastage.

Monika Kędra

Institute of Oceanology Polish Academy of Sciences, Poland

Linking benthic communities and biogeochemical cycling in marine coastal areas

Benthic animals that live in the marine sediments can have large influence on marine biogeochemical cycles though their feeding and other activities that lead to sediment mixing. I will present results of project funded by the Polish National Science Centre 'Comeback' that aimed to study the complexity and functioning of benthic communities and their role in biogeochemical processes in coastal areas affected by anthropogenic impacts. This study was carried out in shallow parts of the southern Baltic Sea and covered shallow brackish lagoons, open coast, and river prodelta during spring, autumn and winter from late 2018 to early 2020. It included studies of species diversity and community structure, their food webs, sediment mixing, and impact on fluxes of carbon, oxygen and nutrients - nitrogen, phosphorus and silica in spatial and temporal scales. I will show that shallow benthos, in addition to sediment properties, can play a dominant role in shaping carbon, oxygen and nutrients' benthic fluxes. I will also show how the role of benthic organisms in ecosystem functioning may change with accelerating climate change.

Lalit Khandare

Pacific University, United States

Caste-Based Cultural Experiences of USA Immigrants from India

Background and Purpose: In the postmodernist era of globalization, international migration has rapidly grown from developing and under-developing countries to developed countries for education and employment. South Asia is one of the largest populated regions in the world with tremendous human resources and economic potential. In the last three decades, migration from South Asia to North America has grown rapidly. The South Asian migrants carry their caste, cultural and religious burdens with them and continue the unequal practices, especially with fellow citizens from their home country who come from oppressed castes. The distance and territorial change do not make much difference for the oppressed castes who face discriminatory practices. Hence, this has not only affected the professional lives at educational institutions and employment offices of the South Asian diaspora but deeply made an impact on the personal lives of privileged sections of the caste-based South Asian diaspora society.
Methods: Seven focus group discussions were carried out with more than 50 participants who migrated from the South Asian (SA) countries to the United States of America. Qualitative research with explorative design was conducted to explore the caste based practices with SA migrants. Content analysis was done of focus group transcripts developing a saturation of language and discourse to describe “caste trauma” (Soundararajan, 2022) and practices as they appear in the contemporary American context.
Findings: The paper analyzes the qualitative experience of respondents, their journey from South Asian countries to North America, being there as students or employees, the issues they faced due to their social position, and how it contributed significantly and negatively to their mental health. Moreover, this paper provides insights into the coping mechanisms adopted by individual refugees and immigrants to overcome the traumatic experiences of discrimination.

Hussam Khasawneh

Al Hussein Technical University, Jordan

Harnessing the Future: Green Hydrogen and Power-to-X (PtX) Technologies

This talk explores the significant prospects and challenges associated with Green Hydrogen and Power-to-X (PtX) technologies in the context of renewable energy progress. The talk will assess their capability to contribute to decarbonizing the global energy sector, focusing on the feasibility, environmental benefits, and obstacles to widespread adoption. By exploring these technologies' potential to mitigate climate change through reduced carbon emissions, the talk aims to offer an overview of their role in moving towards a sustainable, net zero-emission (NZE) future.

Ganbaatar Khurelbaatar

Helmholtz Centre for Environmental Research, Germany

How much does the achievement of SDG#6 cost us? vs. how much does the non-achievement of SDG#6 cost us?

It is estimated that, despite recent efforts, SDG #6 will not be achieved by 2030. The main hurdles are the lack of planning and estimation tools, and financial shortfalls. Many researchers and scientists have estimated the costs needed to achieve SDG#6 at different levels, such as local, national and regional. For example, the costs have been calculated for Jordan. Jordan is one of the few countries that has made significant efforts to achieve SDG#6 over the past decades.
In order to increase the connection rate of its population from the current 65% to 95% by 2030, the country needs about $6100-6500 million as investment. This means that the country needs to spend this amount of money to provide the population with access to safe sanitation.
However, what this estimate does not include is the cost of neglecting the SDG, which raises an important question: How much does it cost not to achieve SDG #6? In many scientific fields it is obvious that we pay the price in one way or another. For example, due to high nitrite concentrations in drinking water in OECD countries, $1000 million is spent annually on the medical treatment of people suffering from colon cancer. Water bodies are polluted by surface runoff from storm events. Without addressing SDG #11 in the urban space, countries will have to deal with the high costs, which may even increase in the future.
Therefore, a framework for this type of assessment is needed.
This abstract and the lightning talk presentation are meant to start a discussion among the audience on how we, as GYA, can start to establish an estimation platform for the costs of not establishing the SDGs. The challenge here is that, compared to the costs associated with achieving the SDGs, this assessment is much more complex and involves many aspects.

Mandira Lamichhane-Dhimal

Planetary Health Research Centre, Kathmandu, Nepal

Nepal's commitment on climate change and health at COP26: Achievements and challenges

In the context of Nepal, health sector has been in the forefront in advocating for actions and responses against climate change. Nepal's started mainstreaming climate change in health sector in early 2000. Nepal is one of the countries to commit to develop climate resilient health systems in the 26th conference of parties of United Nations Framework Conference of Climate Change (UNFCC COP26). As per commitment in COP26, Nepal has already completed climate change and health Vulnerability and adaptation assessments (V&As), developed health national adaptation plan (H-NAP), used the V&A and HNAP to facilitate access to climate change funding for health from Green Climate Fund, and completed baseline assessment of greenhouse gas emissions of the health systems. However, Nepal still needs to set a target date by which to achieve health system net zero emissions, and develop an action plan or roadmap by a set date to develop a sustainable low carbon health system (including supply chains) which also considers human exposure to air

pollution and the role the health sector can play in reducing exposure to air pollution through its activities and its actions. Furthermore, capacity building, setting a target to achieve health system net zero emissions and securing funding for implementation of H-NAP is still perceived as a challenge for developing climate resilient health system in Nepal.

