• <u>Objective:</u>

» Provide numerical solvers to NEMO 5

» Leverage existing packages for linear solvers, eigensolvers, and nonlinear (Newton) solvers

» MPI parallelization mandatory

• <u>Results / Impact:</u>

» User-friendly C++ interfaces

» Double & complex arithmetic usable

» Successful builds of PETSc/SLEPc on various systems

» Static & dynamic linking possible

» Discovered 2 memory scalability issues in PETSc – developers will fix it

• <u>Approach:</u>

Compile and interface:

» PETSc: linear and Newton solvers. Includes MUMPS, SuperLU, Hypre

» SLEPc: eigensolvers. Includes Parpack.

PETSc 3.1

Nonlinear Systems		
Line Search	Trust Region	Other

Time Steppers			
Euler	Backward Euler	Pseudo Time Stepping	Other

Krylov Subspace Methods							
GMRES	CG	CGS	Bi-CGStab	TFQMR	Richardson	Chebychev	Other

Preconditioners						
Additive Schwarz	Block Jacobi	Jacobi	ILU	ICC	LU	Other

Matrices				
Compressed Sparse Row (AIJ)	Block Compressed Sparse Row (BAIJ)	Block Diagonal (BDIAG)	Dense	Other

Vectors	Index Sets			
	Indices	Block Indices	Stride	Other

SLEPc 3.1

SVD Solvers					Quadratic	
Cross Product	Cyclic Matrix	Lanczos	Thick R. Lanczos		Linear-ization	Q-Arnoldi

Eigensolvers					
Krylov-Schur	Arnoldi	Lanczos	GD	JD	Other

Spectral Transformation				
Shift	Shift-and-invert	Cayley	Fold	Preconditioner

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