**How environmental movement constraints shape the neural code for space**

Kate Jeffery (University College London)

The neural code for space in mammals, including humans, is centred on the hippocampal place cells, which are active in particular places in the environment. A longstanding question is: how do place cells “know” where to be active? Research in animals over several decades has revealed the existence of numerous other spatial cell types which supply the place cells with information: examples include the grid cells in entorhinal cortex and the head direction cells, found in numerous brain areas. These neurons use a mixture of information about the animal’s movements and information about the environment to create and update their map-like representation. This talk will review these findings and then describe recent work from my and other labs suggesting that the map of space is not fixed, but rather is adapted to the movement constraints of the environment. For example, neural coding is different on a horizontal vs. vertical plane, and different in a lattice than on a surface. These findings are pointing towards a more flexible spatial code in which the map is adapted to the environment rather than being rigidly anchored to the world. This may explain why some types of navigational behaviour in humans look sub-optimal under some conditions.