

# Detection of fetal biomagnetic signals using optically pumped magnetometers

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Fetal magnetocardiography (fMCG) provides the requisite precision for diagnostic measurement of electrophysiological activity in the fetal heart [1]. Despite its significant benefits, fMCG using current cryogenic based sensors has been limited to few centres due to the high cost of purchase and maintenance. Optically pumped magnetometers have emerged as a viable, flexible, and low cost alternative to cryogenic SQUID based systems. Here, we demonstrate the use of a new generation of optically pumped magnetometers in fMCG evaluated on five fetuses of 32-38 weeks GA. We extract the fetal heart by making use of an independent component analysis algorithm (FastICA) [2]. Further research can potentially increase the clinical use of OPMs for fetal magnetocardiography.

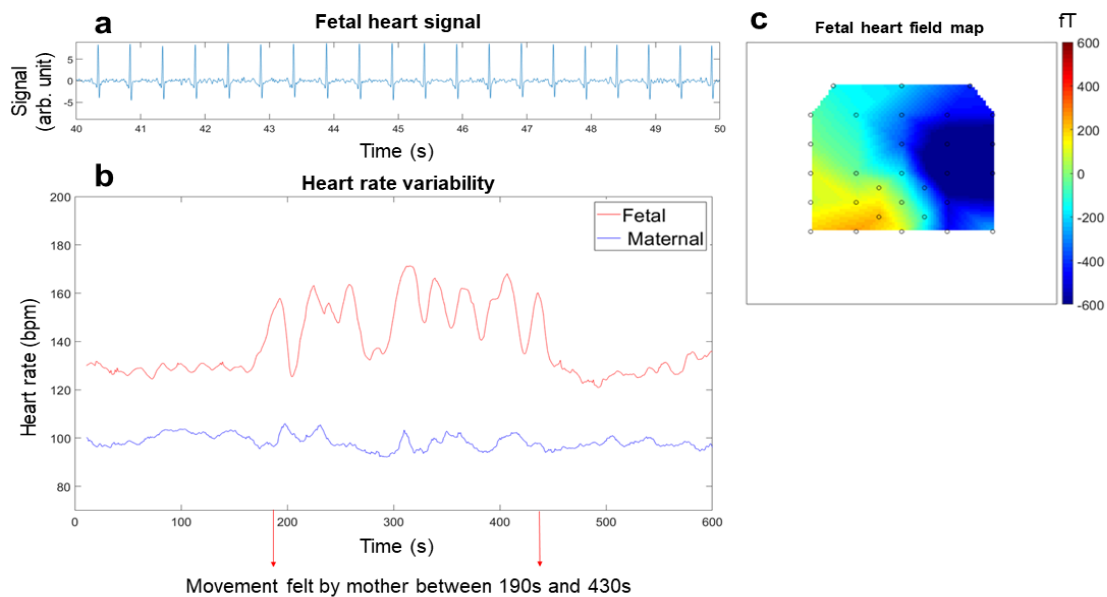


Figure 2: a) Fetal cardiac trace as extracted by ICA. b). Heart rate variability of fetus and mother throughout a ten minute recording. Note the correlation between increased fetal heart rate variability and movement felt by mother. c) 2D field map created of fetal heart.

## References

- [1] H. Eswaran, D. Escalona-Vargas, E.H. Bolin, J.D. Wilson and C.L. Lowery, *Prenatal diagnosis* **37**, 193-196 (2017).
- [2] F. Pedregosa *et al.*, *JMLR* **12**, 2825-2830 (2011)