Announcement: mini-course (12 hours) on

Functions of matrices: theory, numerical methods and applications

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The lectures will begin on Monday, May 28 and end no later than Friday, June 8. The course is expected to consist of six lectures of 2 hours each.

Tentative program:

- Lecture I: Examples of functions of matrices and operators. Background notions in linear algebra, approximation theory and functional analysis.
- Lecture II: Equivalent definitions of matrix function. The holomorphic functional calculus.
- Lecture III: Introduction to numerical methods for the approximation of functions of large matrices.
- Lecture IV: Krylov subspace methods for the computation of $f(A)\mathbf{v}$, with $\mathbf{v}$ a given vector.
- Lecture V: Gaussian quadrature formulas for the approximation of bilinear forms $\langle f(A)\mathbf{u}, \mathbf{v}\rangle$, with $\mathbf{u}$, $\mathbf{v}$ given vectors. Decay bounds for the entries of $f(A)$.
- Lecture VI: Applications to Quantum Chemistry (electronic structure computations) and Network Science (Markov chains, centrality and communicability measures).

Target audience: students in mathematics, chemistry and physics.

Prerequisites: A good knowledge of linear algebra and mathematical analysis. Basic notions of numerical analysis.

An excellent reference is N. J. Higham, *Functions of Matrices: Theory and Computation*, Society for Industrial and Applied Mathematics, Philadelphia, 2008. Other sources will be cited and possibly made available in the course of the lectures.