



## KONWERSATORIUM INSTYTUTU FIZYKI UMCS

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### *„Emergence and non-locality of Majorana bound states in nanoscopic systems”*

Concept of the Majorana fermion refers to a particle that is identical with its own antiparticle. Their existence in a natural form has not been confirmed yet, but similar quasiparticles can emerge in the condensed matter systems and they are known as the Majorana bound states. They do not fit in the usual categorisation of fermions and bosons because of their fractional (anyon) statistics. Topological protection of such quasiparticles might lead to implementation of quantum bits that would be immune to environmental decoherence and their non-Abelian braiding might help to realize the topological quantum computation scheme. However, before applying such Majorana quasiparticles in any technological device, we need to thoroughly understand their properties.

I shall discuss experimental methods capable of probing the unique tendency of the Majorana bound states to be located at boundaries of the systems. I will present several nanoscopic systems, hosting the Majorana bound states and will discuss their properties. Emergence of the Majorana bound states will be analysed from the real and momentum space perspectives. Finally, I will also consider leakage and delocalisation of such Majorana quasiparticles on the side-attached non-topological regions.

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Uprzejmie zapraszam wszystkich pracowników, doktorantów i studentów Instytutu Fizyki.

Dr hab. Ryszard Zdyb, prof. UMCS  
Dyrektor IF UMCS