VAGELOS COLLEGE OF PHYSICIANS & SURGEONS,
COLUMBIA PRECISION MEDICINE INITIATIVE,
IRVING INSTITUTE FOR CLINICAL AND
TRANSLATIONAL RESEARCH, AND THE
HERBERT IRVING COMPREHENSIVE CANCER CENTER

PRESENT

PRECISION MEDICINE SCHOLARS' DAY

Featuring Research Presentations by Joint Precision Medicine Pilot Award Winners

TUESDAY, JUNE 17TH, 2025

9:00AM - 1:00PM

ROY AND DIANA VAGELOS EDUCATION CENTER

104 HAVEN AVENUE, 4TH FLOOR, NY, NY 10032

COLUMBIA | PRECISION MEDICINE

COLUMBIA | IRVING INSTITUTE FOR CLINICAL AND TRANSLATIONAL RESEARCH

COLUMBIA
VAGELOS COLLEGE OF PHYSICIANS AND SURGEONS

COLUMBIA
COLUMBIA UNIVERSITY HERBERT IRVING COMPREHENSIVE CANCER CENTER

Schedule

9:00 am Welcome by Christine Garcia, MD, PhD

9:10 am Opening remarks by Muredach Reilly, MD

9:20 am Nicholas Arpaia, PhD

9:45 am Chaolin Zhang, PhD

10:10 am Kathrin Schilling, MSc, PhD

10:35 am Break

10:50 am Yueqing Peng, PhD

11:15 am Gamze Gursoy, PhD

11:40 am Thomas Hays, MD, PhD

12:05 pm Samuel Sia, PhD

12:30 pm Networking Poster Session. Light Refreshments.

Schedule subject to change. This is a private meeting for Columbia researchers. By participating in this meeting, you agree to treat all information disclosed during the meeting as solely for Columbia internal use for academic purposes.

Christine K. Garcia, MD, PhD

Frode Jensen Professor of Medicine, Director of the Columbia Precision Medicine Initiative, and Chief of the Division of Pulmonary, Allergy and Critical Medicine within the Department of Medicine at Columbia University Medical Center.

Christine Kim Garcia, MD, PhD, is the Frode Jensen Professor of Medicine, Director of the Columbia Precision Medicine Initiative, and Chief of the Division of Pulmonary, Allergy and Critical Medicine within the Department of Medicine at Columbia University Medical Center. Her laboratory studies the genetic basis of monogenic lung disease, with a specific focus on familial pulmonary fibrosis. Her group has identified several rare variants in genes belonging to the telomere, surfactant, and spindle pathways. She received her MD and PhD from the University of Texas Southwestern Medical Center, where she completed residency in internal medicine and fellowship in pulmonary and critical care medicine. In 2019 she moved to Columbia and has been a member of the Center for Precision Medicine and Genomics and an affiliate of the Institute for Genomic Medicine. Dr. Garcia has received a number of awards and honors, including the Irene and Arthur Fishberg Prize from VP&S (2022), American Society for Clinical Investigation (2012), Doris Duke Charitable Foundation Clinical Scientist Development Award (2008), President's Research Council Distinguished Young Investigator Award from University of Texas Southwestern Medical Center (2006), Charles E. Culpeper Foundation Medical Scholar Award (2004), Parker B. Francis Fellowship Award in Pulmonary Research (2003) and Alpha Omega Alpha (1991). She currently co-chairs the NIH Clinical Genetic (ClinGen) Pulmonary Domain Executive Committee.

Muredach Reilly, MD

Director of the Irving Institute for Clinical and Translational Research (Irving Institute); Vice Dean for Clinical and Translational Research at the Vagelos College of Physicians and Surgeons at Columbia University Irving Medical Center and Director of the Cardiometabolic Precision Medicine Program in the Division of Cardiology.

Translational research takes discoveries from basic biological research and applies them to clinical trials, leading to therapeutic opportunities and advancements. Dr. Reilly, a cardiologist and Herbert and Florence Irving Professor of Medicine, was recruited from the University of Pennsylvania to lead Columbia's Irving Institute into a new era of genomics and translational personalized healthcare. His research program is dedicated to precision medicine studies of cardiovascular disease and related metabolic disorders.

This translational research emphasizes humans as the most ideal "model" to understand mechanisms of human disease and therapeutic opportunities for prevention. Clinically, Dr. Reilly is an expert in preventive cardiology and provides expert care for patients with rare cholesterol disorders and premature heart disease. Through his leadership role at the Irving Institute, Dr. Reilly builds programs to drive forward the field of precision cardiovascular medicine.

