Smaller is different and more: coherence phenomena in low dimensional superconductivity

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ABSTRACT

Recent experimental advances in superconducting interfaces, heterostructures and nano-grains are revolutionising the field of low dimensional superconductivity. In contrast with bulk high temperature superconductors, the superior experimental control in these engineered materials offers an ideal playground to unveil novel forms of quantum matter and also to achieve more robust superconductivity. In this talk I give a pedagogical introduction to this emerging field of research that includes some of my contributions to the theory of nano-structured, out of equilibrium and topological superconductors. I also review the research questions that are likely to set the agenda of the field in the coming years. A successful response to these challenges has the potential to open a new era in superconductivity characterised by artificially designed materials with on-demand properties.