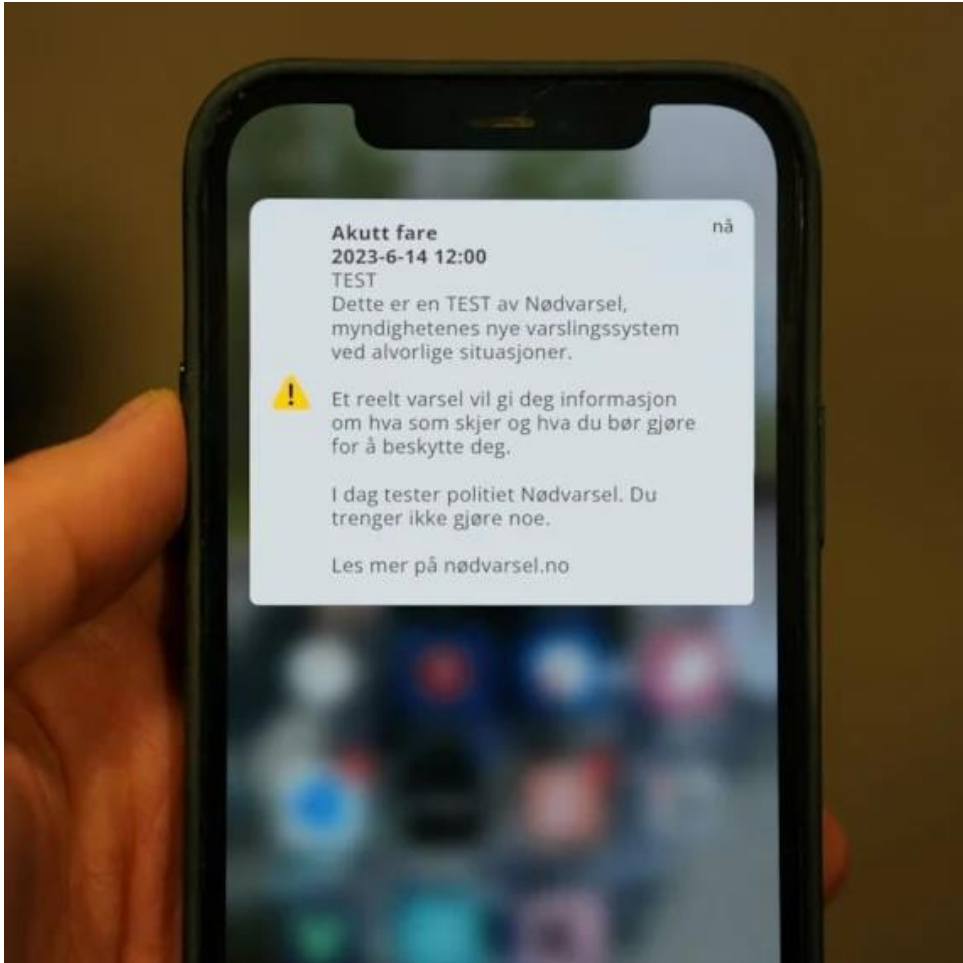


Protonterapi i Norge: En kort introduksjon om fysikken og teknikken bak



Nødvarsel i dag KL 12.00



Dette skjer når Nødvarsel testes

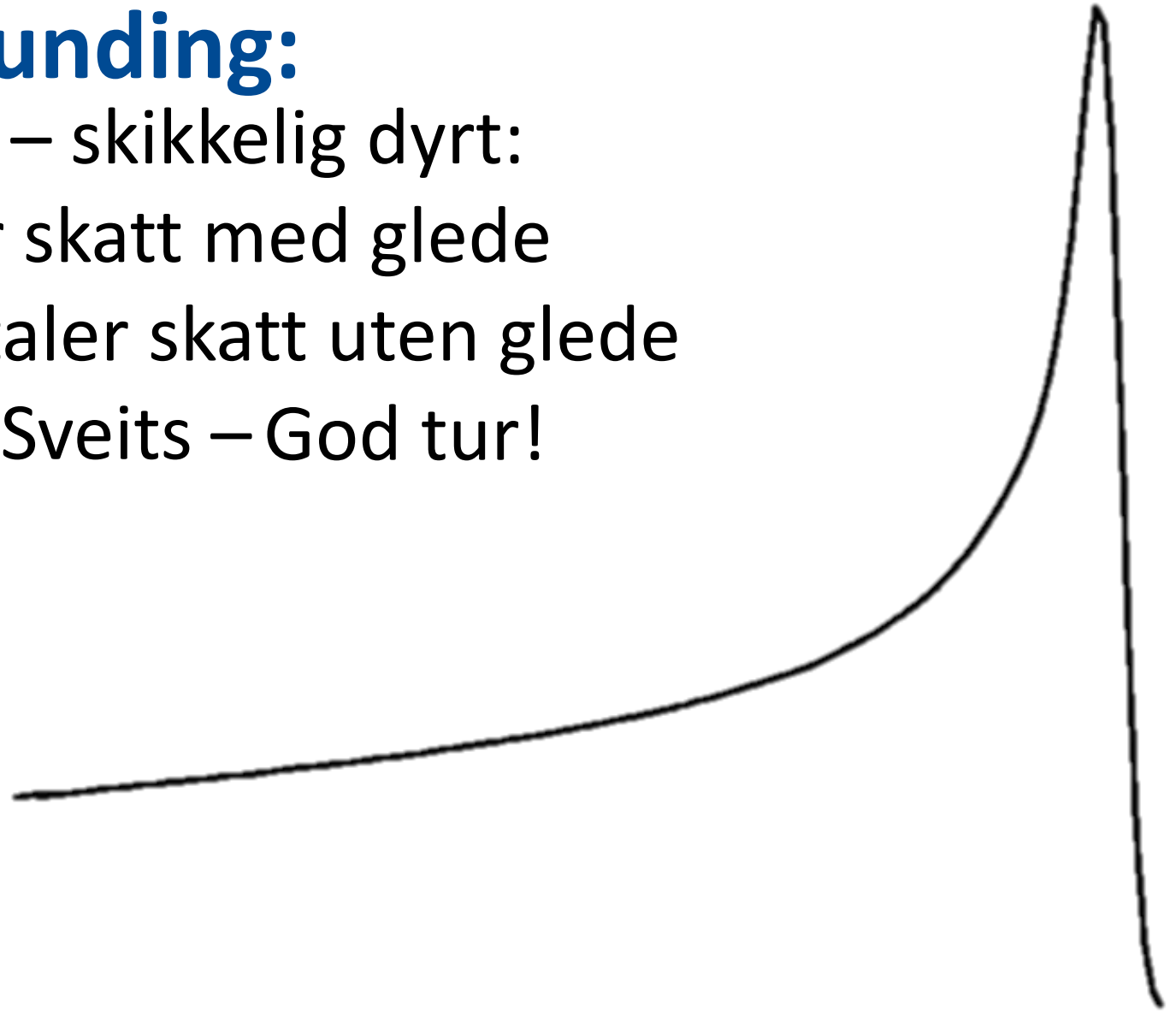
- Testen utløses mellom kl. 11.55 og 12.10 den 14. juni 2023
- Når du mottar testen vibrerer telefonen og spiller av en høy, sireneaktig lyd i ca. 10 sekunder.
- En tekst på norsk og engelsk dukker opp på skjermen. I teksten står det at dette bare er er test.