Mariel Lavieri

University of Michigan, United States

Personalizing monitoring of patients with chronic conditions

Chronic disease management often involves sequential decisions that have long-term implications. Those decisions are based on high amounts of information, which must be quickly assimilated in busy clinical practices.
I describe some of my ongoing research personalizing monitoring decisions of patients with glaucoma. As new information about the patient is obtained during each visit, the models dynamically incorporate the new information with existing historical data to determine the optimal timing at which patients should be monitored. The models can be tailored to each individual patient's characteristics. They are designed to support, not supplant, the joint decisions made by patients and clinicians. If our models were to be used to assist clinicians in managing glaucoma patients across the US, we estimate this would save the US healthcare system over 10 million tests with no drop-off in disease progression detection.

Shaoshan Liu

Shenzhen Institute of Artificial Intelligence and Robotics for Society, Hong Kong

The Role of Autonomous Machine Computing in Shaping the Autonomy Economy

The Autonomy Economy represents a transformative phase in our society, driven by the integration of autonomous machines like vehicles, delivery robots, drones, and more into the provision of goods and services. Central to this revolution is Autonomous Machine Computing (AMC), the technological backbone enabling these diverse autonomous systems. This talk delves into AMC's critical role in fostering the Autonomy Economy.
The ascension of autonomous machines signifies a paradigm shift from the digital economy. Originally confined to basic robotics and industrial applications, these technologies now permeate everyday life, signaling a move towards an autonomy-driven era. In contrast to the digital economy, which significantly propelled economic growth (accounting for 21% of GDP growth in mature economies from 2005 to 2010 and contributing $2.1 trillion to the U.S. economy in 2019), the Autonomy Economy is poised for an even more profound impact. A key example is the potential transformation of the $1.9 trillion U.S. transportation sector through the widespread adoption of autonomous vehicles, indicative of the sweeping changes across various industries.
At the heart of this transition is AMC, encompassing sensing, computing, communication technologies, algorithms, and crucial considerations like reliability and security. This talk aims to

explore how AMC is not just enabling, but actively driving the shift towards the Autonomy Economy, empowering a myriad of robotic forms to navigate and accelerate this societal change.

Sandra Lopez-Verges

Gorgas Memorial Institute for Health Studies, Panama

Serosurveillance in sloths looking for emerging zoonotic pathogens

Most emergent pathogens are zoonotic, passing from animals to humans, and generally come from regions with high biodiversity impacted by ecological changes due to human activity. Panama, due to its geographical position and great biodiversity, has played an important role in the discovery and control of emerging zoonotic diseases with impact on public health. These agents have been described in different reservoirs, principally birds and mammals, such as sloths. These animals have been involved in the transmission of parasites like Trypanosoma cruzi and Leishmania panamensis, and arboviruses (viruses transmitted by arthropods) such as Oropouche, Punta Toro group, and Utive virus. However, the current status of these mammals and their role as a possible reservoir is unknown. We aimed to determine the seroprevalence against parasites and arboviruses in sloths captured in rural areas of the province of West Panama, endemic for Dengue. We detected in some sloths, antibodies against parasites and viruses known to cause disease in humans like Chagas disease, Leishmania and viral Venezuelan equine encephalitis, even if human cases in that region have not been detected recently. Most were positive to new viruses, whose potential harm to humans is unknown. The presence of zoonotic parasites and viruses with emerging potential in sloths in a region that is under increasing deforestation and urbanization, a risk factor for emergence, is of interest. Future studies are needed to determine the role of sloths and other sylvatic and domestic animals in the transmission cycle of these pathogens and their spill over to humans.

Mohamed Mahmoud

Galala University, Egypt

Self-powered integrated solar-microbial electrochemical system for simultaneous green hydrogen production and wastewater treatment

Although fossil-fuel reservoirs remain enormous enough to meet our society's energy demand for hundreds of years, maintaining the current status quo for providing energy would lead to an unprecedented increase in CO2 levels over the coming few decades. A promising green technology for harnessing solar energy to generate green hydrogen (H2) is photoelectrochemical cells (PECs). Even though photoelectrochemical water splitting has been extensively studied as a sustainable technology to generate H2, the energy demand needed to drive this non-spontaneous reaction limits the technology's competitiveness. In addition, the poor efficiency of photoanodes in PECs has been one of the factors governing their overall solar conversion efficiency. Here, a novel stacking approach of TiO2 nanotubes (TNA) photoanodes was proposed to improve their light-harvesting and charge transfer properties. Interestingly, the stacked photoanodes exhibited a much higher photocurrent of ~ 0.79 mA/cm2 at 1 V (vs. SHE) than the single-sheet TNA photoanode (i.e., ~ 0.07

mA/cm2) at the same potential, implying that the TNA stacking approach resulted in effective light absorbance and management and much lower charge transfer resistance across the interface of photoanode and electrolyte. In addition, a self-biased, integrated solar-microbial system was developed, in which a microbial fuel cell (MFC) fed with real animal manure wastewater was used as a power source to drive sustainable H2 production in a PEC having stacked TNA photoanodes. Without any external bias, the integrated system generated a photocurrent of 0.44 mA/cm2 with an H2 production rate of 0.45 ± 0.03-m3 H2/m3 day under 1 sun illumination, which is ~ 1.5–1.9-fold higher than other tested systems. This study demonstrates the synergetic effect between MFCs and PECs, in which electrons recovered from wastewater biodegradation in MFCs significantly increase H2 generation in PECs without the need for an external power source.

