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Recover fetal electrocardiogram morphology via optimal shrinkage

I will discuss recent progress in dealing with the single-channel blind source separation by combining time-frequency analysis, random matrix theory, and diffusion geometry and its application to recover fetal electrocardiogram (ECG) morphology from the single-channel trans-abdominal ECG signal. The main challenge for the long term fetal ECG analysis is the limited physiological channels with complicated statistical features, like time varying amplitude, frequency and non-sinusoidal pattern, and the signal quality is often impaired by non-stationary noise including uterine contraction and motion artifacts. If time permits, I will report a recently finished clinical trial outcome that detects maternal stress based on the fetal ECG analysis.