- Varselet kan "dras" vekk eller fjernes ved å trykke "ok" (Dette avhenger av hvilken type telefon og operativsystem man har).



Acknowledgements/Funding:

Staten. Protonterapi er dyrt – skikkelig dyrt:

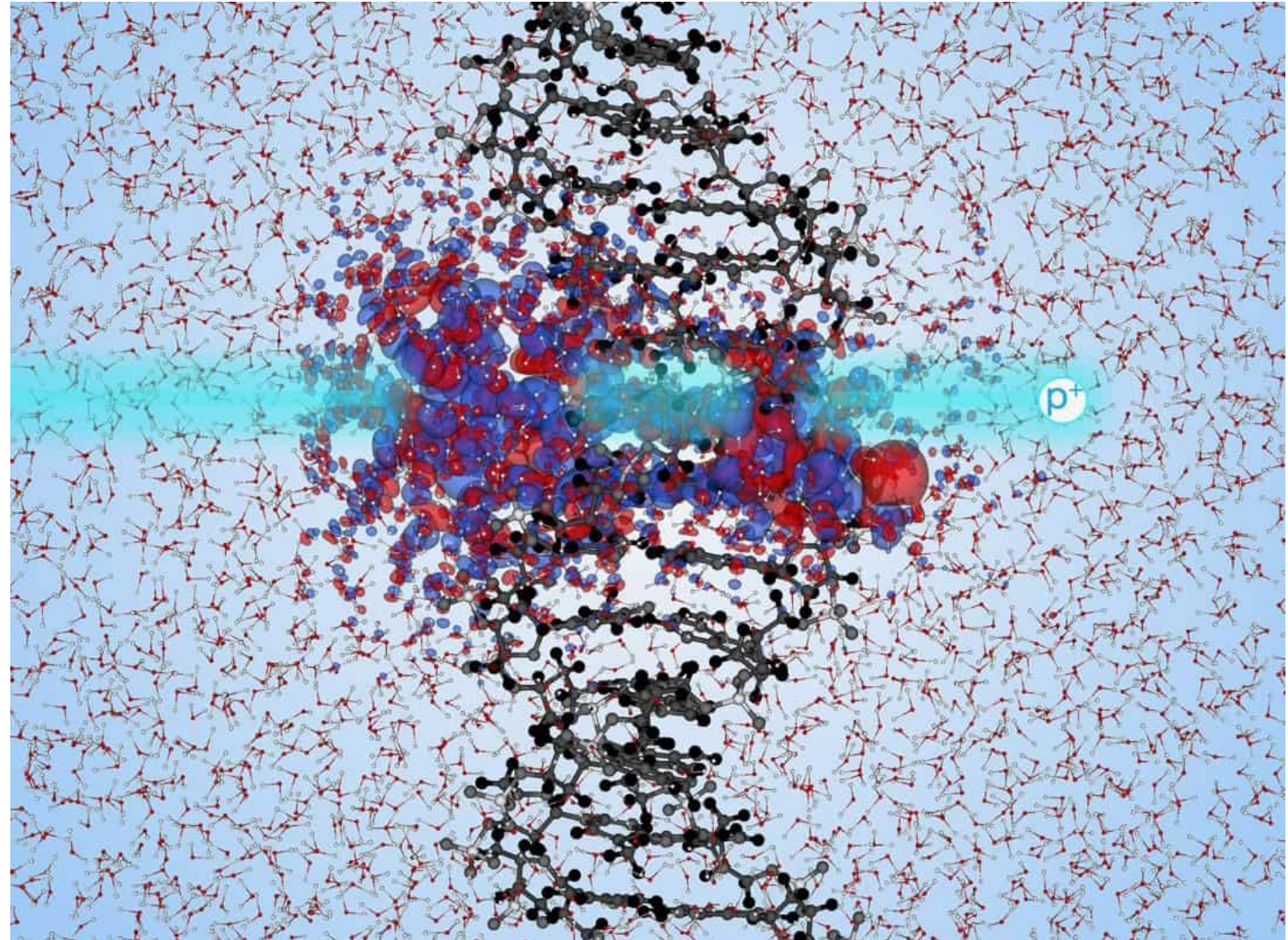
- Så takk til deg som betaler skatt med glede
- Ekstra takk til deg som betaler skatt uten glede
- og til deg som er på vei til Sveits – God tur!