Jessica Menold

The Pennsylvania State University, United States

Facilitating Innovation: What can AI agents learn from human facilitators?

Teams play a vital role in engineering design by harnessing collective problem-solving abilities and enhancing innovative and creative outputs. However, teams face challenges including complex social dynamics, cognitive biases, and individual traits that hinder their overall effectiveness, rendering them less useful than the combined capabilities of their members. A neutral external party that manages team processes, or a facilitator, can mitigate these issues by influencing team processes through the formation of trust and the maintenance of a healthy team climate. While previous research has recognized the importance of facilitator presence and favorable team climate for engineering design team success, limited research has explored the specific behaviors employed by facilitators to achieve desired outcomes at the team level. Problematically, human facilitation is often infeasible in dynamic and uncertain environments, and is often prohibitively expensive, limiting the ability to scale the benefits of facilitation broadly across organizations and firms. Therefore, emerging research in human-computer interaction is beginning to leverage intelligent agents, not just as a tool, but as a manager. The proposed talk will review emergent findings from in-situ studies of expert human facilitators, discovered via novel computational techniques, and discuss the implications of these findings with regards to the design and implementation of intelligent agents as managers of human problem-solving teams.

Thao Thi Phuong Nguyen

Hanoi Medical University, Institute for Preventive Medicine and Public Health, Vietnam

Pioneering Interventions and Insights: Enhancing Physical and Mental Well-being in Post-Stroke Patients in Vietnam

This study concentrated on the declining physical and mental health among post-stroke patients for the first time but also pioneered innovative interventions to enhance their mental and physical well-being. These interventions included (1) combining Physical therapy and Rehabilitation; (2)

Motivational Interviewing (psychology therapy), and (3) using Functional Near-Infrared Spectroscopy (fNIRS) measurement devices to assess the progress of mental health following interventions (https://www.obelab.com/).
In a randomized trial with 92 post-stroke patients (46 in each group), Cohen's d assessed differences in post-stroke physical and mental health. Utilizing bootstrapping (500 resamples) ensured precise values with a non-normal distribution dataset. Physical health improvements were moderate over six months, while mental health gains, particularly in depression and fatigue, were high after the same period in the intervention group.
fNIRS data, analyzed with the MATLAB-based NIRSIT package, revealed increased Oxy-Hb concentrations in specific prefrontal cortical areas associated with reduced depressive symptoms and fatigue in the intervention group. GEE regression analysis identified positive Oxy-Hb changes over time, with descriptive analysis displaying improvements in depression and fatigue. The charts below illustrate Oxy-Hb concentration changes in key prefrontal cortical regions, indicating the intervention group's improvement in depressive symptoms over time, and proportional changes in the left Dorsolateral Prefrontal Cortex associated with reduced post-stroke fatigue after six months.
In conclusion, this research impact goes beyond pioneering insights into the physical and mental health of post-stroke patients in Vietnam. It opens up avenues for effective interventions, improved screening processes, and more holistic care for stroke survivors.

Christian Nkanga

University of Kinshasa, Democratic Republic of the Congo

Targeted Enteric Phage Therapy: An Innovative Approach to Enhancing Microbiome Health and Combatting Antimicrobial Resistance

Antimicrobial resistance (AMR) represents a significant threat to global health, responsible for 1.27 million deaths annually, with projections rising to 10 million deaths by 2050. Antibiotics, while crucial to combating infections, not only suffer from AMR, but also reduce microbial diversity, causing conditions like Irritable Bowel Syndrome and prolonged gut microbiome disruption. Even a short course of antibiotics can disrupt the gut microbiome for extended periods, allowing opportunistic pathogens like Clostridioides difficile to thrive, potentially causing severe colon damage and can be fatal. Moreover, gut microbiome imbalances give rise to specific pathogenic gut bacteria that are increasingly implicated in various serious health issues, including cancers, immune, neurological, and cardiovascular diseases, highlighting the urgent need for novel AMR therapies.
Phages are viruses with specificity for particular bacteria and offer a promising strategy for addressing AMR pathogens, serving as an alternative or adjunctive therapy to conventional antibiotics. Phage fragility, however, is challenging; gastric acidity during oral administration can destroy their viability and effectiveness. To overcome this, we have focused on developing targeted delivery systems for phages and other bioactive agents to the gastrointestinal (GI) tract.
Our research and development efforts have yielded an enteric encapsulation method and formulation, protecting over 95% of phages and bioactive agents from harsh stomach acidity, ensuring precise release into targeted locations of the GI tract. This innovation paves the way for new therapeutic strategies to modulate the gut microbiome, representing a significant advancement in the fight against the AMR crisis and having important implications on global health.