Prior to his role at Columbia, Dr. Reilly held faculty positions at UPenn and led initiatives in clinical and translational research, including in his roles as Director of Translational Core Laboratories, Associate Director of General Clinical Research Center, and as Associate Director of the Cardiovascular Fellowship Program. Dr. Reilly received his medical degree from University College Dublin, Ireland and completed his residency and fellowship training in Medicine and Cardiovascular Medicine at the University of Pennsylvania, where he also received an M.S. degree in clinical epidemiology. In 2010, Dr. Reilly was elected to the Royal College of Physicians in Ireland as well as to the American Society of Clinical Investigation. In addition, he has received numerous awards, including the 2006 UPenn Donald B. Martin Teaching Service Award, the 2013 William Osler Patient Oriented Research Award, American Heart Association's Mentor of Women Award in 2015 and, in 2018, the Jeffrey M. Hoeg Award for Basic Science and Clinical Research from Arteriosclerosis, Thrombosis, and Vascular Biology (ATVB). In April 2025, he was elected to membership in the Association of American Physicians.

Nicholas Arpaia, PhD

Associate Professor of Microbiology & Immunology

Dr. Arpaia received a BS in Biochemistry from the State University of New York, Geneseo in 2006 and a PhD in Molecular and Cell Biology (Immunology and Pathogenesis) from the University of California, Berkeley in 2011. Dr. Arpaia serves as the Director of the Microbiology & Immunology Graduate Program and Associate Director of the Integrated Doctoral Program in Cellular, Molecular, and Biomedical Sciences. He was named a Searle Scholar in 2017 and received the Harold and Golden Lamport Award for Excellence in Basic Science Research in 2021.

His graduate work with Dr. Gregory M. Barton examined interactions between Salmonella typhimurium and the innate immune system and demonstrated that Toll-like receptor–sensing of S. typhimurium promotes pathogen virulence and immune evasion. As a Postdoctoral Research Fellow in the laboratory of Dr. Alexander Y. Rudensky at Memorial Sloan Kettering Cancer Center, Dr. Arpaia investigated how tissue-resident leukocytes sense changes in their local environment and identified environmental signals that drive the differentiation and specialization of regulatory T (Treg) cell subsets. He began his independent laboratory as an Assistant Professor of Microbiology & Immunology at Columbia University Irving Medical Center in 2016 and was promoted to Associate Professor (with tenure) in 2024.

Chaolin Zhang, PhD

Associate Professor, Department of Systems Biology

Dr. Chaolin Zhang is an Associate Professor in Department of Systems Biology, Department of Biochemistry and Molecular Biophysics, and Motor Neuron Center at Columbia University. His lab takes a multidisciplinary approach to studying mechanisms and functions of post-transcriptional gene regulation, in particular alternative splicing in both normal and disease contexts. On the mechanistic side, the Zhang lab focuses on fundamental understanding of the targeting specificity of RNA-binding proteins (RBPs), how they regulate alternative splicing in various cellular contexts, especially in the nervous system, and how such regulation can be disrupted by mutations and genetic variations. On the functional side, the lab aims to uncover the roles of RBPs in determining the neuronal cell fate, morphological and functional properties during neural differentiation and maturation. More recently, the lab has also been working on translating fundamental knowledge on RNA regulation to precision genetic medicine, with a particular focus on multiple devastating monogenic diseases affecting the central nervous system.

Dr. Zhang and his lab have pioneered RNA Systems Biology approaches to investigating splicing-regulatory networks. Dr. Zhang's work has led to breakthroughs in mapping protein-RNA interactions at single-nucleotide resolution on a genome-wide scale (e.g., Zhang & Darnell, Nat Biotech, 2011; Weyn-Vanhentenryck, Cell Rep. 2014). Building on this unprecedented resolution, his lab has developed innovative statistical models to better define the binding specificity of RBPs, which led to discoveries of novel binding modes of old RBPs under decades of investigations, with implications in development and cancer (e.g., Ustianenko, Mol Cell, 2018 (cover story); Feng, Mol Cell, 2019). Dr. Zhang also developed an integrative modeling strategy to define splicing-regulatory networks by combining multiple modalities of genomic data and evolutionary signatures (Zhang, Science 2010). The lab has leveraged these networks to elucidate RBPs driving molecular diversity underlying neurodevelopment (e.g., Weyn-Vanhentenryck, Nat Commun, 2018; Jacko, Neuron, 2018) and neuronal cell type diversity (Feng, PNAS, 2021).

