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Detection of brain magnetic fields with an atomic magnetometer HUI XIA, DAN HOFFMAN, ANDREI BARANGA, MICHAEL ROMALIS, Princeton University — We report detection of magnetic fields generated by evoked brain activity with an atomic magnetometer. The measurements are performed with a high-density potassium magnetometer operating in a spin-exchange relaxation free regime. Compared to SQUID magnetometers which so far have been the only detectors capable of measuring the magnetic fields from the brain, atomic magnetometers have the advantages of higher sensitivity and spatial resolution, simple multi-channel recording, and no need for cryogenics. Using a multi-channel photodetector array we recorded magnetic fields from the brain correlated with an audio tone administered with a non-magnetic earphone. The spatial map of the magnetic field gives information about the location of the brain region responding to the auditory stimulation. Our results demonstrate the atomic magnetometer as an alternative and low cost technique for brain imaging applications, without using cryogenic apparatus.

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