Alexia Nuñez-Parra

Universidad de Chile and Member of the Chilean Frontier Program, Chile

Chilean Frontier Program for Young Scientists: building bridges for collaboration

The Chilean Frontier Program, sponsored by the Chilean Academy of Science, is a selective and prestigious initiative designed to foster interdisciplinary scientific and academic collaboration among young Chilean scientists. Among its distinguished past members are three National Prize winners in Science and one Governmental Secretary of Science.
Its objectives encompass promoting the dissemination of science, fostering discussions on the scientific ecosystem, and collaborating in the formulation of public policies aimed at advancing research and technological development in our country.
We are launching this year a survey to collect data about the perception of young and mid-career scientists about academia, work/life balance, funding availability, publishing industry, among others, and invite all the scientists from the GYA and other organizations to join the project.

Justine Germo Nzweundji

Institute of Medical Research and Medicinal Plants Studies, Cameroon

Revealing the Potential of Prunus Africana: Bridging Biotechnology and Policy for Sustainable Use

Prunus Africana or African cherry is the only indigenous Prunus in Africa with medicinal virtues that grows in sub-Saharan Africa. It is a multi-virtue species used to treat a range of illnesses in humans; it is a source of Non-Timbers Forests Products that has captured the attention of national and international traders. The bark has been used for the treatment of Benign Prostatic Hyperplasia which affects more than 50 % of men over the age of 50. Prunus africana faces significant threats due to overexploitation, the recalcitrance of its seed propagations, endangering its natural populations. That is why it is listed under Appendix II of CITES, marking it as a species at risk of extinction. Therefore, biotechnology can help to address these threats to P. africana, through germination, micropropagation, and the use of natural fertilizers' such as mycorrhizal fungi as well Phytochemical and molecular analysis, to better characterize the specie. Despite the policies toward conservation of biodiversity and natural resources, a gap remains in translating these scientific advancements into practical applications for policymakers. The aim is to foster an understanding of plant biotechnology research related to Prunus africana, enhance guidance for policymakers on sustainable harvesting and conservation practices. Thus, the importance of collaboration between researchers and the community to ensure the outcomes are culturally resonant and innovative; helpful for policymakers to craft supportive policies that resonate with the realities faced by communities.

Myrtani Pieri

University of Nicosia, Cyprus

Eating for two: a universe within us

Every time we eat, we nourish ourselves. However, we also feed the trillions of non-human cells residing in our gut.
Science journalist Ed Young once wrote, “All zoology is really ecology.” To this, I would add that human physiology is fundamentally ecology as well. Every meal affects our gut bacteria, and to truly understand our physiology, we must grasp how the symbiosis, interactions, and dysbiosis with the trillions of microbes within us unfold.
With every meal, we not only consume essential nutrients such as carbohydrates, proteins, fats, vitamins, and minerals, but we also ingest the nucleic acids, like DNA and RNA, of the organisms we consume. While it is widely believed that these nucleic acids are completely broken down in the consumer’s gastrointestinal tract through digestion, recent evidence suggests that some small RNA molecules, known as microRNAs, may act in a “heretic” way. They survive. And these molecules are genes regulators, they are essentially “information”.
My research delves into the emerging and somewhat controversial field of 'cross-kingdom regulation' by exogenous microRNAs and their potential protective or pathogenic effects on the host, affecting human or non-human cells.
Is it time to view nutrition not merely as nutrient intake but also as information intake? And should we examine the interplay between food, human cells, and bacterial cells to fully understand health and disease?
FUNDING: University of Nicosia Seed Grant supports this work.

Dipak Vitthal Pinjari

Institute of Chemical Technology, Mumbai, India

Pyrolysis: Sustainable Strategies to Reduce the Carbon Footprint

As the global community grapples with the pressing need for sustainable waste management practices and mitigating climate change, the utilization of waste plastic as a feedstock for pyrolysis emerges as a promising solution. Pyrolysis, a thermochemical conversion process, offers a sustainable approach to address the challenges associated with plastic waste while simultaneously contributing to carbon neutrality objectives.
This research explores the sustainable pyrolysis approach as a means to convert waste plastic into valuable products, such as biofuels and other chemicals, thereby reducing the environmental impact of plastic pollution. The study investigates the technical, economic, and environmental aspects of pyrolysis as an alternative to traditional waste disposal methods, with a focus on achieving carbon neutrality. Key components of the research include an in-depth analysis of the pyrolysis process parameters, such as temperature, pressure, and catalysts, to optimize the yield and quality of the end products. Furthermore, the economic feasibility of implementing pyrolysis facilities for waste plastic management is assessed, considering factors such as initial investment, operational costs, and potential revenue streams from product sales.

The research underscores the potential of sustainable pyrolysis as a viable strategy for achieving carbon neutrality in waste plastic management. By converting waste plastics into valuable resources, this approach not only reduces the burden on landfills and incineration but also contributes to a circular economy by promoting the reuse of plastic-derived products. The findings of this study aim to provide valuable insights for policymakers, industry stakeholders, and researchers working towards a more sustainable and environmentally friendly approach to plastic waste management.

