Project 3

Main topics

- Ordinary diff. eq. : initial value problems
  - ↑ for one indep. variable, here now <u>time</u>.
  - ↑ contrast to bound. val. problem where indep. variable was x

- $\not\subset$ ⤷ Runge-Kutta 4$^{\text{th}}$

- Object-oriented programming (as disc. last week)

- Presentation of work in form of a report

- Physics case : Simulate a Penning trap !

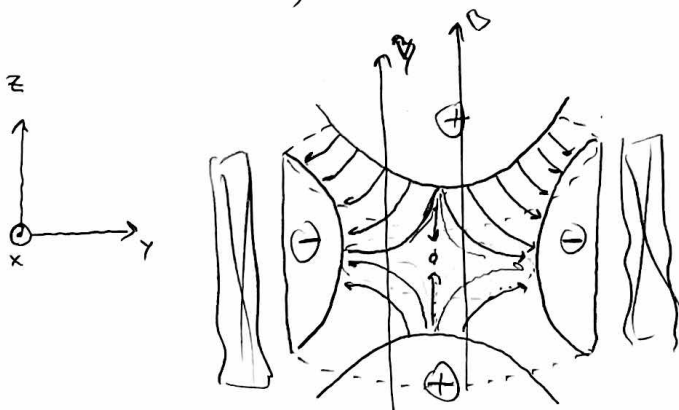<s>Ex "Angels and Demons"</s>

Penning traps

- Device for storing charged particles in a vacuum ! using static $\bar{E}$ and $\bar{B}$-fields
  - ⤷ CERN
  - ⤷ "Angels and Demons"
  - ⤷ Eye scanner

- Drawing

charged particles affected

by $\bar{F} = q\bar{E} + q\bar{v} \times \bar{B}$

- E field confines in z-direction, but pushes particles outwards in xy direction

- Compensate with B-field that deflects it and puts the particles into orbital paths

- Can be used to store / cool down charged particles for a long time

- Used in super-precise meas.

- Drawbacks: Difficult to access particles (lots of material) and to get particles into the trap.

- Go Through project description !

  Point out pitfalls !