

PhD program in Statistics

## DSS Statistics Seminar

March 31, 2022, 12:00

**In person** Room 24 (CU002)

**Webinar** [https://uniroma1.zoom.us/j/86881977368?pwd=SWRFc](https://uniroma1.zoom.us/j/86881977368?pwd=SWRFcVFjMDZTa0lXZk05TE1zNm5adz09)

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Passcode: 432940

Functional estimation of anisotropic  
covariance and autocovariance  
operators on the sphere

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In this talk we present nonparametric estimators for the second-order central moments of possibly anisotropic spherical random fields, within a functional data analysis context. We consider a measurement framework where each random field among an identically distributed collection of spherical random fields is sampled at a few random directions, possibly subject to measurement error. The collection of random fields could be i.i.d. or serially dependent. Though similar setups have already been explored for random functions defined on the unit interval, the nonparametric estimators proposed in the literature often rely on local polynomials, which do not readily extend to the (product) spherical setting. We therefore formulate our estimation procedure as a variational problem involving a generalized Tikhonov regularization term. Using the machinery of reproducing kernel Hilbert spaces, we establish representer theorems that fully characterize the form of our estimators. We determine their uniform rates of convergence as the number of random fields diverges, both for the dense (increasing number of spatial samples) and sparse (bounded number of spatial samples) regimes.

A simulation study and a preliminary exploration of a real dataset of ocean temperatures will be also discussed.

Joint work with Julien Fageot, Matthieu Simeoni and Victor M. Panaretos.



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