Notes on Scientific Computing

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0 Administrivia

A standard reference on numerics is *Numerical Recipies*. For a standard programming book on C, Kernigham and Ritchie is an excellent place start to start.

There will be 6 to 8 homework sets and a final project. There will be a review session every Friday at 3pm.

0.1 Tentative topics

- Introduction to basic numerics and numerical stability

- Simple differential equation solvers

- Statistical mechanics of liquid argon; simulate $10^3 - 10^4$ interacting argon atoms; compute equation of state $f(P, V, T) = 0$

- Monte Carlo techniques for a canonical ensemble; MC used to simulate thermal fluctuations; random number generation

- General discussion of topics in statistics; applications to the above two topics

- Linear algebra algorithms; large systems (sparse matrices of order $n = 10^9$)

- Linear algebra on parallel computers

- **Time permitting:** General relativity; quantum Monte Carlo