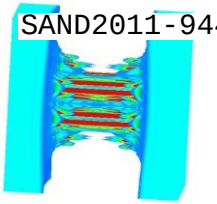
Precision Neutral Computation Enables Efficient Robust Algorithms

- **Problem**
  - Default use of high precision (i.e., double precision) in scientific computing wasteful of storage and bandwidth
  - In push to exascale, storage and data movement dominates compute time and energy consumption
  - Few scientific computing libraries allow expression of algorithm independent of floating-point precision
- **Solution**
  - Allow for reduced memory bandwidth and size usage by templating scalar type through solver stack
  - **Enable precision-neutral and mixed-precision computation**
  - Available open-source in Trilinos (trilinos.sandia.gov)
- **Impact**
  - Leverage templated Trilinos solver stack in open source Tramonto fluid-DFT code (*software.sandia.gov/tramonto/*)
  - Enables ***2x speedup*** when using float vs. double
  - ***Enables solution of previously intractable problems*** via high-precision arithmetic (QDLib). Binary mixture problems, numerically intractable in double precision, are now solvable.

SAND2011-9440P



Fluid-DFT Applications

Fluid-DFT Code (C++, Templated)

Algorithms and Enabling Technologies

Linear Solvers (C++, Templated)

Tpetra parallel linear algebra library (C++, Templated)

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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