**Physics Talk Plan**

**Lagrangians and Hamiltonians**

Intro – animations, possibilities, difficulties of Newtonian mechanics

Least action principle

Action as integral of Lagrangian, Euler-Lagrange equations

Free particle example

Pendulum attached to mass

Double Pendulum

Hamiltonian from energy conservation of Lagrangian

Previous problems using Hamiltonian

**Special Relativity**

Speed of light problem

Galilean relativity

Lorentz transformations

Velocity addition

Lorentz factor, rocket example

Muon example, length contraction

Twin paradox

Train paradox

Relativistic acceleration

SτVAT equations, Andromeda example