# Lecture 19, Oct 27, 2021

## Work

- Definition: Work is change of the energy of a system $\Delta E$ as a result of external forces
- Forces can only do work if their point of application is displaced, e.g. pushing on a wall does no work
- Work can result in changes in all forms of energy
- Since energy in a closed system is conserved, work only applies when energy enters or leaves a closed system: $E_f = E_i + W$
- Work is positive if the point of application moves in the same direction as the applied force and negative if it moves in the opposite direction
- Consider two blocks with a spring between them; if the system is considered to be the spring and the blocks, then the system is closed and there is no work since no change in energy happens; if the system is considered to be just the spring, the blocks would do positive work on it
- When picking the system, avoid picking a system that would have friction acting on the boundary; since friction creates thermal energy, which goes into both the system and what's outside the system, it's difficult to tell how much energy is going into the system; furthermore friction is not acting on a single point, so $\Delta x_f$ cannot be determined