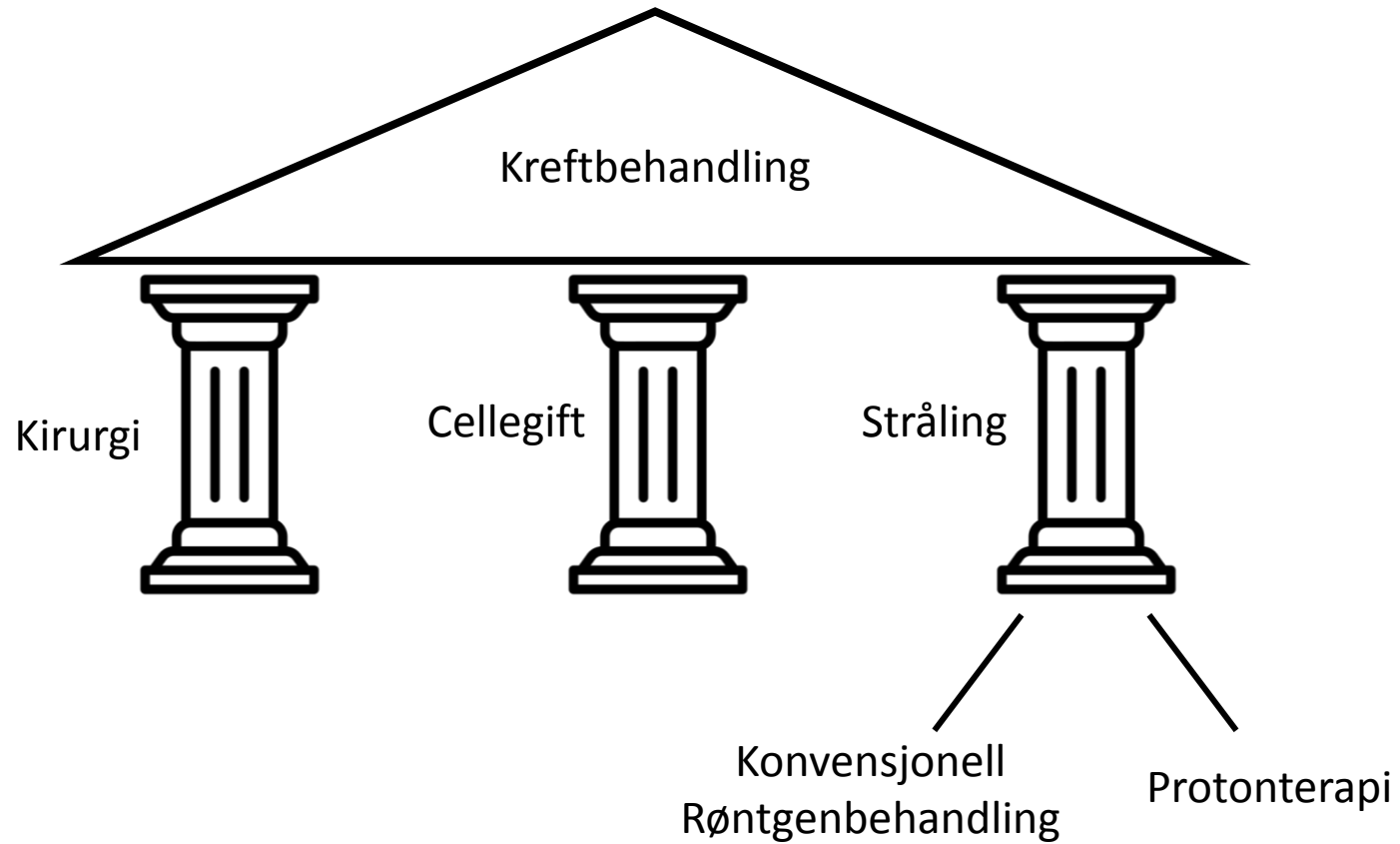
Agenda

En kort introduksjon om

- Fysikken
- Teknologien
- Byggeprosjektet



De tre søyler i kreftbehandling



