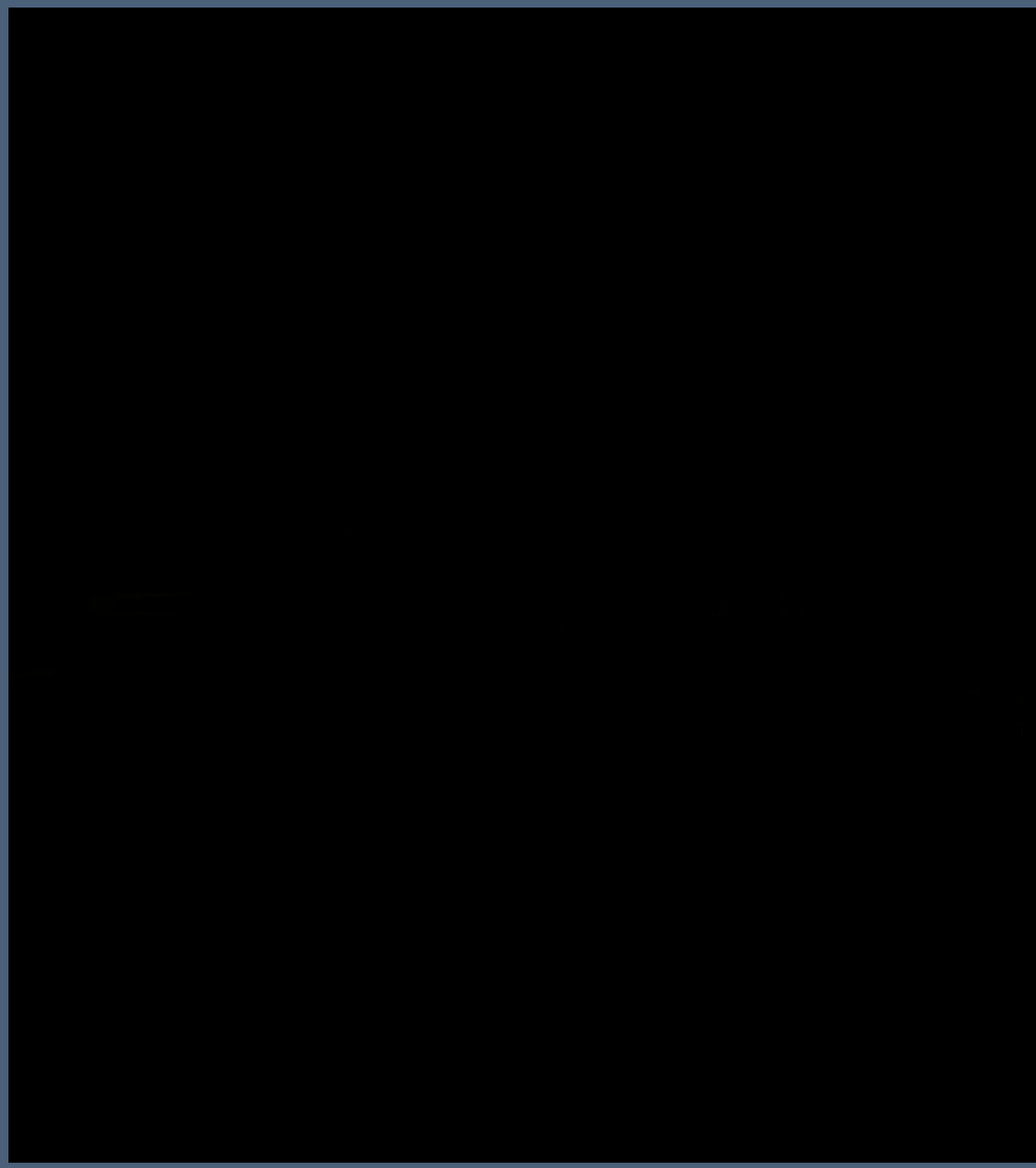
PhysH308

Continued review of Newtonian Mechanics

Ted Brzinski, Sept 5, 2024

Last week

- Inertial vs non-inertial frames
- Staticity, forces of constraint
  - Special/limit cases
  - Scaling
- Equations of motion



