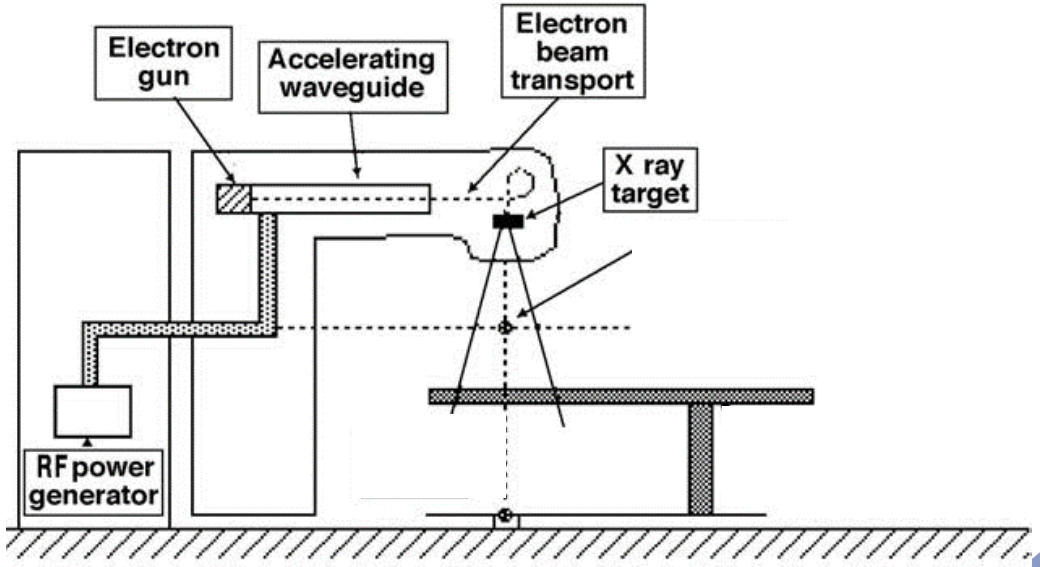
CAUTION
X-ray coming
RAD
A
VE
CERN
M-E-D
T-E-C-H
H-A-C-K
April 6th-9th 2018
Medtech.Hack@cern.ch
indico.cern.ch/e/medtechhack18

Statistics (in Europe)

- Almost 4M cancer cases/y
  - Surgery,
  - Chemotherapy
  - Radiotherapy
    - Gamma therapy
    - Hadron therapy
    - X-ray therapy
- 2000+ medical accelerator
- Over 1M treatments/y

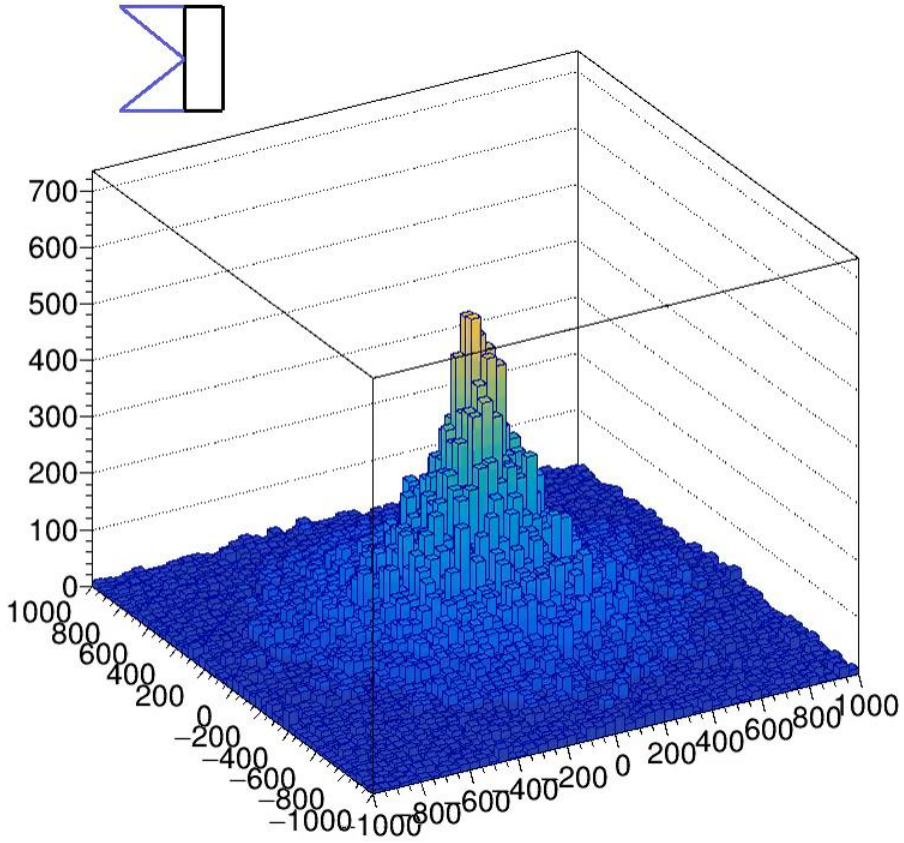
X-ray therapy (in Europe)