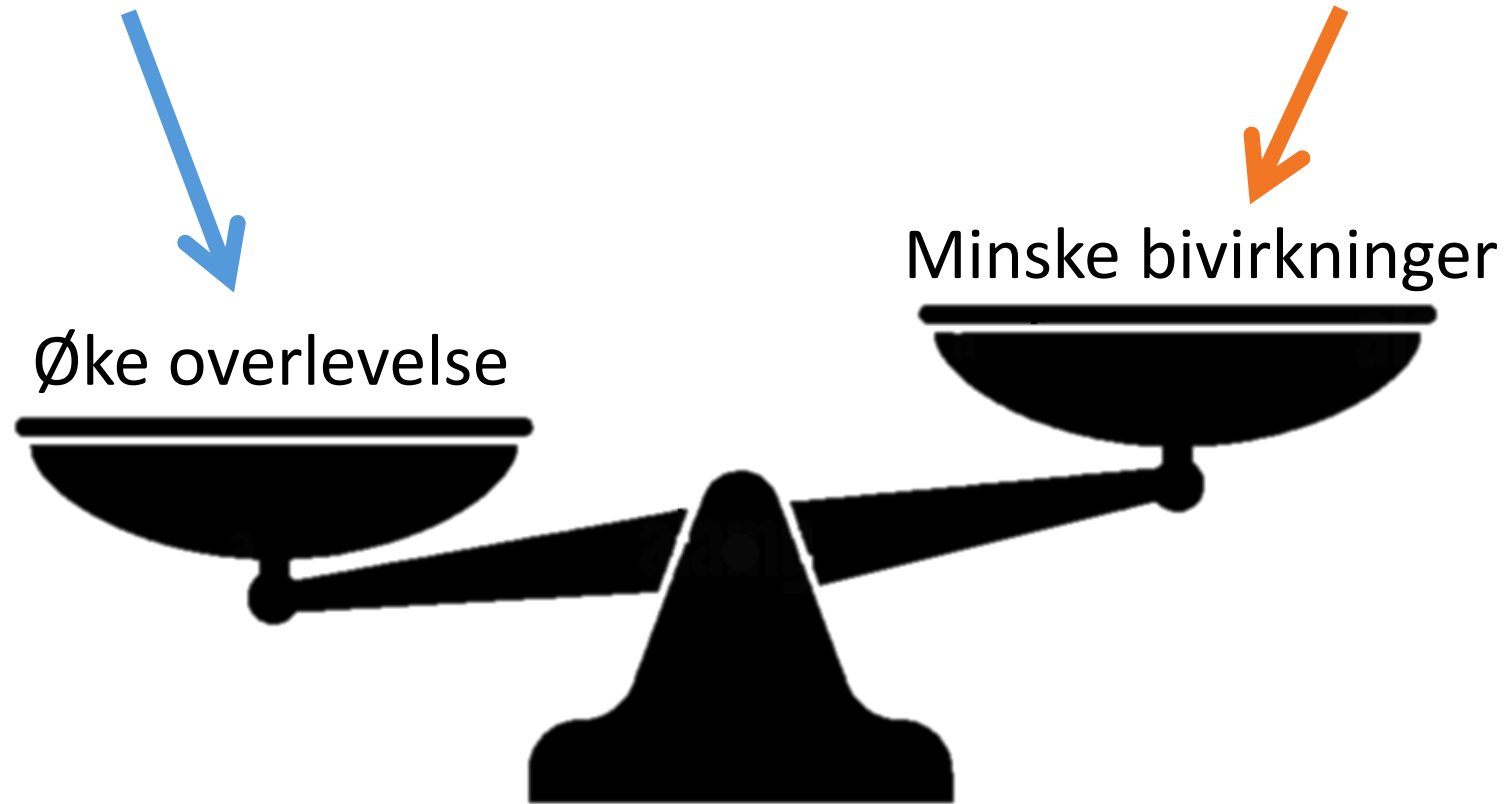
+ Immunterapi,
Presisjonsmedisin ++



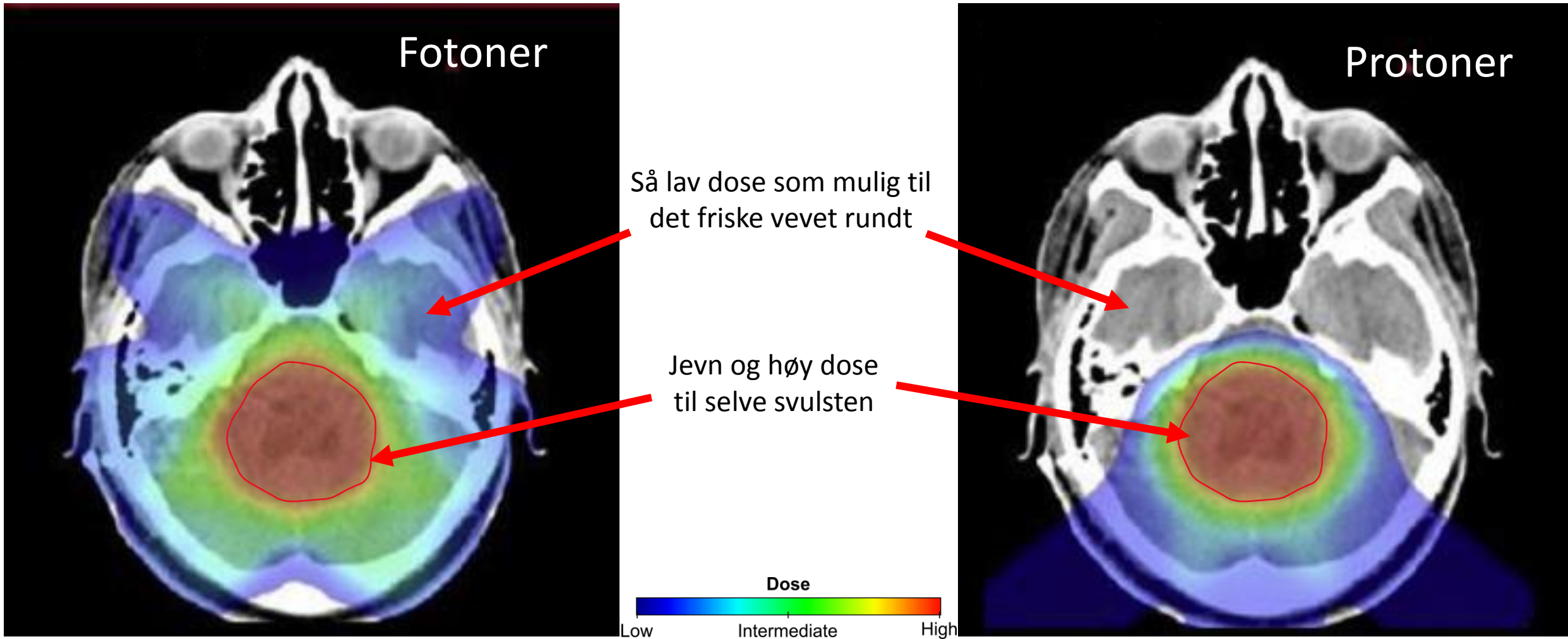
Grunnprinsipper i strålebehandling

