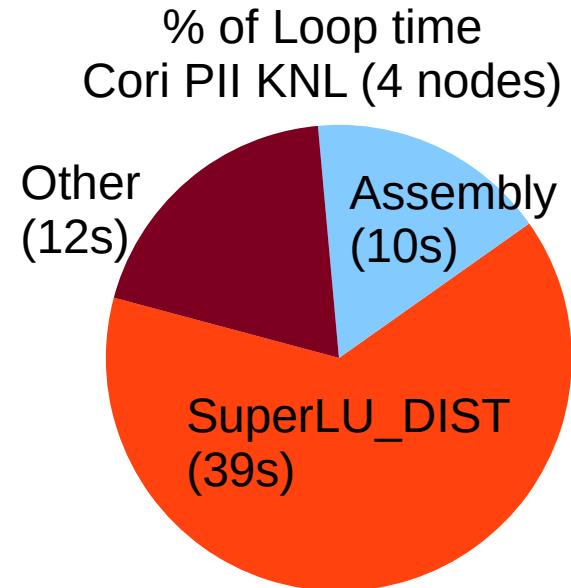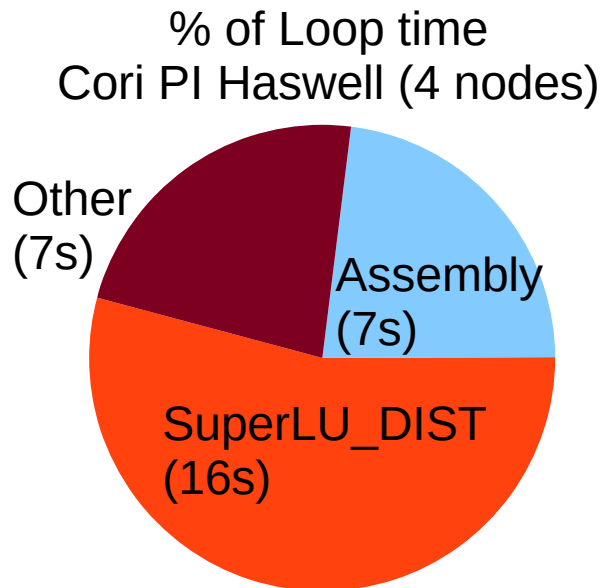# Run time on KNL is more dominated by sparse matrix inversion relative to Haswell

- SuperLU_DIST: factor and back-solve kernels for block-Jacobi preconditioner
- Assembly: finite-element quadrature integration kernels
- Other: Iterative solver (GMRES), quadrature point updates, I/O, run-time diagnostics

% of Loop time
Cori PI Haswell (4 nodes)

Other (7s)

Assembly (7s)

SuperLU_DIST (16s)

% of Loop time
Cori PII KNL (4 nodes)

Other (12s)

Assembly (10s)

SuperLU_DIST (39s)

Collaboration with LBL ASCR scientists to optimize NIMROD for Cori PII KNL

- Sparse matrix factorization and solve as a block Jacobi preconditioner dominates run times on KNL

- Collaboration with Sherry Li, Yang Liu and Sam Williams (LBL) lead to 40% SuperLU_DIST performance gain

- Biggest improvement: use of new "trisolve" version of SuperLU_DIST

- Test case: DIII-D edge-mode case;
  50 backsolves per factorization

- Trisolve is not integrated into SuperLU_DIST 6.0 with improvements (need to update performance)