Lydia Rhyman

University of Mauritius, Mauritius

The Role of Computational Chemistry in the Sustainable Development Goals

Chemistry is an experimental natural science which makes use of laboratory equipment in order to carry out competitive research. Computational chemistry is a relatively new discipline because it requires software and computational resources to deliver scientific insights for experimentally relevant systems. Efficiently coded quantum chemical programs are now available and the speed of computational hardware has increased in the last decades. These have contributed to the present situation, where chemical research developed to an experimental and theoretical discipline.

There is no doubt that chemistry in general plays an important role in helping to achieve the Sustainable Development Goals (SDGs) and there is nowadays essentially no area of chemical research without the use of modern computational methods. This holds for classical synthetic work in fundamental organic and inorganic chemistry as well as for presently highly important applications of chemical studies in areas such as material sciences, drug design, energy storage and photochemistry.

This presentation will review (i) the applications of computational chemistry in different areas of research in achieving the SDGs; (ii) our research using computational chemistry ranging from fundamental to applied research, particularly to address SDGs 3, 6, 7, and 13 and (iii) our programme in training scientists in computational chemistry.

Filippo Rossi

Politecnico di Milano, Italy

Biphasic porous structures formed by monomer/water interface stabilization with colloidal nanoparticles

Bicontinuous jammed emulsion gels (known as bijels) are Pickering emulsion where the aqueous and organic phases are present as continuous phases. These emulsions, stabilized by colloidal nanoparticles at the interface between the two phases, can be used in a variety of applications. The goal of this study is that of using a hydrophobic monomer, able to polymerize in bulk, thus forming a bicontinuous structure with polymer and water present as immiscible phases.

ε-caprolactone, selected as monomer, has been inserted in the reacting cylinder, along with TBD as catalyst. The system was mounted on an orbital shaker, and a stirring velocity of 1000 rpm has been set. Once the polymerization has occurred, an aqueous solution of NPs (both organic and inorganic have been tested) has been added. Release tests have been performed by soaking the bicontinuous structures in PBS at 37 °C for mimicking the physiological conditions.
DOSY analyses were able to confirm the bicontinuity of such structures, and their mechanical and chemical properties have been fully characterized through different analyses (GPC, NMR, ESI-MS, DSC, Fluorescent confocal microscopy). Furthermore, the results obtained for release in PBS and solid media gave encouraging results. Important topic to be highlighted is the temperature control for the production protocol, since the final material strongly depends on it.
These materials have been demonstrated the ability to load both hydrophilic and hydrophobic molecules and their release properties have been intensively studied. Furthermore, the possibility of codelivery of two different molecules (hydrophilic and hydrophobic respectively) has been demonstrated.

Wasim Sajjad

National University of Medical Sciences, Rawalpindi, Pakistan

Let's Quench the Quorum: A Novel Strategy to Tackle Biofilm Forming Multidrug Resistant Bacteria

The discovery of penicillin in 1928 started the golden era of antibiotic that peaked in mid 1950s. Since then a rapid decline in antimicrobial discovery and development and evolution of drug resistance has led to antimicrobial resistance crises. Today AMR is a serious social, political and economic challenge and endorsed in 68th session of the World Health Assembly in Global-Action Plan. Mostly hospital acquired infections are caused by bacteria which proliferate within quorum sensing mediated biofilms. Quorum-sensing is cell-to-cell communication that permits bacteria to synchronize communal behavior in a population density-dependent fashion.
A joint action is required for a healthier tomorrow by investing in research and development; obviously, finding new classes of antibiotics is really hard, so repeating the old strategies, while expecting different outcomes, seems to boarder on insanity. In this lightening talk, I will be a story teller that how bacteria prefer strategy "united we stand divided we fall". The disruption with quorum quenching antimicrobial peptides for inhibition of quorum sensing system is a potential substitution strategy. The success of the strategy is the fact that this approach does not intend to kill the pathogen or limit cell development, but shuts down the expression of the pathogenic genes.

Antonia Saktiawati

Faculty of Medicine, Public Health, and Nursing Universitas Gadjah Mada, Indonesia

How to prevent fungal infections related to climate change?

Fungi are everywhere. Sometimes, they are too small to see with the naked eye. Fungi live outdoors (i.e., in soil and on plants), indoors (on surfaces and in the air), and on people's skin and inside the

body. There are millions of fungal species, but only a few hundred of them can make people sick. Molds, yeasts, and mushrooms are all types of fungi. Fungi can cause many illnesses, including asthma, rashes, lung infections, bloodstream infections, or brain inflammation.
Humans and other mammals have warmer body temperatures than most fungal pathogens can tolerate, so they have historically been protected from most infections. However, the prominent climate change in the past decades (rising temperature and humidity) causes fungi to gradually adapt to higher temperatures, and the human body's average temperature tends to decrease. Therefore, fungal infections become a future threat. Meanwhile, no potent vaccine for fungi exists, and only limited drugs are available to treat the diseases.
Our research shows that we can prevent fungal infections with these measurements:
1. Maintaining a clean and dry environment, as fungi thrive in moist conditions (disinfect and dry wet areas, avoid prolonged exposure to damp and humid environments).
2. Good hygiene, includes avoiding wearing tight or sweaty underpants, not sharing towels, and washing hair regularly.
3. Proper diets include avoiding grains like corn or wheat, sugars, yeast, and fungal products.
It's important to note that some individuals may be more susceptible to fungal infections, such as those with weakened immune systems, and may require additional precautions.