Kreftsvulsten skal få en høy og jevn stråledose til å ta liv av alle kreftceller

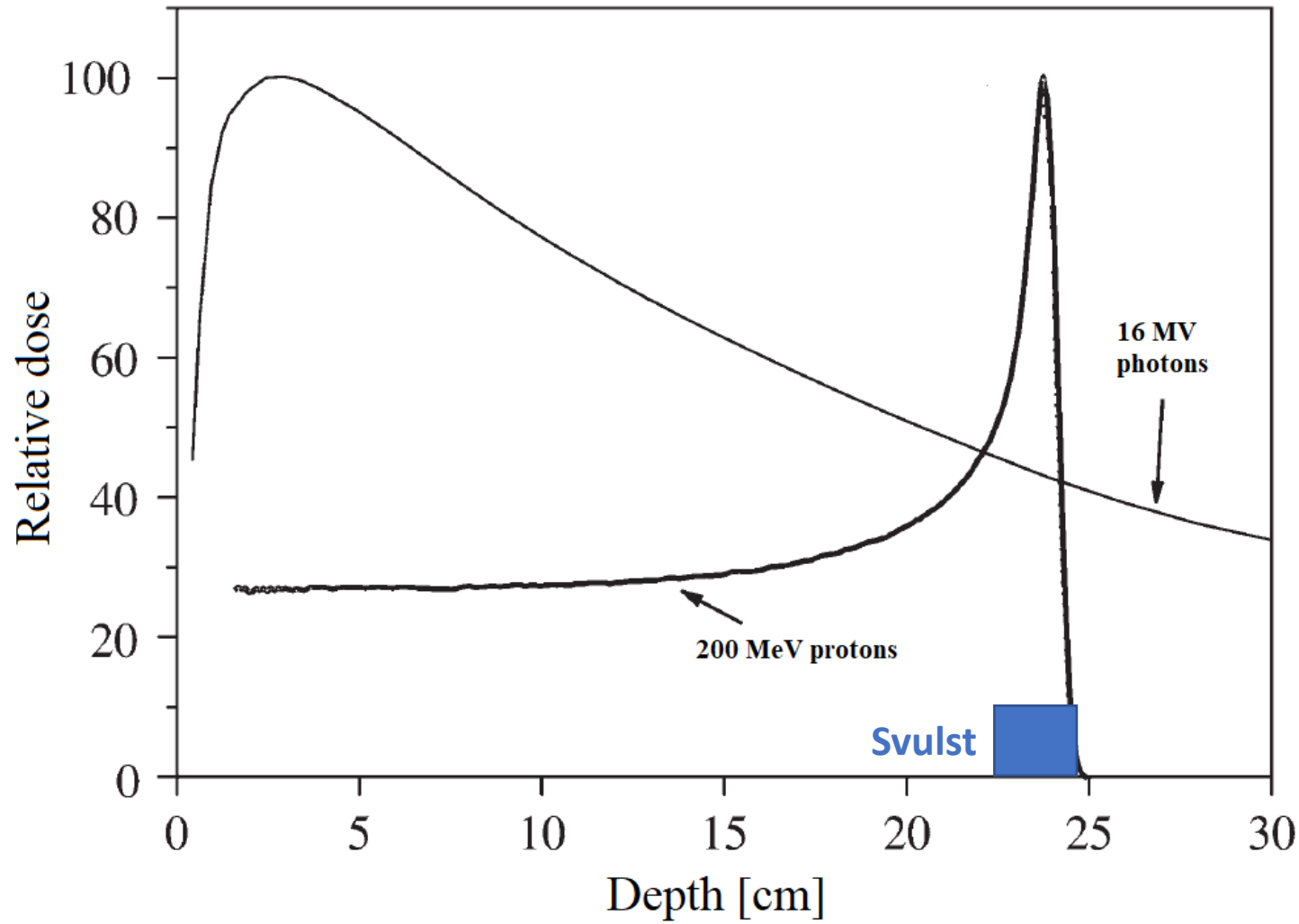
Friskt omliggende vev skal få så lav stråledose som mulig



