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Toward an Optically Pumped Magnetometer Magnetoencephalography System with Full Head Coverage

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We will present various aspects of our development effort to implement a 108-channel optically pumped magnetometer (OPM) array in a magnetically shielded room (MSR). Our four-channel OPM [1] has been re-designed [2] to ease manufacturing, reduce the external temperature, improve the magnetic field control and uniformity, and reduce the required optical power, while maintaining or improving the sensitivity (see Figure 1) and bandwidth. With laser light delivered to our OPM modules via optical fiber, we have implemented a light distribution system for our two-color pump/probe OPM. Finally, we will discuss efforts to develop custom control hardware and software, OPM array calibration approaches, an MSR with magnetic field control, installation of the OPMs into the MSR, and hopefully our first human measurements with the system.

[1]

A. P. Colombo, Optics Express 24, 15403-15416 (2016).

[2]

J. Iivanainen, Optics Express 32, 18334-18351 (2024).

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