Emergence Lec 5

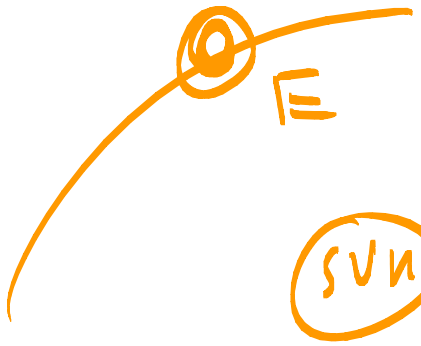
Newton's paradigm.

→ identify universal FORCES.

→ apply laws of motion. $F = ma$

(initial conditions of the problem).

gravity → $F = GMm/r^2$.

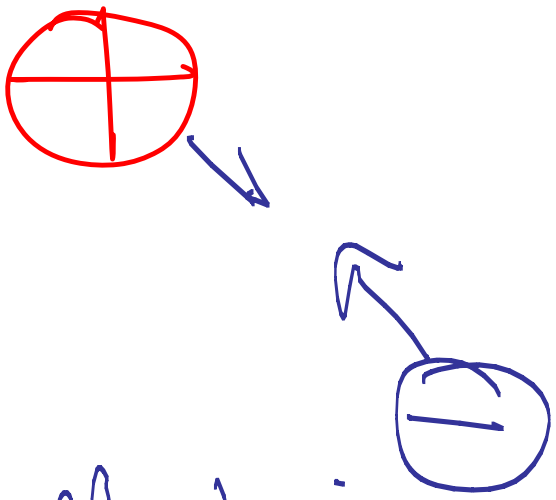


- position at $t = 0$
- velocity at $t = 0$

SOLVE for motion

More force laws

$$F_Q = \frac{k Q_1 Q_2}{r^2}.$$



Q = "charge"

Coulomb's law.

electric force.

F_Q is HUGE compared to gravity

Q can have both SIGNS

charge tends to CANCEL out.
while mass (in Newton's law of gravity) is always > 0

gravity dominates on large "cosmological" scales.

charge dominates on "atomic" scales

coulomb. faraday.

MAGNETISM.

"electromagnetism"

"E+M"

⟹ all put together in 1860 by James Clerk : MAXwell

maxwell's Equations (4 of them)

– equations contain OPTICS.

- light is an electromagnetic wave phenomenon!

- speed of light "falls out" of this theory.

Quantum Mechanics

From Prof Deyirmenjian

Wednesday