Titles and Abstracts

Zia Mian
(Princeton University)

The Struggle against the Bomb: The Responsibility of Scientists as Intellectuals

Seventy-five years ago, in May 1946, Albert Einstein led a group of physicists to create the Emergency Committee of Atomic Scientists as a way to educate and mobilize others on the dangers of nuclear weapons. The group declared “We scientists recognize our inescapable responsibility to carry to our fellow citizens an understanding of the simple facts of atomic energy and its implications for society. In this lies our only security and our only hope. We believe that an informed citizenry will act for life and not for death.” This lecture will reflect on the history of physicists as citizen-scientists and public intellectuals, their efforts to transcend nationalism and to bring science and democracy to bear on the challenge of reducing and eliminating the risks from nuclear weapons, the challenges from nuclear weapons today, and the possibilities represented by the new United Nations Treaty on the Prohibition of Nuclear Weapons.

Adonai Herrera-Martínez
(European Bank for Reconstruction and Development)

Physics and international development: energy and climate change

Climate change is an existential threat to humanity. As the impacts of a changing climate worsen, the role of science in understanding the risks and mitigating the consequences becomes all more important. Physicists often have access to powerful tools and skills that are invaluable to the fight against climate change. For example, during my professional career in international development I have leveraged the computational and data processing skills I developed at CERN to analyze learning curves for energy projects and to model CO2 emissions. In this conversation, I will discuss the different roles after I left physics and linked this to my current position as director of environmental funds at the at the European Bank for Reconstruction and Development, my work on climate risk, and how physics and research have shaped my profile, work and career.

Laura Grego
(Union of Concerned Scientists)

Physics and the Security and Sustainability of Outer Space

People and societies around the world rely increasingly on satellites for vital communication services, environmental monitoring, navigation, weather prediction, and scientific research. This largely beneficial trend is happening, at the same time that space is becoming a more intensely military domain. More states are considering fielding weapons that can target satellites or ballistic missiles, or potentially targets on the ground. As scientists, we see that physics imposes important limits on what can and can't be done in space, and as policy advocates, we see that the policy debate would strongly benefit from being technically informed. This talk will outline how technical knowledge can help form policies that keep the space environment healthy and usable into the future, and help avoid space activities from sparking or accelerating crises on the ground.

Victor Yakovenko
(Professor of Physics, https://www.physics.umd.edu/~yakovenk/
Department of Physics, University of Maryland, College Park)

Economic inequality from a statistical physics point of view

Inequality is an important and seemingly inevitable aspect of the human society. Various manifestations of inequality can be derived from the concept of entropy in statistical physics. In a stylized model of monetary economy, with a constrained money supply implicitly reflecting constrained resources, the probability distribution of money among the agents converges to the exponential Boltzmann-Gibbs law due to entropy maximization. Our empirical data analysis shows that income distributions in the USA, European Union, and other countries exhibit a well-defined two-class structure. The majority of the population (about 97%) belongs to the lower class characterized by the exponential ("thermal") distribution, which we recently observed in the data for 67 countries around the world. In contrast, the upper class (about 3% of the population) is characterized by the Pareto power-law ("superthermal") distribution, and its share of the total income expands and contracts dramatically during booms and busts in financial markets. Globally, energy consumption (and CO2 emissions) per capita around the world shows decreasing inequality in the last 30 years and convergence toward the exponential probability distribution, as expected from the maximal entropy principle. All papers are available at http://physics.umd.edu/~yakovenk/econophysics/.