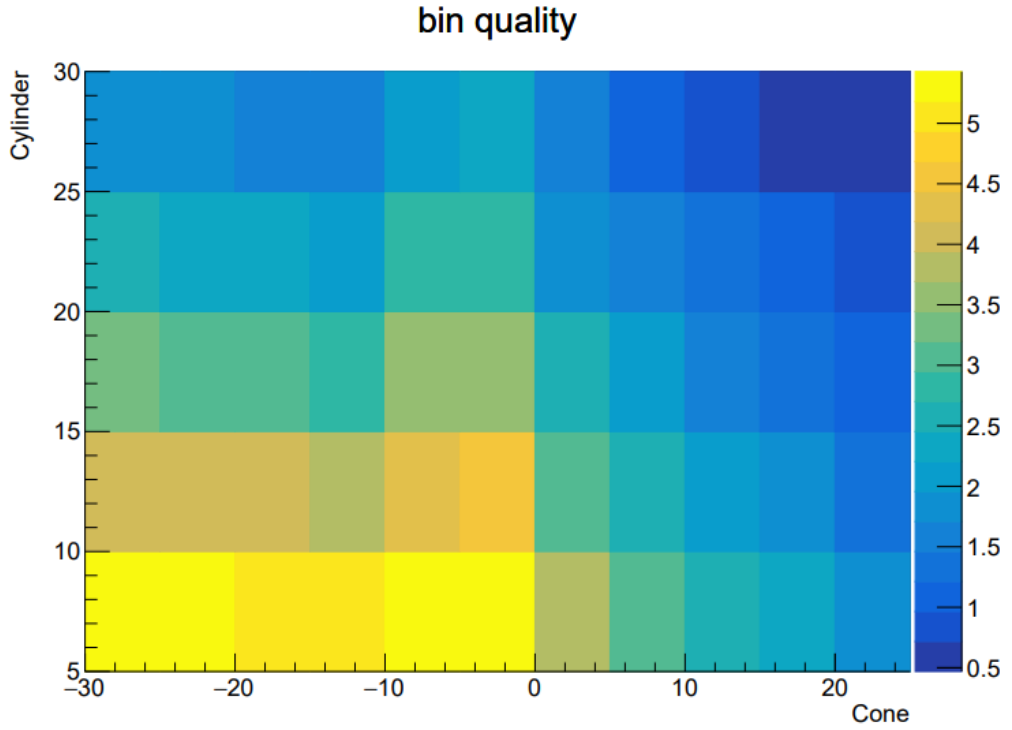
- Over 1M treatments/y
  - 1% in beam efficiency means 10k **more treatments**
  - 1% beam size reduction (by reducing the side effects) can cause **better life** for thousands
    - RF technology
    - Accelerator
    - Beam manipulation
    - Beam monitoring
    - Particle interaction
    - Simulations
    - …