To approach the research goals, Dr. Zhang and his lab regularly use a variety of experimental and computational approaches and techniques, including CRISPR-based genome engineering, high-throughput screening, deep sequencing, probabilistic modeling and machine learning (e.g., Bayesian networks and deep learning). The lab uses both cell-based (e.g., mouse ESCs and human iPSCs and directed neuronal differentiation) and mouse models. Work in his lab has been funded by multiple Institutes at NIH, Simons Foundation, and Columbia Precision Medicine Initiative.

Before starting his academic career, Dr. Zhang was originally trained as an engineer in Department of Automation, Tsinghua University (Beijing). He then completed his PhD training in the Cold Spring Harbor Laboratory, and Postdoc training at Rockefeller University and Howard Hughes Medical Institute. He was awarded a K99/R00 by NIH in 2011, joined Columbia as an Assistant Professor in late 2012, and received tenure in 2019. Trainees from the Zhang lab have also been recognized by multiple awards, including NSF Graduate Research Fellow, Titus M Coan Prize for Excellence in Research, Columbia Precision Medicine Fellow, and NIH K99/R00.

Kathrin Schilling, Msc, PhD

Assistant Professor, Environmental Health Sciences, Mailman School of Public Health

Kathrin Schilling is an isotope geochemist and has been at the forefront of developing stable metal isotopes as biomarkers to answer a wide array of research questions, relevant for the diagnosis, prevention, and control of diseases and nutrient status. Her interdisciplinary approach brings techniques commonly used in Earth Sciences into solving new problems in Biomedical Sciences. For instance, she explores how these isotopic biomarkers can fulfill a much-needed role of tracing environmental sources of exposure to carcinogenic metals as well as help detect minute changes of metabolic processes in humans caused by disease development and progression.

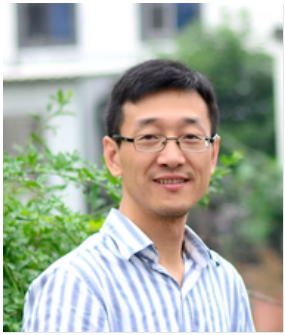
Dr. Schilling's background is originally in Geology, but her past and current research is at the interface of geology, molecular biology, life science, and chemistry. Her research focuses on developing fundamental insights on the fluxes of contaminants and nutrients to extend our knowledge of how to remediate contaminated systems, ensure economic sustainability of critical elements (i.e., selenium and tellurium), and ecological sustainability of essential nutrients (i.e., calcium, zinc, copper and iron).

Research interests:

- Impact of human activity (irrigation, mining) on environmental cycling of redox active metalloids – particularly nutrients (selenium) and emerging contaminants (tellurium, vanadium)
- Effect of microscale microbial and geochemical processes on macroscale ecosystem processes in soil and water
- Trace metal element biogeochemistry assessing deficiency and toxicity risk based on environmental sources and sinks (i.e., zinc, nickel and iron)
- Response of microbial-mediated reactions (i.e., iron, carbon) by variation in process parameters caused by climate change

Yueqing Peng, PhD

Assistant Professor Department of Pathology & Cell Biology Center for Translational Research in Neurodevelopmental Disease



Why do we need sleep? How are sleep states initiated, maintained, and ended? How does sleep impact normal brain functions? What roles does sleep play in neuropsychiatric disorders? The goal of our research is to understand the circuit, cellular, and molecular mechanisms underlying sleep regulation in both normal and diseased brains.

We use a multidisciplinary approach including electrophysiology, calcium imaging, optogenetics, chemogenetics, pharmacology, viral-based neural tracing, molecular biology, and mouse genetics to study the neurobiology of sleep. Currently, we aim to 1) dissect brain circuits that control sleep and wakefulness; 2) identify genes and signaling molecules that initiate and maintain sleep; 3) examine how sleep loss affects brain functions and animal behaviors, such as sensory perception, learning, and memory.

In collaboration with other faculty members at Columbia, we are also interested in understanding the relationship between sleep disruption and neurological/ psychiatric disorders. Specifically, we focus on epilepsy and mood disorders. We aim to identify common neuropathological mechanisms underlying abnormal sleep and brain diseases.

