The work of Ulanovsky’s lab focuses on understanding the neural basis of spatial memory and spatial cognition in freely-moving, freely behaving mammals – employing the echolocating bat as a novel animal model. Prof. Ulanovsky will describe his recent studies, including: (i) recordings of 3-D place cells in the hippocampus of freely-flying bats, using a custom neural telemetry system, as well as 3-D head-direction cells in the presubiculum of crawling and flying bats – which revealed an elaborate 3-D spatial representation in the mammalian brain; and (ii) recordings of “grid cells” in the bat’s medial entorhinal cortex, in the absence of theta oscillations – which strongly argues against the prevailing computational model of grid formation. He will also describe his recent studies of spatial memory and navigation of fruit bats in the wild, using micro-GPS devices, which revealed outstanding navigational abilities and provided the first evidence for a large-scale “cognitive map” in a mammal.

Nachum Ulanovsky is Assistant Professor at the Department of Neurobiology of Weizmann Institute of Science, Rehovot, Israel. After earning his BSc in Physics from Tel Aviv University, he obtained his PhD in neural computation at the Hebrew University of Jerusalem, where he studied the neurophysiology of the auditory cortex with Israel Nelken. He then did postdoctoral research with Cynthia Moss at the University of Maryland, where he pioneered tetrode-recording techniques for recording place cells from the hippocampus of freely-behaving echolocating bats. In 2007, he started his own laboratory at the Department of Neurobiology of the Weizmann Institute of Science, where he studies place cells, grid cells and head direction cells in bats, in 2-D and 3-D.