# Progress in plant and fungal magnetometry

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At the last in-person Hot Vapor Workshop, we reported on efforts to detect the Venus flytrap action potential using atomic magnetometers—work which was since completed and published in [1] (Figure 1). Here we present preliminary results of magnetometry experiments in other diverse systems, such as agricultural plants, oyster mushrooms/mycelia, and the forest floor. Although challenges exist due to the relatively low amplitudes and frequencies of measured plant and fungal signals, atomic magnetometry enables the noninvasive/noncontact detection of electrophysiological activity in both shielded and unshielded environments. Magnetometry data may be compared to traditional electrode recordings for verification [2,3], while yielding richer information about the spatial distribution of systemic electric signaling, as well as isolating electrical pathways of interest from the surrounding medium. Long-term goals of our research include diagnostics of organism response to external stimuli, studies of interplant communication via fungal networks, and development of miniaturized plant-friendly sensors based on (hot but not too hot) atomic vapors.

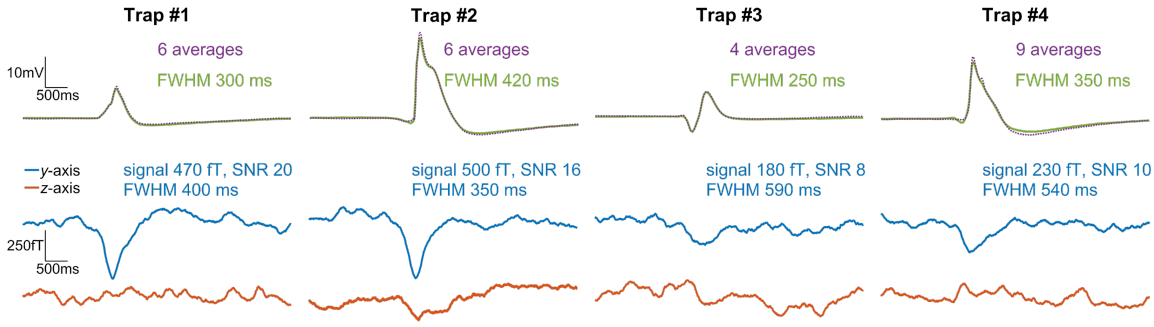


**Figure 1.** Time-series comparison of measured electric (top) and magnetic (bottom) signals—action potentials induced by heat stimulation—from four different carnivorous Venus flytrap plants.

[1] A. Fabricant, G. Z. Iwata, S. Scherzer, L. Bougas, K. Rolfs, A. Jodko-Władzińska, J. Voigt, R. Hedrich & D. Budker, "Action potentials induce biomagnetic fields in carnivorous Venus flytrap plants", *Sci. Rep.* **11**, 1438 (2021).
[2] A. G. Volkov (Ed.) *Plant Electrophysiology: Theory and Methods*, Springer Berlin Heidelberg (2006).
[3] S. Olsson and B.S. Hansson, "Action potential-like activity found in fungal mycelia is sensitive to stimulation", *Naturwissenschaften* **82**, 30-31 (1995).