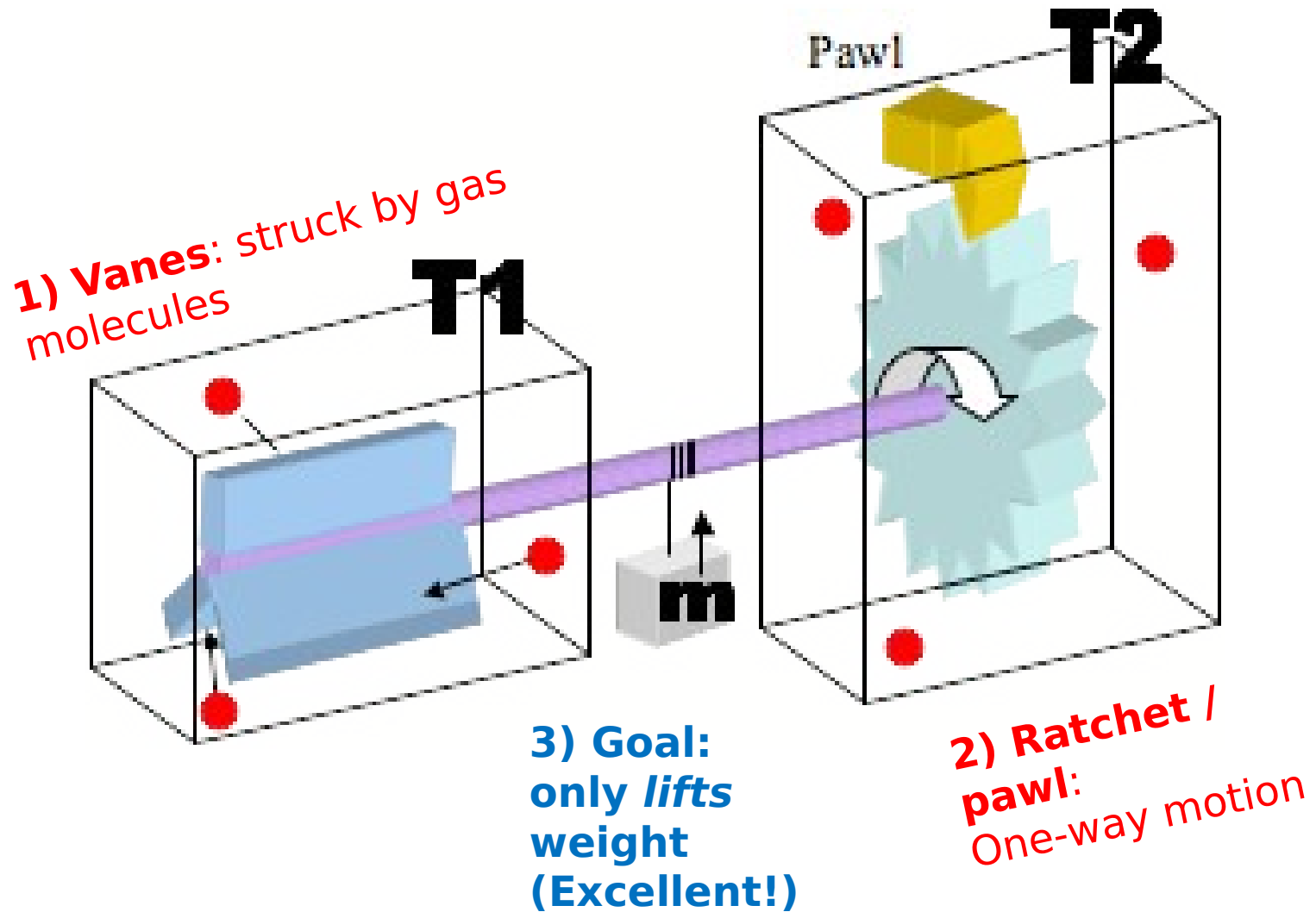


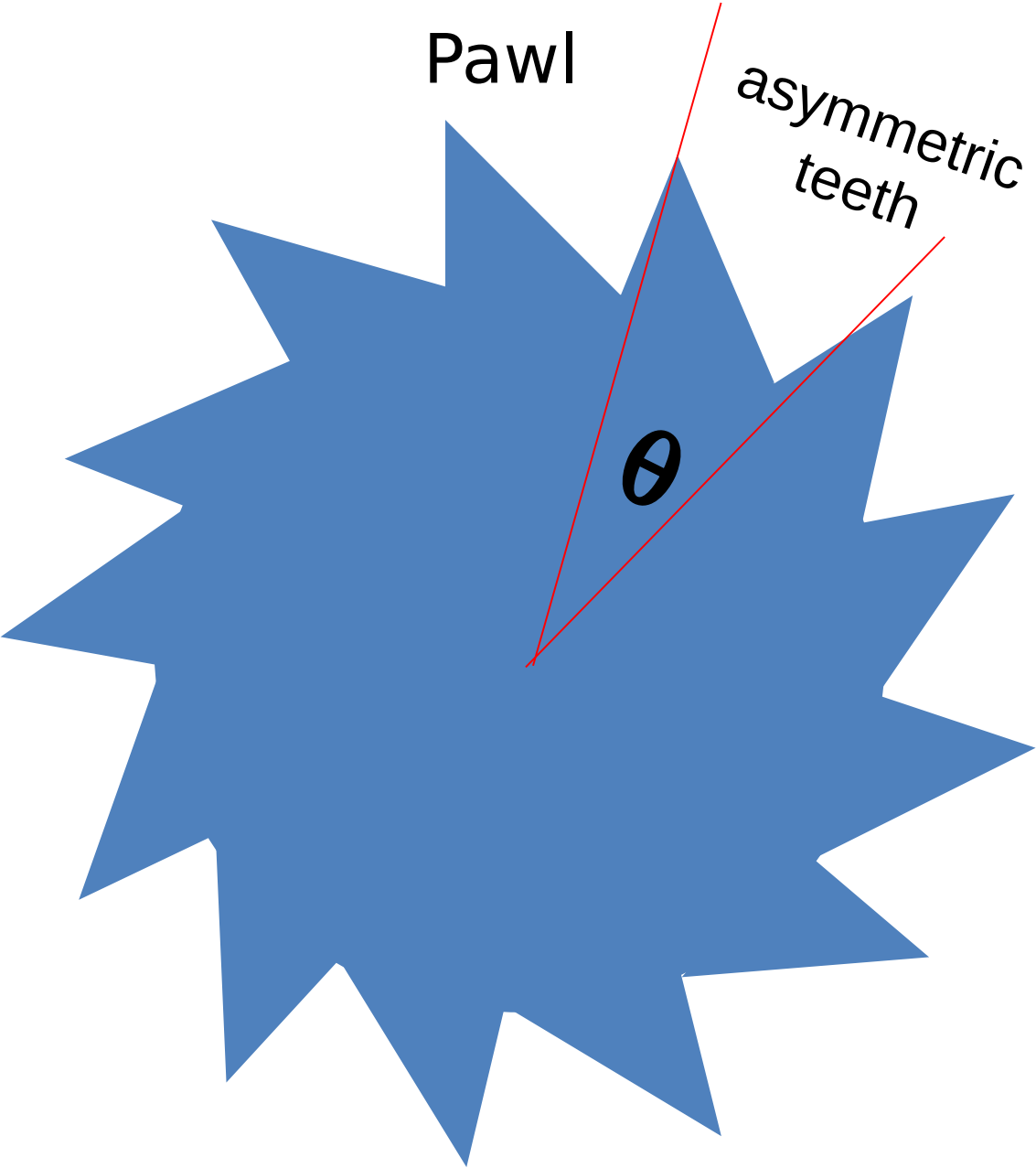
“Ratchet and Pawl:” perpetual motion machine



