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Development of an NV-diamond magnetometer for application in neuroscience JOHN BARRY, Harvard University , JENNIFER SCHLOSS, MIT, MATTHEW TURNER, DAVID GLENN, RON WALSWORTH, Harvard University — Magnetic field imaging based on optically detected magnetic resonances (ODMR) in NV-diamond offers an unmatched combination of sensitivity, resolution and field-of-view. For certain biological applications NV-diamond imaging is particularly useful; in contrast to traditional fluorescent markers, NV-diamond imaging is label-free and does not suffer from bleaching. In addition, the solid-state nature of NV-diamond imaging allows for various fast modulation techniques to be employed to increase the signal-to-noise ratio. Here we present results demonstrating the magnetic detection of action potentials from single neurons in multiple types of invertebrate organisms. Furthermore, we lay out a path forward for imaging of the magnetic field associated with neuronal activity with the goal of application to mammalian neurons.

Matthew Turner
Harvard Univ

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