Gamze Gürsoy, PhD

Assistant Professor of Biomedical Informatics (in Computer Science), Vagelos College of Physicians and Surgeons

The overarching research goal of Dr. Gürsoy's lab is to harmonize diverse fields such as genetics, bioinformatics, molecular biology, engineering, and cryptography to achieve three fundamental aims: (1) to increase biomedical data access to a wider group of scientists while preserving privacy of research participants; (2) to integrate clinical and genetic data to improve the resolution and accuracy of patient phenotyping, and (3) to uncover the molecular underpinnings of gene dysregulation via knowledge gained from functional genomics data. They develop omics and clinical data analysis tools that are adaptable to emerging data modalities and analytical needs, including those focused on privacy-preservation and/or knowledge extraction. Dr. Gürsoy leads a group of computational and experimental scientists, creating opportunities for training in cross-disciplinary studies in her lab.

Dr. Gürsoy's work has been recognized with many honors, most recently a 2024 Irving Scholarship from Columbia Medical School, a 2022 NIGMS Maximizing Investigators' Research Award, a 2020 NHGRI Pathway to Independence Award, a 2018 NIH/IBM Big Data to Knowledge Young Investigator Award, and a 2017 University of Illinois Outstanding Dissertation Award. She led teams to win first and third place in NHGRI iDASH Secure Genome Analysis Competition in 2018 and 2019, respectively.

Dr. Gürsoy joined from Yale University, where she was a Postdoctoral Research Associate in the Molecular Biophysics & Biochemistry Department. During her postdoctoral training with Dr. Mark Gerstein, she specialized in genome privacy and functional genomics; and received training in biochemistry and genome engineering in Dr. Andrew Miranker's lab. Dr. Gürsoy obtained her PhD in Bioinformatics from University of Illinois at Chicago, where she studied the role of 3D genome organization on the function of the genome. Before her graduate studies, she was trained as a chemical engineer with a focus in bioengineering.

Thomas Hays, MD, PhD

Assistant Professor of Pediatrics at CUIMC

Dr. Hays studies the genetic basis of disease in infants. This includes translational research to improve how genetic testing can be used to improve clinical care, as well as basic research to determine the contribution of genetic disorders to critical illness in newborns.

Areas of focus include:

- The genetic contribution to FGR (fetal growth restriction) and SGA (small for gestational age) birth weight
- Congenital anomalies of the kidneys and heart
- Perinatal presentations of Mendelian disorders

Dr. Hays completed his MD, PhD, and pediatric residency at the Icahn School of Medicine at Mount Sinai. He completed his neonatology fellowship at Columbia University. He is now an Assistant Professor of Pediatrics at Columbia University. Summer and postbac training fellowships at the NIH were instrumental to his early interest in biology and medicine.

Samuel Sia, PhD

Professor of Biomedical Engineering; Vice Provost for the Fourth Purpose and Strategic Impact

Samuel Sia, a Professor of Biomedical Engineering at Columbia University, is a scholar and a biotech entrepreneur, focusing on microfluidics and miniaturized wearable and implantable medical devices. He has collaborated extensively with colleagues across engineering and in public health, medicine, and business. His research has been featured in both leading scientific journals and the international press; his work in global health diagnostics has garnered coverage from Nature, Science, JAMA, Washington Post, BBC, NPR, Voice of America, Science News, Popular Science, Chemical and Engineering News, and MIT Technology Review. He was named by MIT Technology Review in 2010 as one of the top world young innovators, and was elected in 2016 into the American Institute for Medical and Biological Engineering. As an entrepreneur, he co-developed a prostate-cancer blood test that has been FDA approved, and is co-founder of Rover Diagnostics. He also co-founded Harlem Biospace, a biotech incubator launched in partnership with the New York City Economic Development Corporation that has hosted over 70 biotech startups since 2013. He was named in City & State NY's Life Sciences Power 50 list in 2021, as a driver of New York State's biotech boom. In 2022, he was appointed Vice Provost for Fourth Purpose and Strategic Impact at Columbia University, a newly created role to bring the university's knowledge to impact for the public good, and to help remove barriers to interdisciplinary collaboration. He completed his bachelor's degree in Biochemistry at the University of Alberta in Canada, a PhD in Biophysics as a Howard Hughes Predoctoral Fellow at Harvard University, and a postdoctoral fellowship in Chemistry and Chemical Biology at Harvard University. Prof. Sia is the current chair of the NIH study section Instrumentation and Systems (ISD), until 2024.


COLUMBIA | PRECISION MEDICINE


COLUMBIA
IRVING INSTITUTE FOR CLINICAL
AND TRANSLATIONAL RESEARCH


COLUMBIA
VAGELOS COLLEGE OF
PHYSICIANS AND SURGEONS


COLUMBIA
COLUMBIA UNIVERSITY
HERBERT IRVING COMPREHENSIVE
CANCER CENTER