Oluwarotimi Williams Samuel

University of Derby, United Kingdom

Advances in Novel Limb Function Rehabilitation and Assistive Technologies

Human limb function loss resulting from neurological diseases or amputation severely impacts the quality of life of affected individuals (AP). In many cases, such loss of function renders AP functionally dependent in aspects such as self-care (eating, drinking, dressing, etc.) and dexterous object manipulation during activities of daily living, precluding optimal use of their potential. To resolve this issue, intelligent rehabilitation robotic systems that can automatically decode limb movement intentions from bio-signals have been proposed to restore limb function loss in AP and reintegrate them into society. However, these robotic systems have only recorded marginal clinical and commercial success due to a number of confounding factors. Thus, my research works have investigated the core limiting factors and proposed novel solutions that adopt efficient Artificial Intelligence (AI)-based and signal processing techniques for the development of next-generation rehabilitation robotic systems. This report introduces my recent research progress, emphasizing the breakthroughs, challenges, and prospects in the field of assistive and rehabilitation technologies.

Noor Shaila Sarmin

Bangabandhu Sheikh Mujibur Rahman Agricultural University, Bangladesh

Impacts of Land use land cover (LULC) change on the socioeconomics of local population in Gazipur, Bangladesh

Land use and land cover (LULC) change has become a common phenomenon in many developing countries including Bangladesh. The central part of the country concentrating on the Capital city is highly populated and more vulnerable to rapid land use change thus affecting the socioeconomics of the local population. Thus, regular monitoring of LULC status and changing patterns is crucial. LULC change in the Gazipur district was studied for thirty years. Landsat images were processed using QGIS and ArcGIS. Five LULC classes (forest, agri/grassland, water, built-up and other) were identified. Agri/grassland is found the largest land use category in the study area and the coverage found an increasing trend. Although the class built-up represents the smallest percent, the values sharply increased from 1990 to 2020. Other land represents fallow or bare land which occupies 10.14, 11.65, 0.94, and 1.16 % for 1990, 2000, 2010, and 2020. Being a peripheral district of the Capital city, district Gazipur has been facing population growth during the recent few decades that forced to use of more fallow land to make new residential areas, industrial infrastructures, more crop production, and convert to homestead areas. During the study period, about 66.62% of forest coverage has declined. About 41859.99 ha of forest area has been converted to agri/grassland, 2455.92 ha of forest converted to built-up, 316.26 ha of forest converted to water, and 358.11 ha of forest converted to other class. The LULC change effecting the local socioeconomics of the study area.

Karma Sawyer

Pacific Northwest National Lab, United States

Equitable Building Decarbonization through Electrification

Electrification of space and water heating is now widely discussed in the clean energy community as a critical solution to decarbonizing the US building stock. There is little research available around the potential positive and negative impacts of electrification, especially on marginalized groups. On one hand, building electrification strategies provides opportunities to reduce exposure to indoor pollutants, which are often 2 to 5 times higher than typical outdoor concentrations and have disproportionate impacts on people who are often most susceptible to the adverse effects of pollution. Most heat pump demonstrations have not been done in underserved communities in which people may live in more dense conditions, changing the performance metrics needed to meet basic energy services. Many buildings, especially in underserved communities, are not insulated properly, limiting the cost and energy savings from heat pump technologies. Decarbonization through electrification is a relatively new strategy that has grown in popularity only since the recent rapid increase of solar and wind generation. Underserved communities that would benefit from building electrification may also be affected by an unreliable and expensive energy system. The current body of research on equity and environmental justice in the power grid is underdeveloped and not broadly adopted. Moreover, the voices of minority, low-income, and protected populations

are often not present in conversations regarding grid planning and resource allocation. This presentation will describe some of the gaps in research and recommendation for analyses and case studies that will be necessary for building electrification to be an impactful decarbonization tool for everyone.

Anina Schwarzenbach

University of Bern, Switzerland

Extremists of a feather flock together? Community structures, transitivity, and patterns of homophily in the US Islamist co-offending network

Prior research suggests that members of terrorist groups prioritize forming network ties based on trust to improve their organizational and operational security. The homophily principle, which postulates that individuals tend to form relationships based on shared characteristics, can be a key mechanism through which people identify trustworthy associates. Next to homophily, the mechanism of establishing interconnected relationships through transitivity is also well known to serve this purpose and shape community structures in social networks. We analyze the community structures of the Islamist co-offending network in the United States, which is highly violent, to assess whether homophily and transitivity determine which extremists form co-offending ties. We rely on a new database on the individual attributes and the co-offending relationships of 494 Islamist offenders radicalized in the United States between 1993 and 2020.
Using community detection algorithms, we show that the US Islamist co-offending network is highly clustered, modular, and includes only a few large communities. Furthermore, results from exponential random graph modeling show that transitive relationships as well as spatial proximity, ideological affiliation, and shared socio-cultural characteristics drive co-offending among US Islamist extremists. Overall, these findings demonstrate that the processes of homophily and transitivity shape violent social networks.

