Public Lecture at 19:00 Tuesday, May 24 at the Aula Magna, Lanthieri Mansion, Vipava

The unbearable lightness of neutrinos

Goran Senjanović

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As you read this, trillions of neutrinos from the sun are passing through every square centimetre of your body, and yet they do no harm to you. Neutrinos are produced by basically everything: nuclear plants, particle accelerators, atmospheric events, radioactivity in the ground and even our bodies.They convey information from the edge of the universe and have been present from its very birth. These mysterious particles have captivated the imagination of physicists from their very first conception and have repeatedly provided a window into new physics.

One question in particular stood out for decades: do neutrinos have mass like their electron siblings from whom they appear inseparable? It took almost seventy years to be sure that indeed they do have nonzero mass, albeit an extremely tiny one. And, finally, last year the Nobel Prize recognised this fundamental fact.

I review here past and future long term efforts to probe the origin and nature of neutrino mass. This ongoing story will take us from the beginnings of elementary particle physics all the way to the frontiers of the Large Hadron Collider at CERN. I argue that this Holy Grail of our field is deeply related to the fundamental question of left-right symmetry in nature that once again may provide a window into new and exciting physics.

About the speaker:

Professor Goran Senjanović is currently one of the most influential scientists studying neutrinos, the most mysterious of the known elementary particles. He has made great contributions to our understanding of nature and is best known for the 'seesaw mechanism', which is recognized today as the main scenario predicting a tiny neutrino mass. This theory received a great boost by the discovery of a non-zero neutrinos mass, which has lead to the Nobel Prize in 2015. Goran Senjanovic is in addition one of the creators of the so called Left-Right symmetric theory according to which nature is completely symmetric at the fundamental level, contrary to the standard wisdom of today. Together with Wai-Yee Keung he has also pioneered the study of neutrino mass at the Large Hadron Collider at CERN, and in collaboration with Bill Marciano has played a major role in the unification of elementary particle couplings at high energy.

Born in Split, he graduated from the University of Belgrade with a major in physics and earned a doctorate degree at the City University of New York in the United States. He was a staff member at the Brookhaven National Laboratory, but he spent most of his carrier at the International Centre for Theoretical Physics (ICTP) in Trieste where on top of producing ground breaking scientific work, he helped discover young talents from developing countries, whom he provided the means of developing successful world-wide scientific careers. Currently he is an emeritus professor at the ICTP and a staff member at newly founded GSSI Center in L'Aquila aiding the development of a new prestigious PhD school in Astro-particle physics.

Nowadays, neutrinos are recognized to be extremely powerful tools to probe early Universe cosmology and high energy processes in astrophysical sources (with the first high energy astrophysical neutrinos detected for the first time in 2013!). In this talk, Goran will tell a story of the developments in our understanding of this mysterious particles, from the perspectives of one of the fathers of the field.

The lecture will be followed by a reception and sky-observations with an amateur telescope in the yard of the Lanthieri Mansion.

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