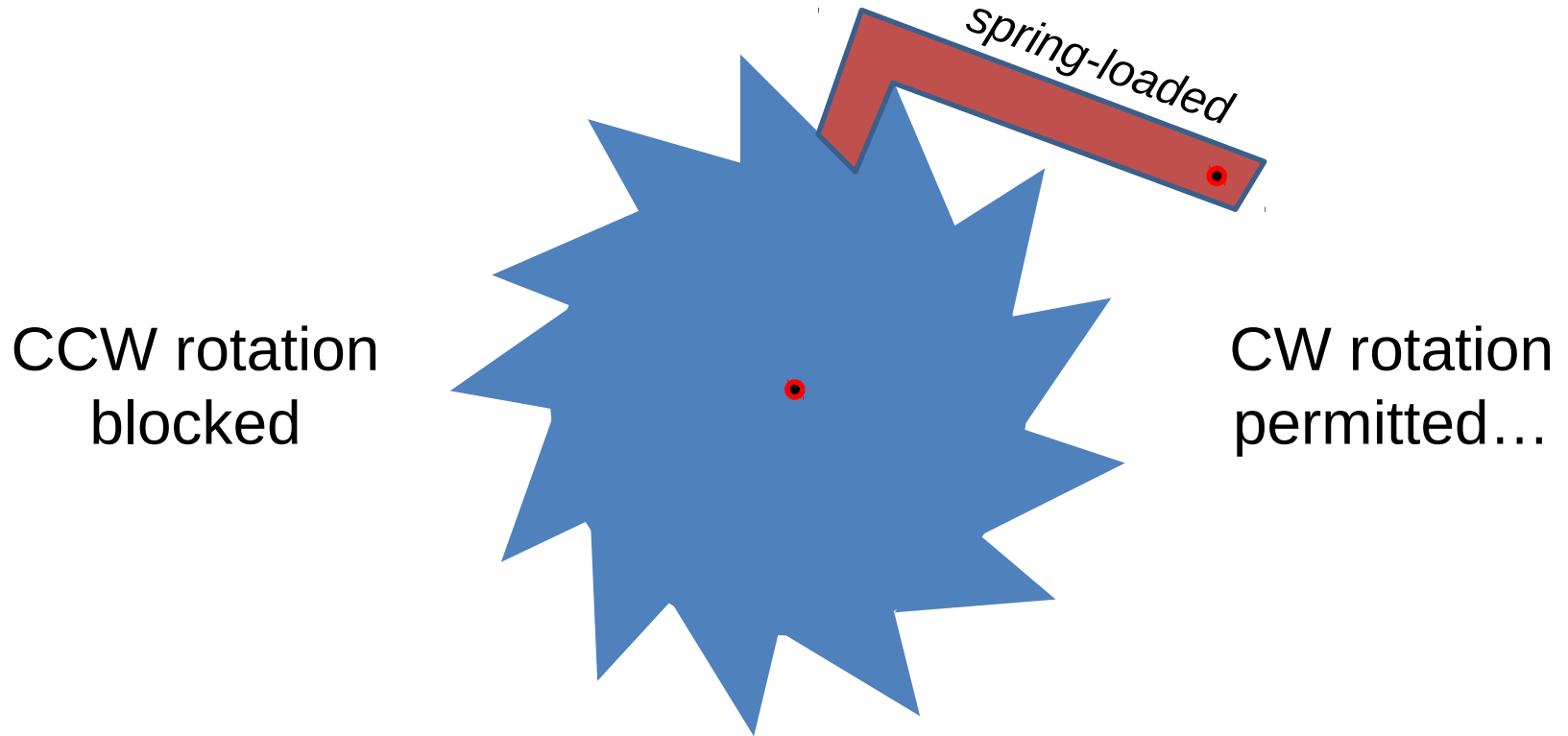
Pawl

asymmetric
teeth

θ

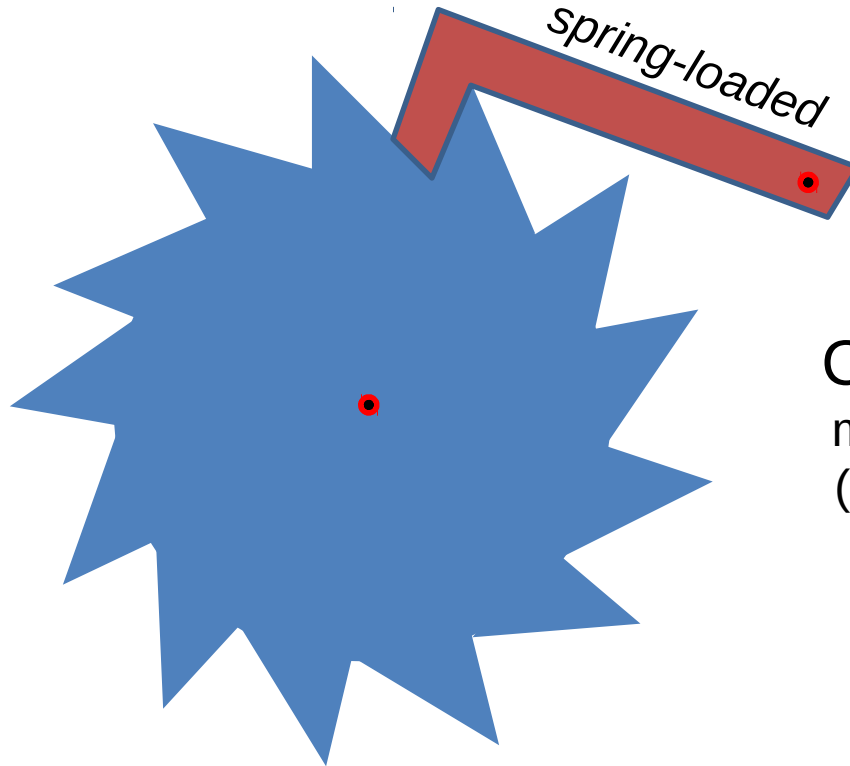


Ratchet



