

## Szehr Oleg, IDSIA (Lugano)

*“An analytic function space perspective on numerical stability and overfitting”*

The study of eigenvalues of non-normal matrices plays a prominent role in numerous applications. But it is a well-known and frequent phenomenon that eigenvalue analysis is misleading when one is interested in global properties of (large) non-normal systems. Behind this stands a form of 'instability', where tiny perturbations lead to an overall significant impact and which can be quantified making use of the concept of pseudo-spectrum. In this talk we discuss the behavior of pseudo-spectra 'in the worst case', provide the extremal matrices and sharp methods (and bounds) on the behavior of pseudo-spectra. We demonstrate that 'the worst case behavior' can be quantified in the language of analytic function spaces and we show how high-level system properties such as 'in-stability' and 'susceptibility to overfitting' can be traced back to notions of the underlying analytic spaces.

---