Contribution ID: **11** Type: **Contributed talk**

One probe is enough for log-det estimation

Tuesday, January 27, 2026 4:00 PM (30 minutes)

The log-determinant of a symmetric positive semi-definite matrix is a quantity that arises in different contexts, for instance in the evaluation of the log-marginal likelihood for Gaussian processes and in the normalization of the determinantal point processes for supervised learning.
We focus on randomized algorithms for estimating this quantity. The algorithms access the matrix only through matrix vector products, and are based on the introduction of a preconditioner and stochastic trace estimator.
We claim that preconditioning as much as we can and making a rough estimate of the residual part with a small budget achieves a small error in most of the cases. We choose a Nystr\"om preconditioner and estimate the residual using only one sample of stochastic Lanczos quadrature. We analyze the performance of this strategy from a theoretical and practical viewpoint. Numerical examples on several test matrices show that our proposed method is competitive with existing algorithms.

Primary authors: Dr CORTINOVIS, Alice (Università di Pisa); TONI, Daniele (Scuola Normale Superiore)

Presenter: TONI, Daniele (Scuola Normale Superiore)

Session Classification: Session 4