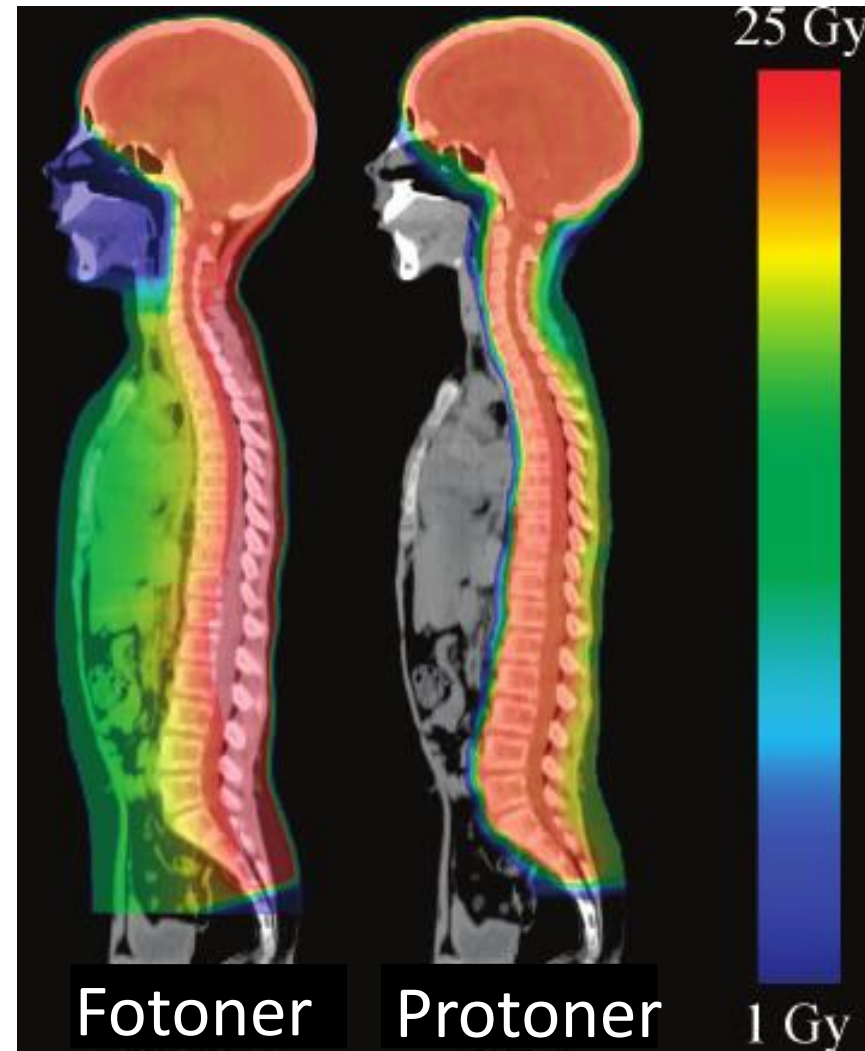
Mer målrettet strålebehandling



Dybbedosekurver



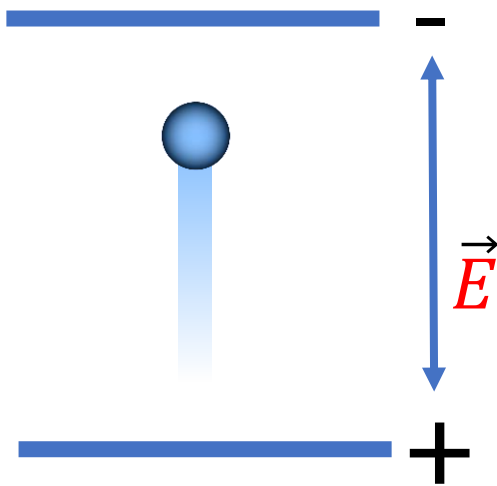
Protonene stopper i pasienten



Lorentz kraften

