

A portable compact optically pumped magnetometer used for DC and RF field measurements

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The use of single-mode chip-scale VCSEL lasers, microfabricated alkali vapour cells and embedded signal processing makes sensitive, accurate geophysical magnetometry possible with a double-resonance optically pumped magnetometer (OPM). We present methods used and results obtained during field trials of a prototype device. Gradiometric measurements of the static (DC) field were conducted. The addition of local static field control facilitated radio-frequency (RF) detection in the range 200 Hz to 200 kHz, in which the reception of digitally encoded data was demonstrated [1]. We discuss the applications and advantages of these techniques, and potential for further technical development.

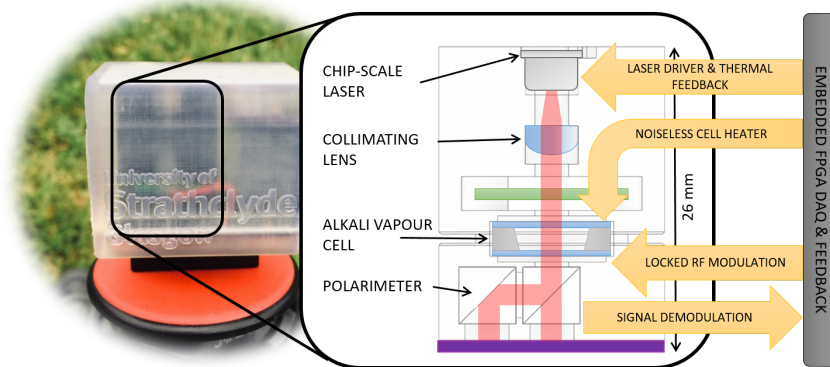


Figure 1. Photograph and schematic for the compact portable OPM used in field trials to demonstrate DC and RF magnetometry.

[1] S. J. Ingleby, I. C. Chalmers, T. E. Dyer, P. F. Griffin, and E. Riis, Resonant Very Low- and Ultra Low Frequency Digital Signal Reception Using a Portable Atomic Magnetometer, arXiv:2003.03267.