MIT/SUTD concept vignettes

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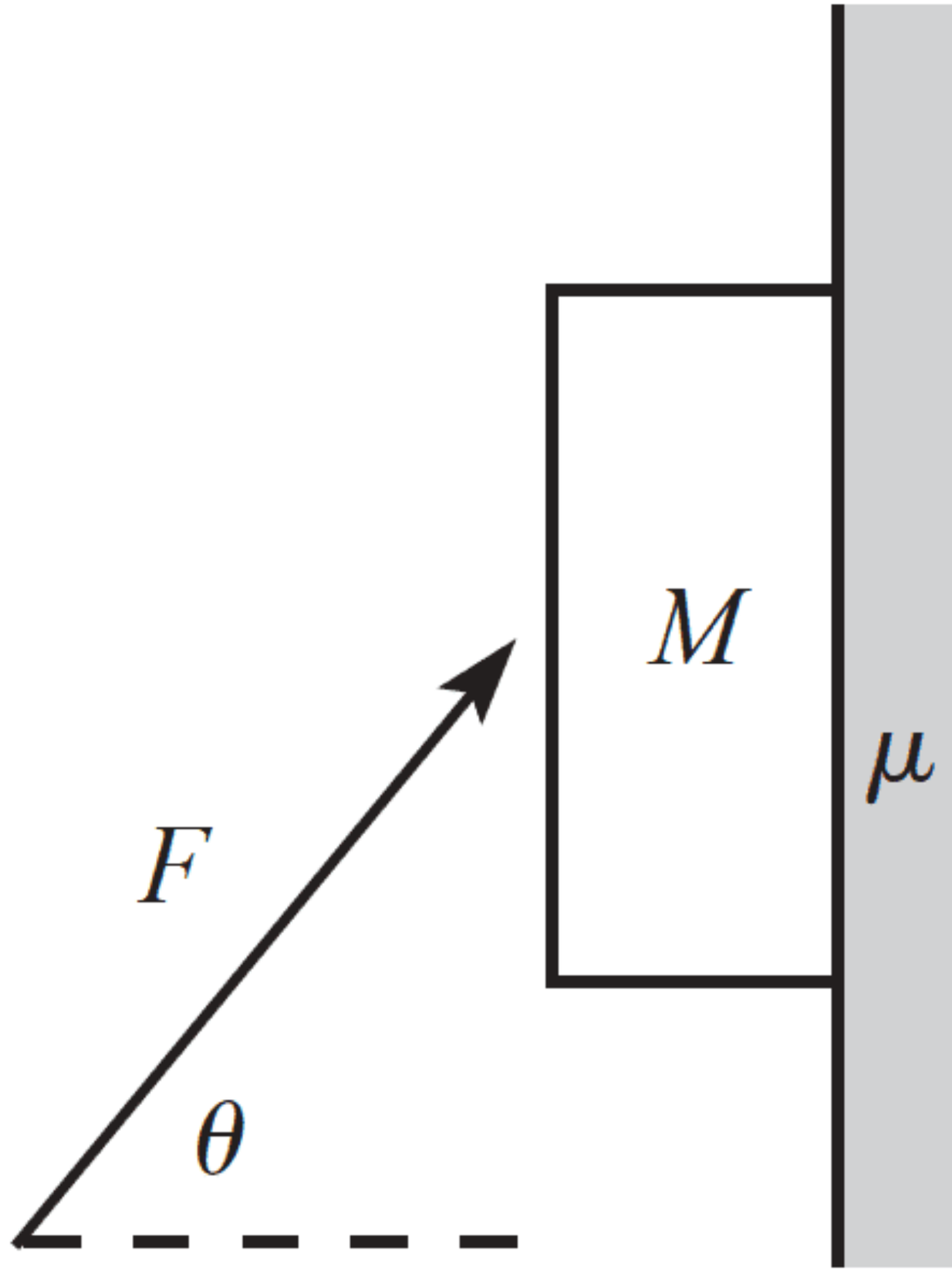