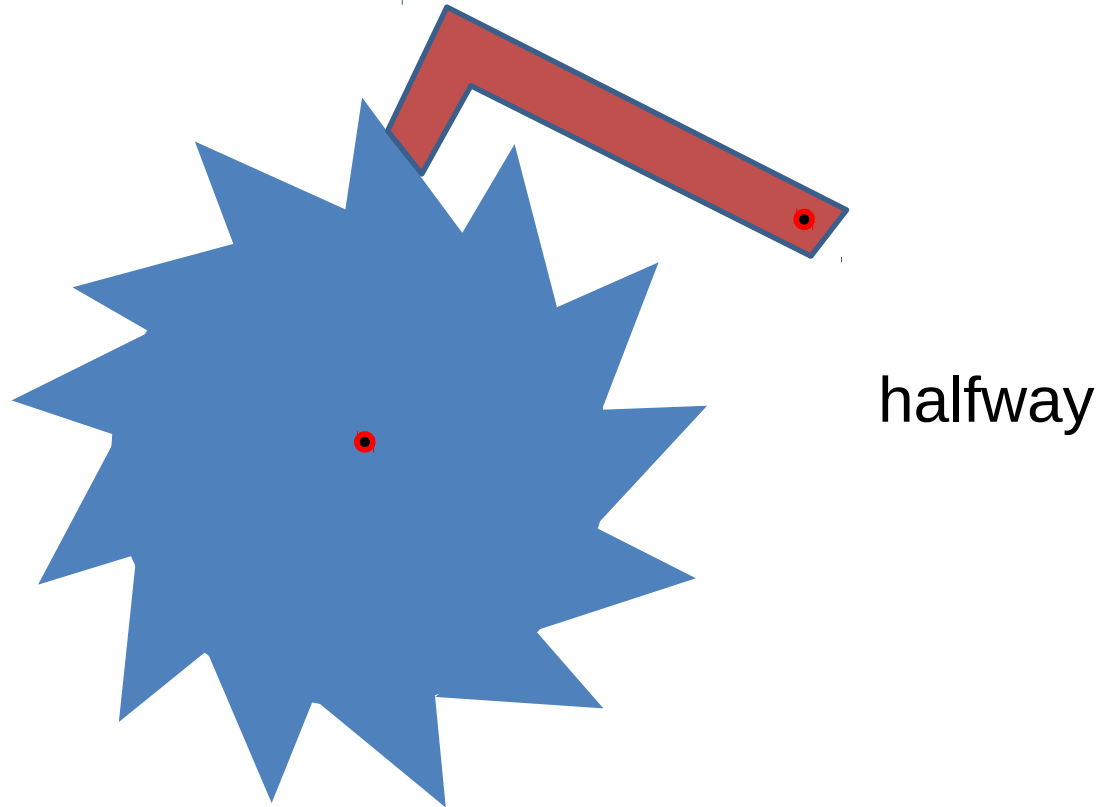
Ratchet

CCW rotation
mass slips down
(rolls free)

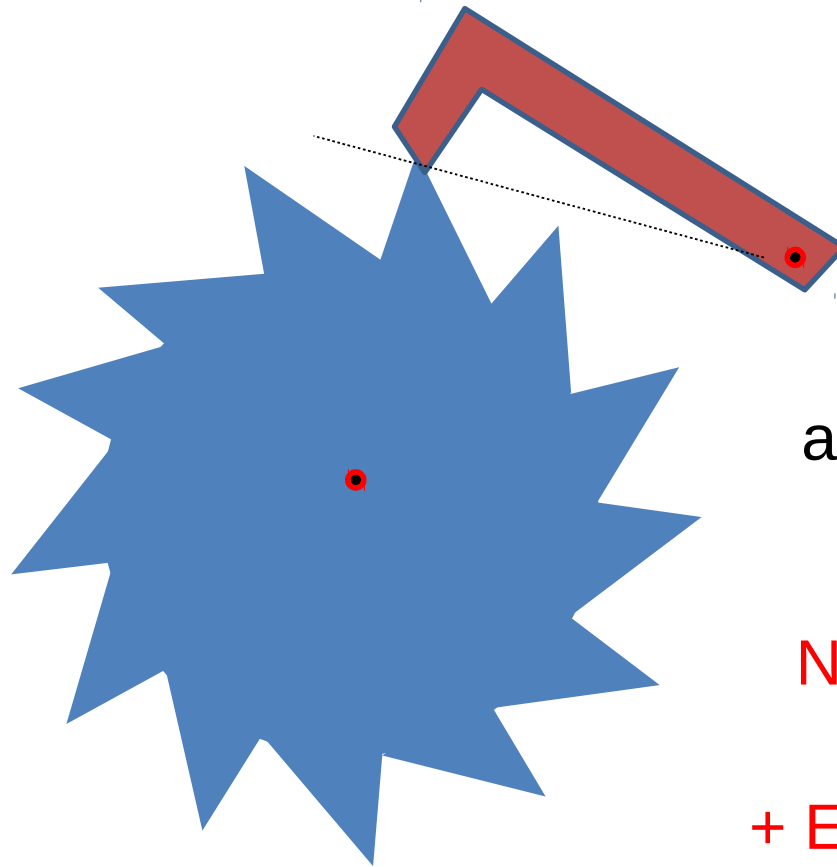


CW rotation
mass winds up
(needs torque)

Ratchet winds up (kick from vane)



Ratchet winds up (kick from vane)