Efficiency, beam quality

- GEANT: electron (6MeV) target (cone + cylinder)

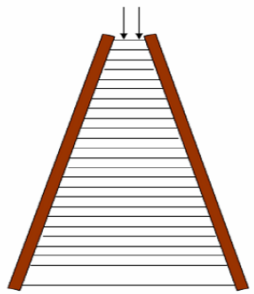




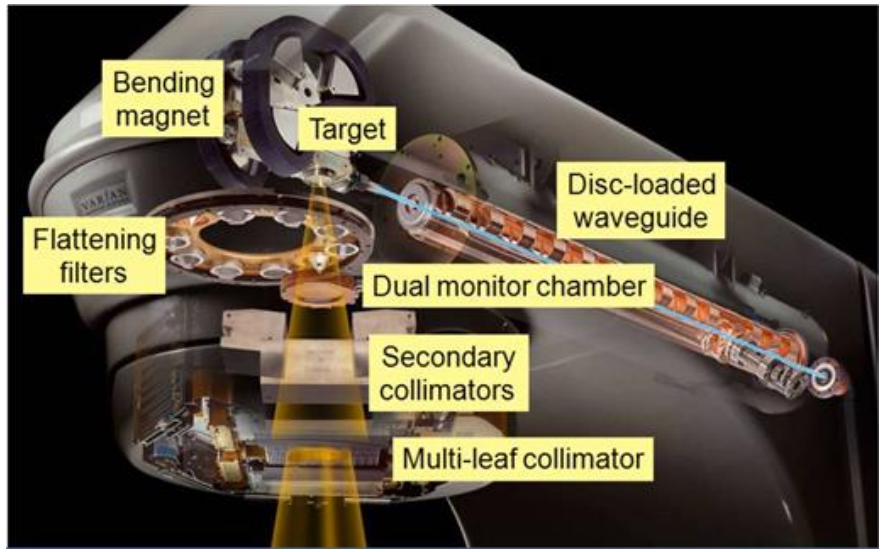
GEANT simulation = find the key parameters

- Build up a real device (from drawings/CAD)
- Run several simulations with different parameters
- Declare what a good beam is (not easy)
- Show what parameters are important