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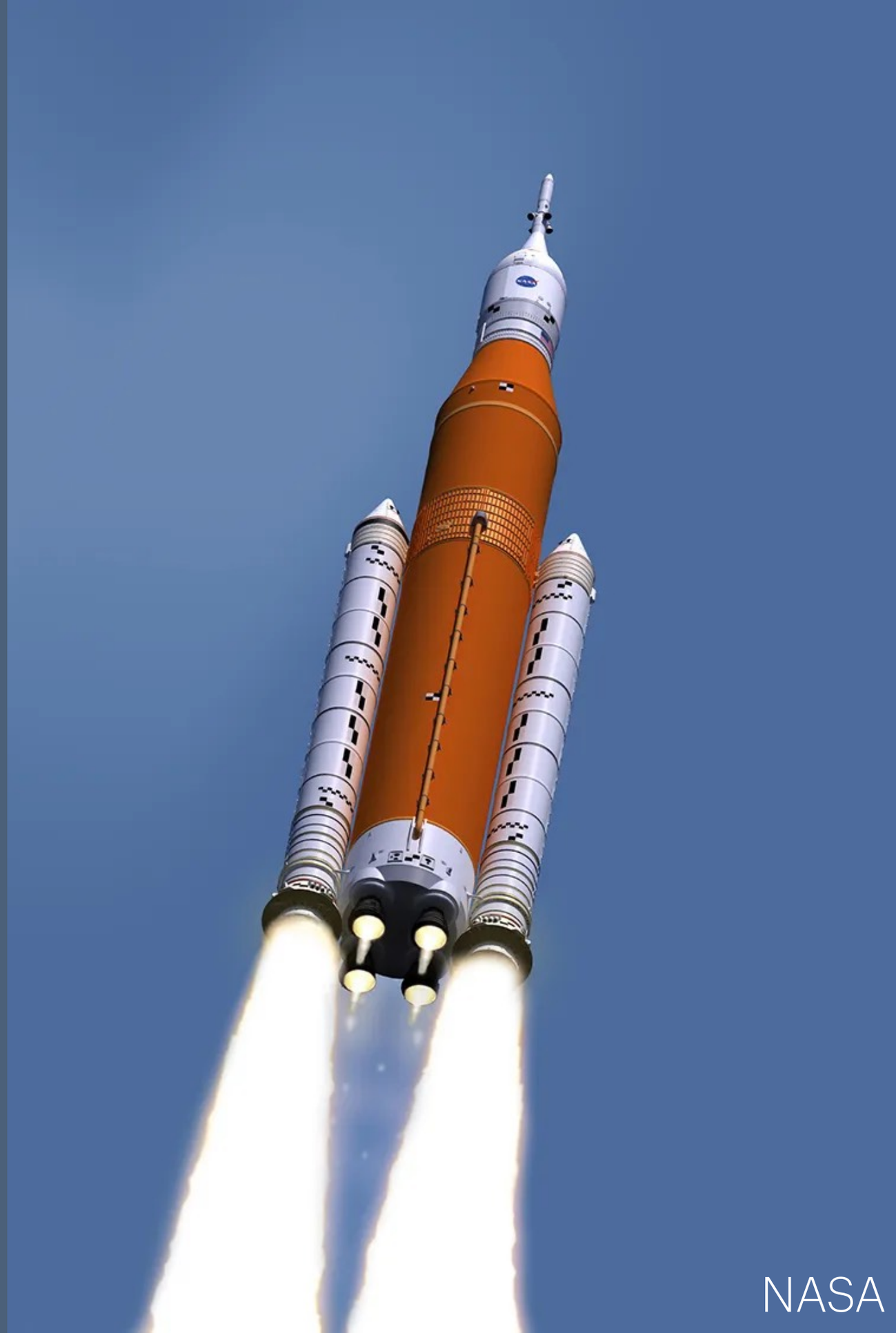
Conservation of momentum

- Momentum: $\vec{p} \equiv m\vec{v}$
- Conserved quantity is a direct consequence of Newton's 3rd law!
$\left(\vec{F} = m\vec{a} = m\dot{\vec{v}} = \dot{\vec{p}}\right)$
- Angular momentum: deceptively complex! Preview: solid body rotation, fluid flow instabilities, etc