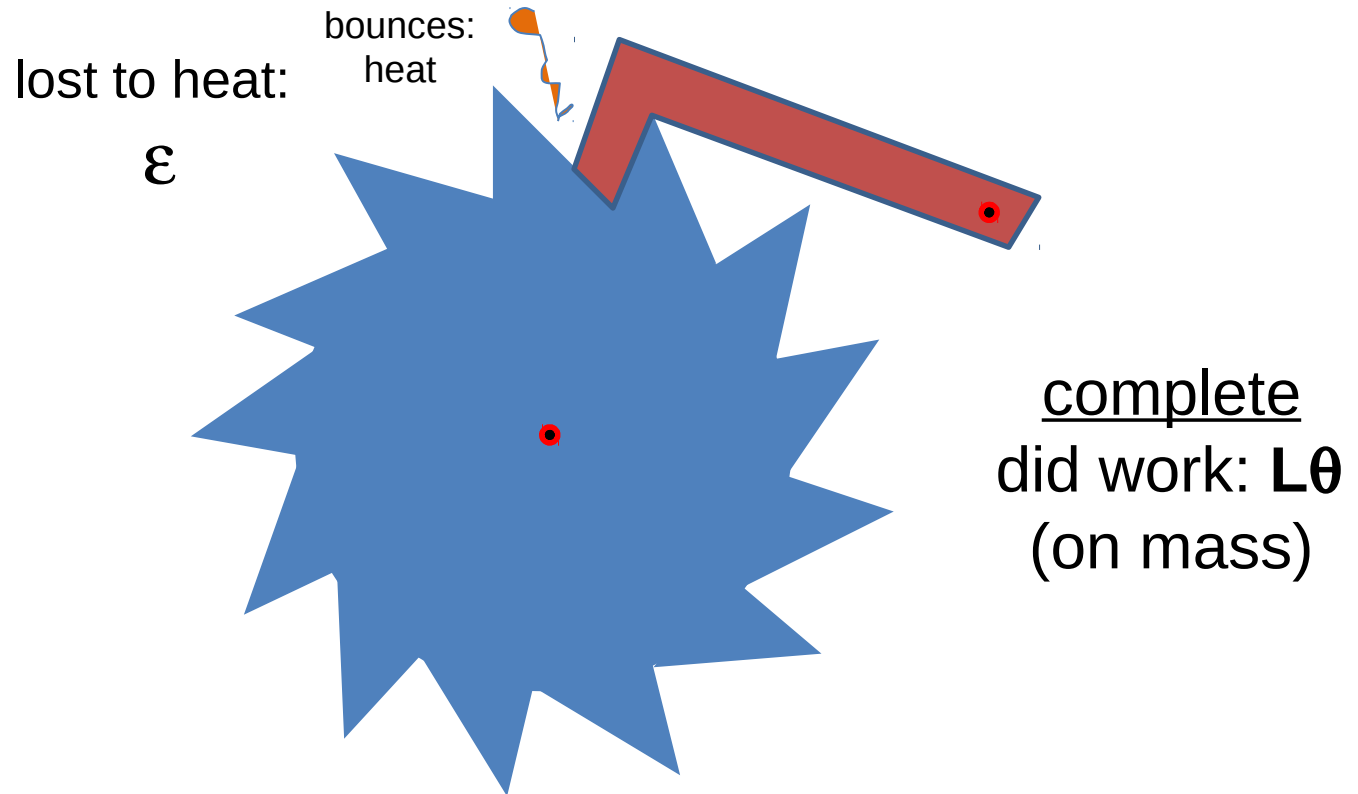
almost there

Needs **$L\theta$**

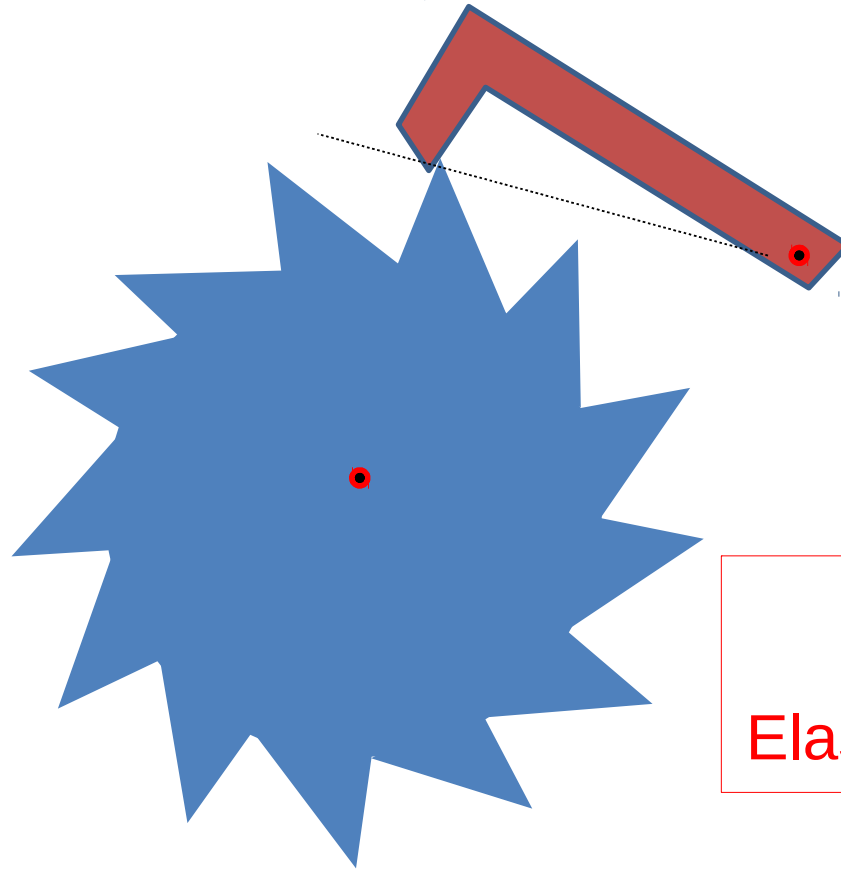
+ Elastic energy

ϵ

Ratchet

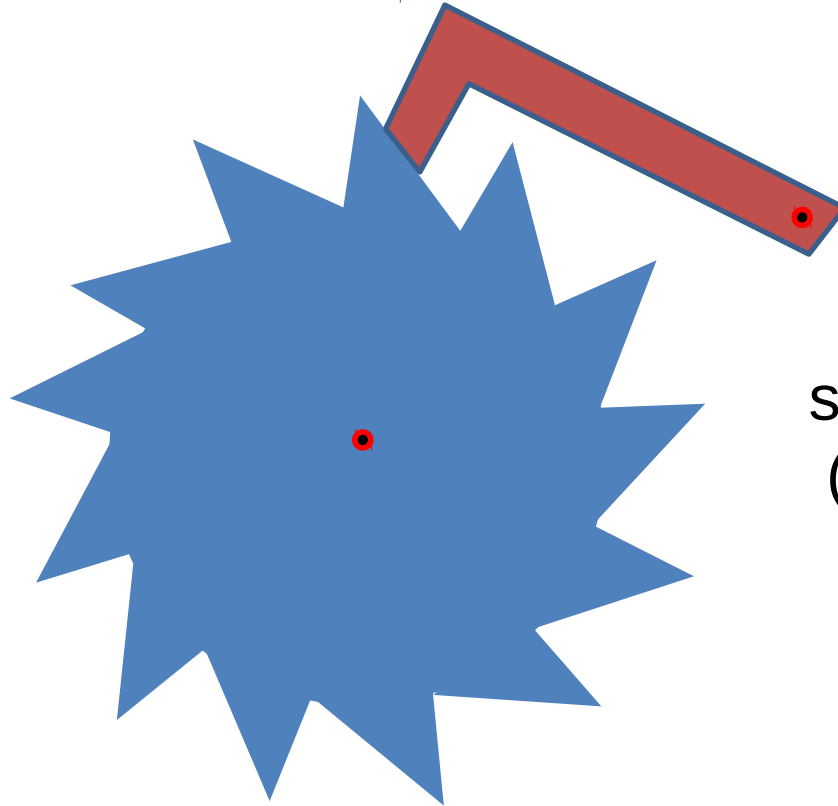


Ratchet slips (kick from local heat..)



Needs
Elastic energy \mathcal{E}

Ratchet slips (kick from local heat..)



slides down!
(reversibly)

Ratchet slips (kick from local heat..)

