武汉物数所理论交叉学术交流系列报告

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Soft and active matter in physics and its relevance to the biological sciences

Prof. Matthew Turner
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频标楼4楼报告厅

About the speaker：

Prof Turner obtained his PhD from Cambridge University in 1991 under the direction of Prof Cates, now Lucasian professor at Cambridge. He later studied with Prof Joanny (France) before undertaking independent fellowships at UCSB and Rockefeller University in the USA. He has been a Fellow of Trinity College, Cambridge, a Royal Society University Research Fellow and, most recently, an EPSRC Leadership Fellow. He is currently a full professor of Physics and a member of the Centre for Complexity Science at Warwick University in England. In recent years he has enjoyed visiting positions in France, including Joliot-Curie and Mayant-Rothschild chairs at ESPCI (Paris) and Institut Curie (Paris), respectively. His main interests lie in soft and active matter physics and their interface with living systems.

Abstract:

Soft condensed matter has been recognised as an important field in physics for half a century or more. Soft matter is matter in which the thermal energy scale kT is comparable to internal (conformational) energy scales. Typical soft materials include polymers, surfactant aggregates, membranes etc. The field can boast many success stories in the development of new materials and a deeper understanding of some extremely challenging physics problems. More recently there has been an explosion of interest in so-called “active matter”. These systems are out of equilibrium and harness energy from external fields (concentration, temperature etc) or chemical fuel (hydrogen peroxide ATP or GTP etc). They offer access to a greatly expanded class of materials that have novel properties related to their self-motility, ability to sense their surroundings and ability to undergo active assembly (potentially with error correction). Finally, I will discuss the connection of these fields with biology. I will argue that living cells are comprised of soft and active matter and, as such, there are exciting new prospects for the understanding of morphology and function in cells using the tools of soft and active matter physics.

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