

TEMPLE UNIVERSITY  
Department of Mathematics

# Applied Mathematics and Scientific Computing Seminar

Wednesday, 25 February 2015, 4:00 p.m.  
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

## Fine-grained parallel computation of approximate sparse matrix factorizations

by Edmond Chow

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**Abstract.** We present a new approach for computing certain sparse matrix factorizations in an approximate way, such as incomplete LU factorizations and sparse approximate inverses, which are useful for preconditioning. The approach is designed to be highly parallel and is suitable for fine-grained parallel architectures such as Intel Xeon Phi and GPUs. All nonzeros in the factorization can be computed in parallel and asynchronously, using one or more sweeps that iteratively improve the accuracy of the factorization. For incomplete LU factorizations, numerical tests show that very few sweeps are needed to construct a factorization that is an effective preconditioner. Another advantage of the approach is that it can update an initial guess for the factorization, giving it a potential niche in the solution of sequences of linear systems.