- Or try new concept

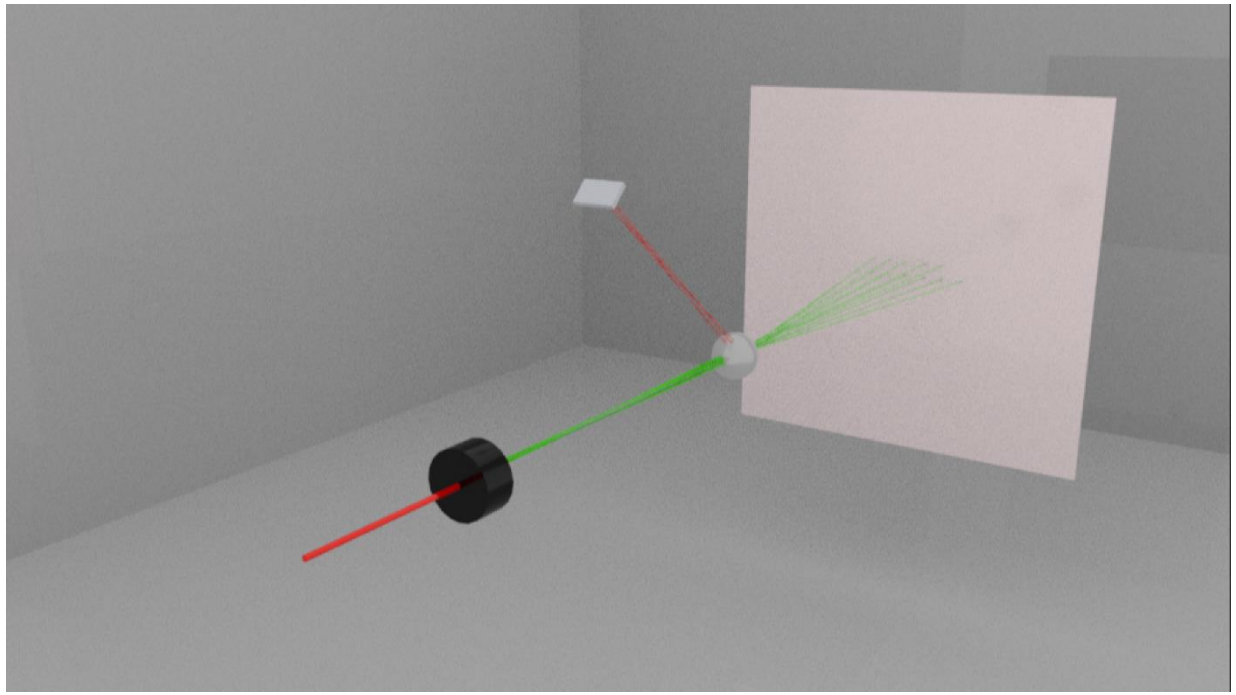


https://arxiv.org/ftp/arxiv/papers/1102/1102.3284.pdf



Beam monitoring, QA

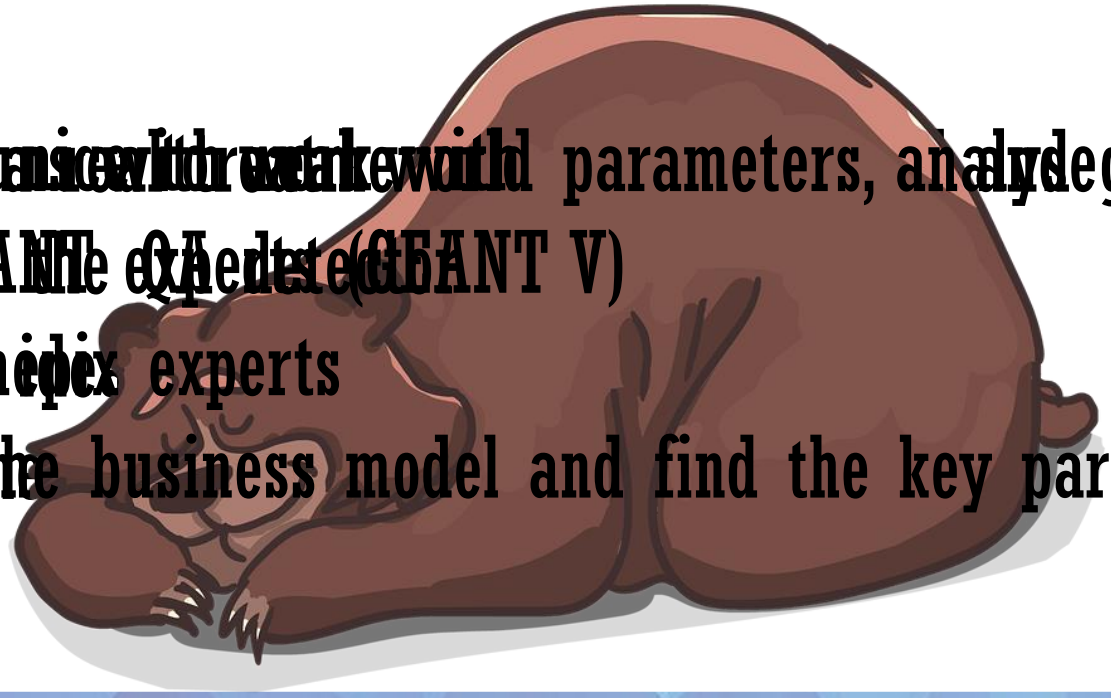
- At CERN, we trust GEANT result, but…
- Show the beam quality by measuring
  - **Energy spectrum at different position** (vs. ionization chamber)



Timeline

NOW 1 WEEK 1 MONTH 1 YEAR

- [illegible] parameters, analyse the result
- Prototype the expected (GEANT V)
- Test new ideas experts
- Develop the business model and find the key partners



Thanks!

Question?