Tofik Ahmed Shifa

Ca'Foscari University of Venice, Italy

Green Hydrogen Production via Water Splitting

The generation of clean energy from water electrolysis is a feasible solution to overcome the problems of energy crisis. However, this viable route depends on the utilization of Pt, which is scarce and expensive. Designing catalysts entirely based on Earth abundant materials is, therefore, the way forward. In this regard, 2D materials (layered or non- layered), and transition metal phosphides have got copious attention. Here, I present strategies to enhance the catalytic (electrocatalysis, photocatalysis) performance of these materials giving a particular emphasis for transition metal chalcogenides (WS2, CuS, etc), transition metal phosphorus trichalcogenides (MPX3; X=S,Se), non-layered Cr2S3 and nickel phosphides. I discuss the advantages of these materials for catalysis and the different routes available to tune their electronic states and active sites. Experimental results show that doping and hybrid material formation play a significant role in optimizing the free energy

of hydrogen adsorption and desorption thereby enhancing water splitting catalysis. Another compelling issue in this research area is about solving the sluggish kinetics of the other half reaction (i.e OER). It has remained a bottleneck in realizing efficient performance. In this regard, nickel phosphide has an excellent track of performance. I also discuss the mechanism behind the very good performance of Ni5P4 and CrOx-CuS toward electro-catalysis of OER. The metal phosphides or sulfides are not the true catalysts, rather in-situ generated metal oxides at the vicinity of phosphides/sulfides are. Moreover, I highlight the emerging layered MPX3 (M= Mn, Ni, Fe, Cu/In) nanosheets as promising materials in sacrificial agent-free photocatalytic water splitting under simulated Sun light (AM 1.5G) illumination.

Aram Simonyan

University of Sussex, United Kingdom

Schematising factors constructing corruption-related descriptive and injunctive social norms

Despite millions of dollars invested into anti-corruption campaigns and research, it remains an unresolved enigma for governments, policymakers, and scholars partly because of its intricate cultural variations (Gephart, 2009). Previous solutions heavily lean on law, institutions, and legislative enforcement (Thompson, 2018; Polinsky and Shavell, 2001). Further, the latest studies pinpointing the power of curbing it through scrutinizing social norms to yield long-lasting effects, predominantly luck statistical analysis, and are dispersed (Urinboyev and Svensson, 2018).
Whereas perceptions forming corruption-related social norms are incremental drivers behind corrupt behaviour, advancing from sporadic assessment to classifying them into groups is still missing. This paper seeks to schematize the anchored perceptions that form corruption-related social norms in the country, which are likely to be stable in the long run.
Social norms are integral to human societies, shaping values and attitudes. Although unwritten, social norms can be more robust in predicting and guiding human behaviour within certain circumstances than written laws. "Different from codified laws, social norms are unwritten codes of conduct that are socially negotiated and understood through social interaction" (Chung and Rimal, 2016). They are the moral compass and framework of acceptable behaviour in a society formed based on observation and expectations (Jones, 1994).

Prabhat Singh

Bhabha Atomic Research Centre, Mumbai, India

Fluorescence based sensors for Heparin: A widely used blood anti-coagulant

This talk explores the development of fluorescence-based 'turn on' sensors for Heparin, a highly sulfated, negatively charged glycosaminoglycan and a prevalent anticoagulant in clinical settings. The extensive use of Heparin in surgeries and thrombotic disease treatments necessitates precise monitoring to avoid complications like hemorrhages and Heparin-induced thrombocytopenia. Addressing the challenge of crafting these sensors from readily available materials, the

presentation will highlight advancements in detecting Heparin levels using molecular rotor-based fluorescent probes, emphasizing their significance in safe anticoagulant therapy.

Inayat Ullah

National University of Sciences & Technology (NUST), Pakistan

Transformative Impact of Technology Integration into the Education System in Developing Countries

Greetings, esteemed audience! Today, I am thrilled to share groundbreaking insights from our research on the diffusion of technology into the public administration system in developing countries, focusing on the transformative impact of a technology-based school monitoring initiative in the Khyber Pakhtunkhwa (KP) province of Pakistan.

In a region where implementing technological advancements in public services poses a significant challenge, our study explores how political support can catalyze and sustain these reforms. Using a natural experiment framework with data from over 28,000 primary and secondary public schools, we investigated the effects of technology-based monitoring on teachers' attendance and, more importantly, on the learning outcomes of enrolled children.

Our findings reveal a remarkable 8 percentage point increase in teachers' attendance in the first year following the monitoring program, demonstrating the immediate positive impact. Despite a slight dip in the second year, the long-term effect remains robust. The program not only enhances teachers' performance but significantly improves students' standardized Reading, Math, and English test scores, with gains of 0.08, 0.09, and 0.10 standard deviations, respectively, particularly in lower grades (0~5).

What makes this initiative stand out is its innovative approach, external control, and incorporation of ICT. The early success generated political demand, with the general public actively campaigning for the sustainability of the program. The government, recognizing its transformative potential, endorsed the scaling up of the initiative through a multi-year partnership approach.

This success story showcases the pivotal role of technology in overcoming challenges in public administration and fostering positive educational outcomes.

