

# Matrix Computations and Scientific Computing Seminar

Organizer: J. Demmel and M. Gu

Wednesday, 12:00–1:00 pm, 380 Soda Hall

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Oct 12      **Michael Saunders**, Stanford University

*The DQQ procedure for multiscale optimization*

Constrained optimization solvers typically scale the constraints, solve the scaled problem, then unscale. With multiscale problems and a conventional double-precision solver, the unscaled solution may not satisfy the constraints well. Our DQQ procedure continues with a quad-precision version of the solver to obtain accurate solutions efficiently.

A prime application is to metabolic networks in systems biology. Keywords are flux balance analysis (FBA) and genome-scale modeling of Metabolism and macromolecular Expression (ME models). DQQ typically achieves at least 20 digits of precision. (Joint work with Ding Ma)

For smooth functions with few variables, Quad improves the performance of quasi-Newton optimization with finite-difference gradients. We illustrate with IMSPE-optimal design of computer experiments. (Joint work with Selden Crary)