NASA

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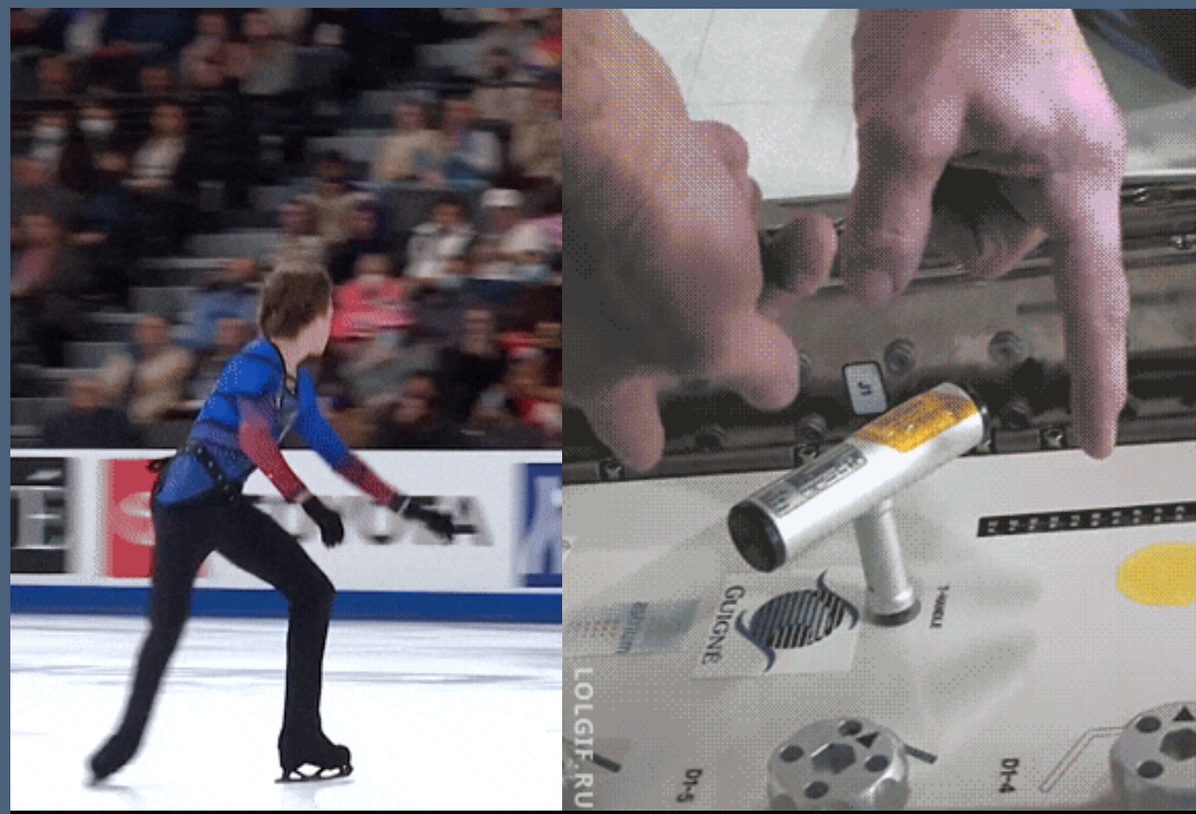
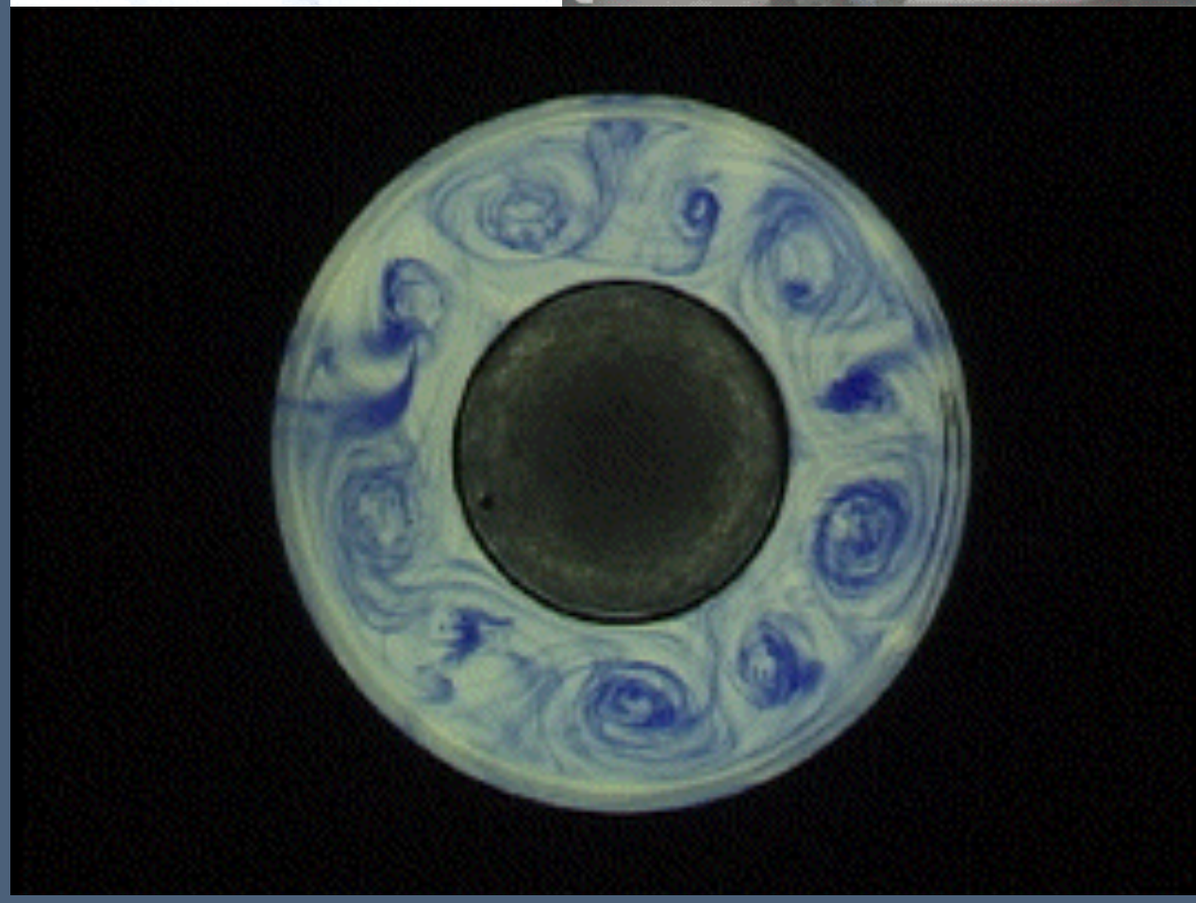
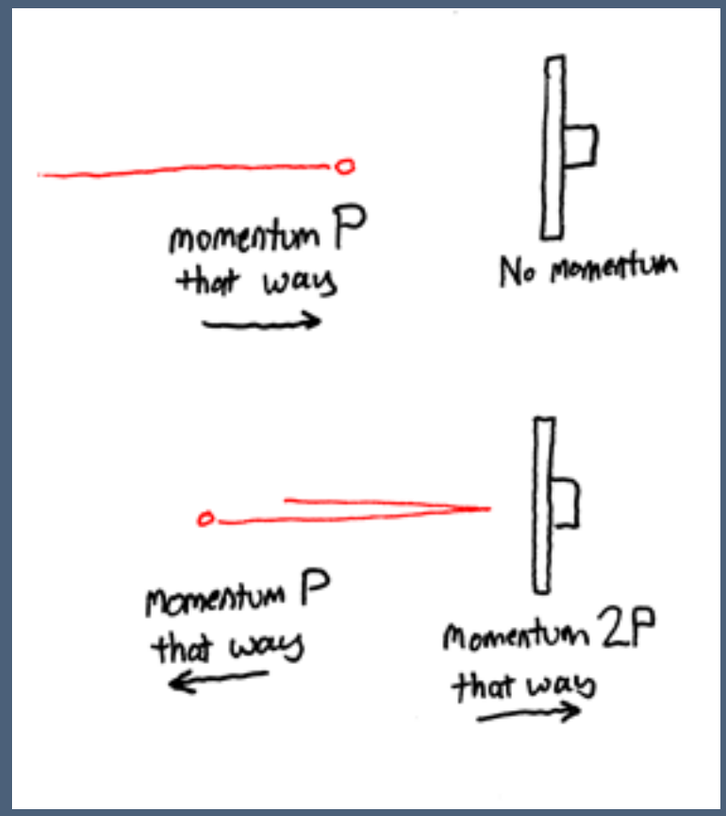
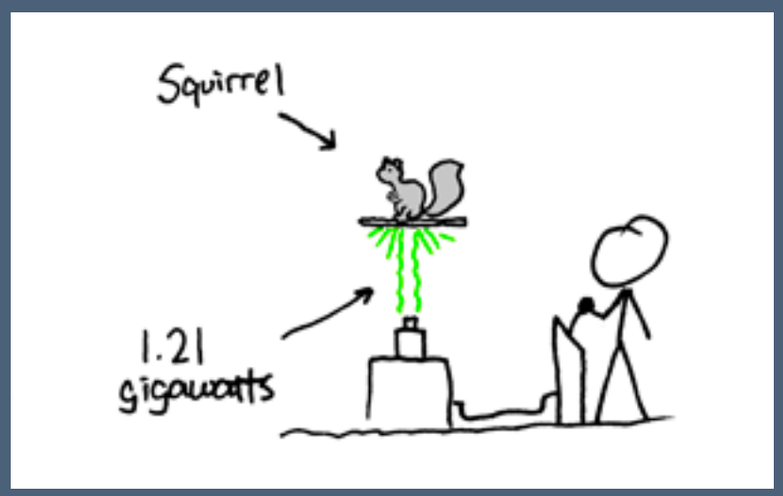




Problems for today

- 3.5 - Billiards, elastic collision
- 3.10 - a tricky rocket problem. Remember the chain rule! $\frac{dA}{dC} = \frac{dA}{dB}\frac{dB}{dC}$
- 3.22 - Finding the center of mass: good practice for rotating bodies





https://blog.xkcd.com/2008/02/15/the-laser-elevator/