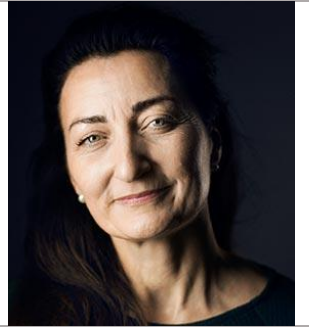


## Professor May-Britt Moser

(2014 Nobel prize winner for Physiology and Medicine)

*Brain mechanisms for representing space*

In association with the Wolstencroft Trust



### Abstract

Spatial navigation and memory depend on brain structures such as the entorhinal cortex and the hippocampus. Over the past 15-20 years, we have explored the wider circuit of the mammalian positioning system. In this lecture, I will show that the medial entorhinal cortex contains grid cells – cells with firing fields that tile environments in a periodic hexagonal pattern. The tiling of an environment by a grid cell is reminiscent of an internal coordinate system. These cells – which may serve a metric function in the navigation system - are intermingled with other cells that respond to other features of navigation, such as what direction the animal goes and how fast it is moving. Today we know that the entorhinal space circuit contains both speed cells, border cells and head direction cells, in addition to grid cells.

I will spend some time on the most recently discovered cell type – the speed cells. I will show that speed is represented across a wider brain circuit that includes speed cells in the mesencephalic locomotor region, whose outputs may reach the medial entorhinal cortex via speed cells in the diagonal band of Broca. These multiple cell types of the entorhinal-hippocampal system are critical elements of a positioning system that dynamically monitors our changing location in the environment, and that may provide the spatial component of episodic memories. I might also touch upon how the positioning system develops.