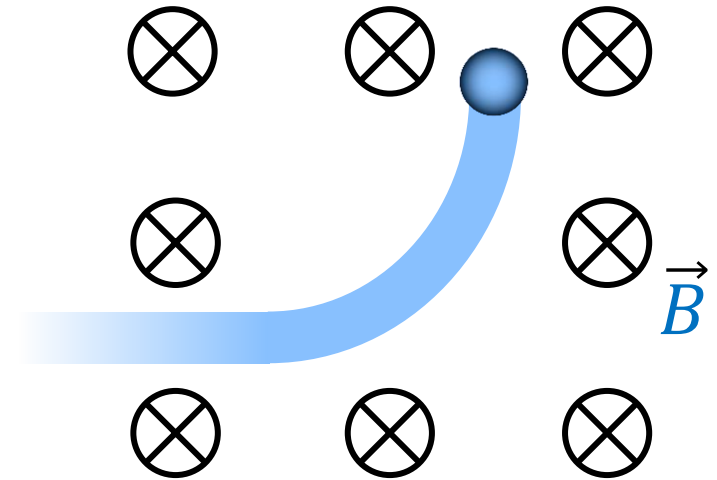
$$\vec{F} = q\vec{E} + q\vec{v} \times \vec{B}$$

Elektrisk felt:



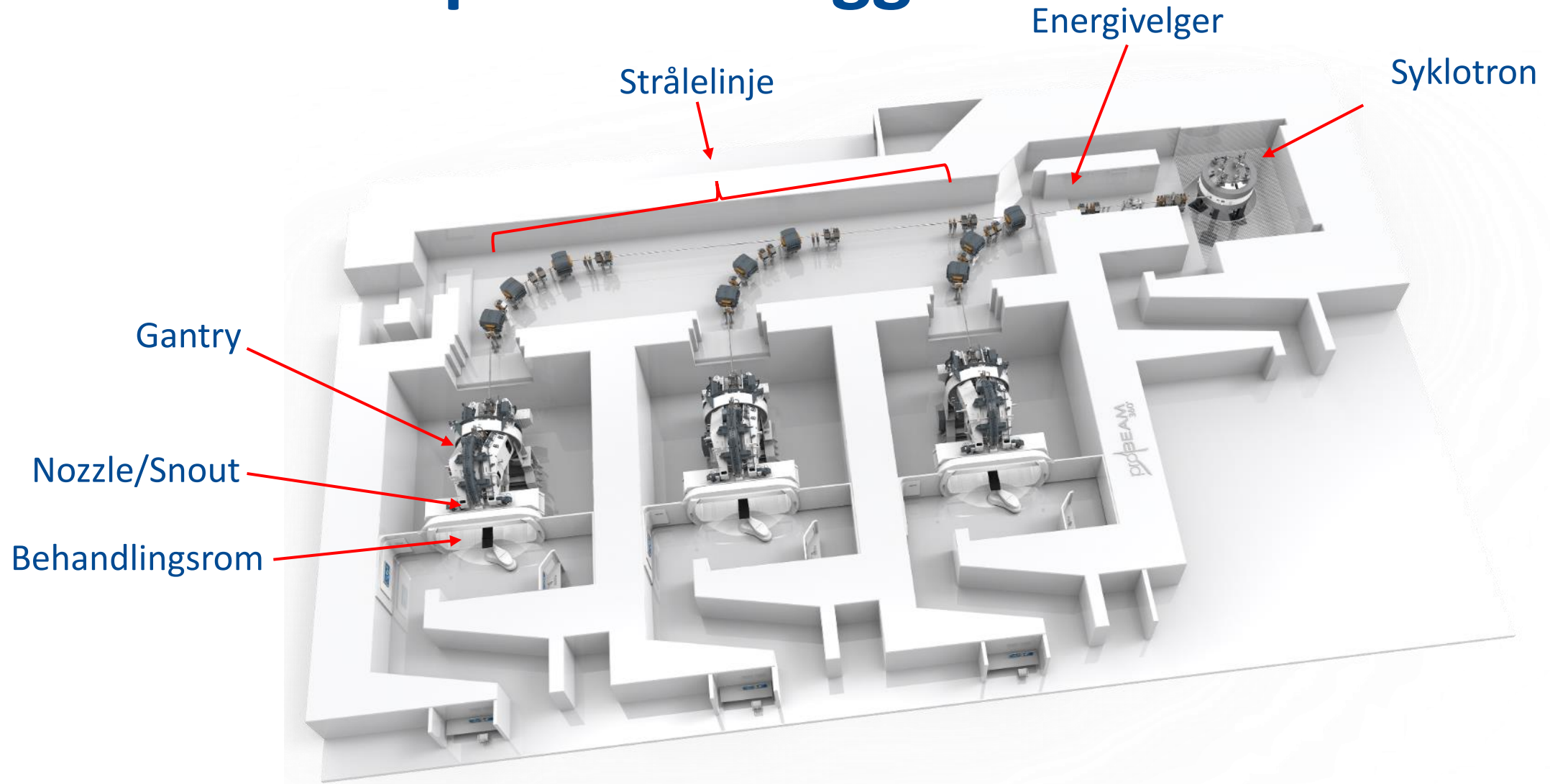
Elektrisk felt **akselererer** en ladd partikkel

