Search for biomagnetism in Dionaea muscipula (venus-flytrap) plants

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In this experiment, we attempt to detect the magnetic fields produced by living plants, using sensitive atomic magnetometers. Our group previously conducted gradiometric measurements on a blooming titan arum ("corpse flower") at the Berkeley Botanical Garden in California [1]. As far as we know, the only successful detection of magnetic fields produced by intact plants was published in 2000 [2]—an array of SQUID magnetometers was used to measure signals from wounded bean plants in a magnetically shielded room.

After consultation with plant biologists at the University of Würzburg, we have chosen to launch a new biomagnetism experiment using the venus flytrap. This carnivorous plant is relatively easy to stimulate mechanically, and one can generate action potentials (APs) consistently. So far we have successfully set up surface-electrode measurements for AP monitoring (see figure), and we are currently conducting preliminary magnetometry measurements in a small magnetic shield with commercial QuSpin magnetometers. We are also in the process of acquiring our own magnetically shielded room, to which the experiment will eventually be moved. Our future goal is to develop a robust system for measuring biomagnetic signals from a variety of living plants (e.g. agricultural species), based on compact atomic sensors.

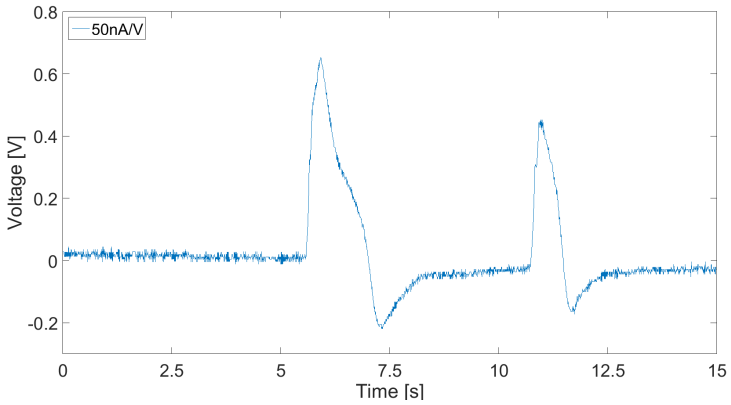

Figure 1. Electric signals produced by a trap after mechanical stimulation of its trigger hairs. Each peak corresponds to a single stimulation.

[1] E. Corsini, V. Acosta, N. Baddour, J. Higbie, B. Lester, P. Licht, B. Patton, M. Prouty, and D. Budker, "Search for plant biomagnetism with a sensitive atomic magnetometer", J. Appl. Phys. **109**, 074701 (2011).
[2] V. Jazbinsek, G. Thiel, W. Müller, G. Wübbeler, and Z. Trontelj, "Magnetic detection of injury-induced ionic currents in bean plants", Eur. Biophys. J. **29**, 515-522 (2000).