**MPI Lab**

*1. Intro with setup (comm\_world, ranks) as well as communication (4 main types)*

*2. Speeding up Monte Carlo to Compute Pi (unit square, check point in unit circle), ratio then multiply*

Compute speedup and efficiency of multiple processors

Compare accuracy achievable in same time using more processors

*3. The Basics of N-Body Computations 1/n^2 vs 1/n relationships*

Write serial/broadcast

Scatter-gather versions of an N-body computation

Benchmark with varying N and P and N is fully divisible

Compute % efficiencies

**CS205 HW 1**: **All About that MPI**

*1. Warm Up: Generalizing the Parallel N-Body from Lab*

Rewrite the scatter, gather version to handle all ranks, giving the extras to the first processor ranks

*2. Application: Tomography*

Question from HW2 last year – to recover an xray image taking into a account a rotation

First code with MPI Send/Recv only – logically intuitive, but harder to implement

Then do the same using MPI scatter

Benchmark and compare (is scatter as optimized as pure send and receive or do we see a greater overhead for send/recv). Discuss

*3. Application: Parallelizing the 2D Wave Equation via Domain Decomposition*

Question from HW3 last year – to simulate (in parallel) 2D wave equations by dividing up the domain and using ghost points

First use send/recv

Then use Isend/irecv

Compute efficiencies, speedups and compare. Discuss