Luisa Maria Viegas Becerra Urtiaga

UFBA, Brazil

BioDivA Lab: Fighting for (Bio)Diversity under an Intersectional and transdisciplinary approach

This talk will showcase the work I develop at the Laboratory of (Bio)Diversity in the Anthropocene (BioDivA Lab), a collaborative laboratory based in Brazil that advocates for a more diverse, inclusive, collaborative, and healthier scientific community. The lab recognizes that scientific research is not a neutral activity but rather is influenced by societal norms and values. The lab's activities are informed by intersectionality, a social theory that recognizes the interconnections between different forms of social inequality, such as gender, race, and sexuality. One of the lab's key efforts is building

a collaborative scientific network. The lab collaborates with researchers from different disciplines, regions, and countries to share knowledge and promote transdisciplinary research. This approach involves collaboration across disciplines and stakeholders to develop innovative solutions to complex problems, fostering diverse perspectives and creative solutions to scientific questions. Finally, the BioDivA Lab uses science outreach as a tool for environmental conservation and diversity and inclusion in STEM fields. The lab's outreach initiatives aim to inspire young people, especially those from underrepresented groups, to pursue science and participate in creating a more inclusive and sustainable world. The lab works with local schools and communities to provide hands-on science education and promote awareness of environmental issues. These policies aim to create a supportive academic environment and provide opportunities for underrepresented groups. The BioDivA Lab's transdisciplinary and intersectional approach to research, collaboration, and science outreach provides a model for building a more diverse, inclusive, and collaborative scientific community. The lab's efforts to promote inclusion and support young scientists from underrepresented groups are critical for addressing historical exclusion in science and creating a more equitable and sustainable world.

Hussain Wahedi

National University of Sciences & Technology, Pakistan

The “SIRTified” Skin Regeneration and Wound Healing

Regeneration of cells and tissues is instrumental to the restoration of normal structure and function of the body and the reinstatement of human health. Although the importance of tissue regeneration in any body part cannot be undermined, skin bears additional significance for a couple of reasons. Since skin is the outermost organ of the body, it is most susceptible to damage by environmental factors and mechanical catastrophes. Complete, speedy, and scar-less (in order of their importance) restoration of the skin after damage/injury is, therefore, of supreme significance as it is the frontline defense system of the body. My work focuses on the activation of Sirt1 (the leading member of the Sirtuin family of NAD+-dependent deacetylases) in skin cells through the treatment of natural and synthetic compounds and its effects on the viability and regeneration of the skin cells that were subjected to UV irradiation and mechanical injury respectively. Our findings showed that the chemical activation of Sirtuins leads to an increased rate of skin regeneration and wound healing. Since we used human skin keratinocytes for our study, our findings are relevant and meaningful because skin stem cells are a subpopulation of these keratinocytes. Thus, it is very much possible that the transformation of the differentiated cells into stem cells is mediated through Sirt1 activation. In another study, we have demonstrated that the expression of Sirt1 (along with Sirt3 and Sirt6) reduces with age in human dermal fibroblast cells (NHDFs). This supports the idea that the ability of cells to renew and regrow depends upon the level of Sirt1 (if not other Sirtuins) at least partially. In our most recent project, we applied our findings to the development of a wound-healing bandage that has passed pre-clinical testing and is currently in the clinical trial. To summarize, our research provides a new paradigm in the area of regenerative medicine using Sirt family proteins as drug targets.

Jane Yau

DIPF Leibniz Institute for Research and Information in Education, Germany

Games, Climate Emergency and Transformation

In 2023, a significant initiative called Games realizing effective and affective transformation in societal and cultural domains (2023-26) started, which is being co-funded by the European Union and UK Research & Innovation. With partners in Spain, Austria, Germany, UK, Denmark, Cyprus, China and South Africa, the consortium will investigate the potential of digital games and the application of games/playful techniques to support the social engagement of citizens in establishing priorities for policy makers involved in addressing the most pressing global challenge of our time, Climate Change. Using collaborative design and citizen science methods, it brings together researchers with expertise in digital games, data analytics, and policy in an integrated investigation, articulated by case studies of the application of games, leveraging the central role games occupy in contemporary culture. The project will generate new knowledge of the actual and potential impact of games on European society and new understandings of the innovative uses of games to support the social engagement of citizens. It combines academic studies and practical experimentation with novel applications of games. Each case study is a research cycle addressing a policy issue and research questions, with multiple pilots and quantitative and qualitative research activities. Two types of games will be used – short games deployed at scale in hit mobile games, generating quantitative data and reaching 3 million players, and longer collaborative games based around social dilemmas with small groups, generating in-depth qualitative data. I will also provide initial results of my first substantial case study with the United Nations Development Program, where we have collected data citizens of the G20 countries in 21 languages.

Ying Zhang

Meta Platform, United States

The Network that Supports the Hyperscale Social Networks

Network management facilitates a healthy and sustainable network. However, its practice is not well understood outside the network engineering community. In this talk, I will present Meta's network management suit, ranging from network planning, to risk-driven network management, and ultimately to network operation. I will present our intent-driven top-down network management automation that facilitates the network reliability, performance, and long-term evolution. By sharing our operational experiences of running a large-scale network for years, as well as our experiences in supporting a diverse set of networks from backbone, to PoP, to data center, we hope to inspire new research in the area of reliable and verifiable network management.

Laura Zimmermann

University of Georgia, United States

Measuring Labor Trafficking Prevalence

Labor trafficking captures various forms of labor exploitation, including forced labor. Young adults in many developing countries are believed to be at high risk of experiencing labor trafficking, especially after the Covid-19 pandemic led to widespread disruptions of the economy and the closure of international borders. But little data on prevalence rates exists, and lack of awareness, trauma, social stigma and the threat of persecution make labor trafficking a potentially highly sensitive topic. This lightening talk presents the first estimates of labor trafficking prevalence in Malawi and Zambia using a cutting-edge survey design technique from the social sciences.