INTERNATIONAL SOLVAY INSTITUTES BRUSSELS

SOLVAY PUBLIC EVENT - SUNDAY 12 SEPTEMBER 2021

ABSTRACTS

Professor Jean-Marie Lehn

(ISIS, U. of Strasbourg Institute for Advanced Study)

Steps towards complex matter: chemistry!

The evolution of the universe has generated more and more complex forms of matter through self-organization, from particles up to living and thinking matter. Mankind has created science to unravel the ways and means by which matter has become organized up to a thinking organism in particular on our planet earth. Self-organization is the process by which steps towards life and thought have emerged. Animate as well as inanimate matter, living organisms as well as materials, are formed of molecules and of the organized entities resulting from the interaction of molecules with each other. Chemistry provides the bridge and unravels the steps from the molecules of inanimate matter and the highly complex molecular architectures and systems which make up living and thinking organisms. Molecular chemistry has developed very powerful methods for constructing ever more complex molecules from atoms. Supramolecular chemistry seeks to understand and control the formation of complex molecular assemblies. The field of chemistry is the universe of all possible structures and transformations of molecular matter, of which those actually realized in nature represent just one world among all the worlds that await to be created. Conceptual considerations on science in general will be presented. Science shapes the future of humanity. Participate !

Professor Bert Meijer

(TU Eindhoven, The Netherlands)

Why we cannot make artificial life in a laboratory

"The origin of life on earth" is without doubt one of the most fascinating scientific questions, while the wish to create a kind of artificial life in a laboratory is amongst its most difficult challenges. The enormous progress in science and technology over the past decades has provided many deep insights into the miraculous composition and functioning of living systems. Today, on the one hand, we can clone sheep, grow organs from stem cells, while cells, plants, animals and bacteria have been genetically modified. On the other hand, the synthesis of small and large molecules has become so sophisticated that almost every molecule that exists on earth can now be made in a laboratory, including long strands of DNA, RNA, proteins and complex drugs that can cure diseases and modify life. These many insights, however, also show the complexity of the molecular biology of living cells. As a result, the astonishment about how life could ever have originated has further increased. The lecture will illustrate the emergence of molecular complexity. It will show some of the greatest challenges that are encountered by bringing many molecules together that in an orchestrated way should perform a function. As even these small steps show completely unexpected behavior, it will take a very, very long time before an artificial living cell can be made in a laboratory out of its individual components, if it is possible at all. Special attention will be paid to the self-organization of complex molecular systems as a critical step in the building process.

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Professor Paul Nurse
(Francis Crick Institute, London, UK)

What is life?

Life is all around us, abundant and diverse, it is extraordinary. But what does it actually mean to be alive? Nobel prize-winner Paul Nurse has spent his career revealing how living cells work. In this lecture, he will take up the challenge of defining life in a way that every member of the audience can understand. It will be a shared journey of discovery; step by step five great ideas that underpin biology will be illuminated. Using his personal experiences, in and out of the lab, Paul Nurse will share with us the challenges, the lucky breaks, and the thrilling eureka moments of discovery. To survive the challenges that face the human race today - from climate change, to pandemics, loss of biodiversity and food security - it is vital that we all understand what life is.

Professor Aleksandra Walczak
(ENS, Paris, France)

How personalised is our immune repertoire?

Immune repertoires provide a unique fingerprint reflecting the immune history of individuals, with potential applications in precision medicine. Can this information be used to identify a person uniquely? If it really is a personalised medical record, can it inform us about the outcomes of a COVID-19 infection? I will explore how learning about randomness can help us read this information we all carry within us.

website: www.solvayinstitutes.be