Magnetisk felt:



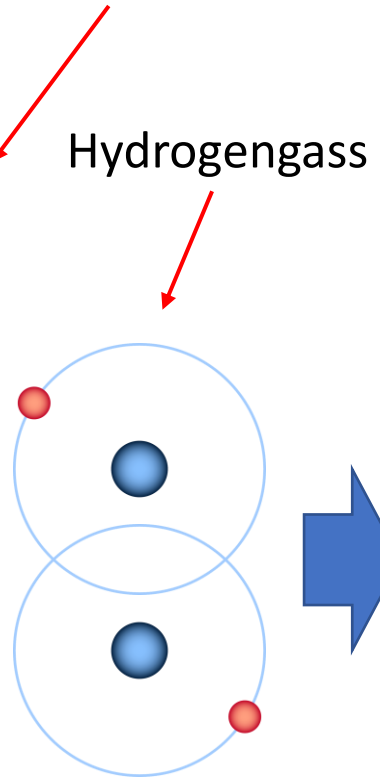
Magnetisk felt **avbøyer** en ladd partikkel

Oversikt over protonanlegg

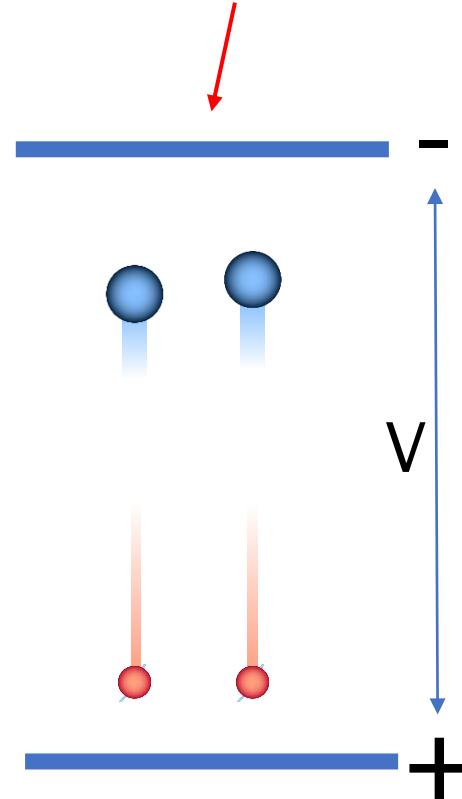


Produksjon av protoner

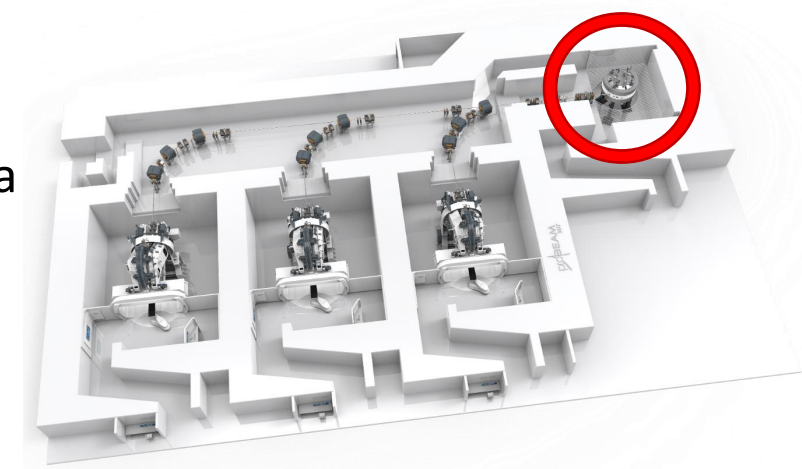
En hydrogentank inneholder årevis med protoner



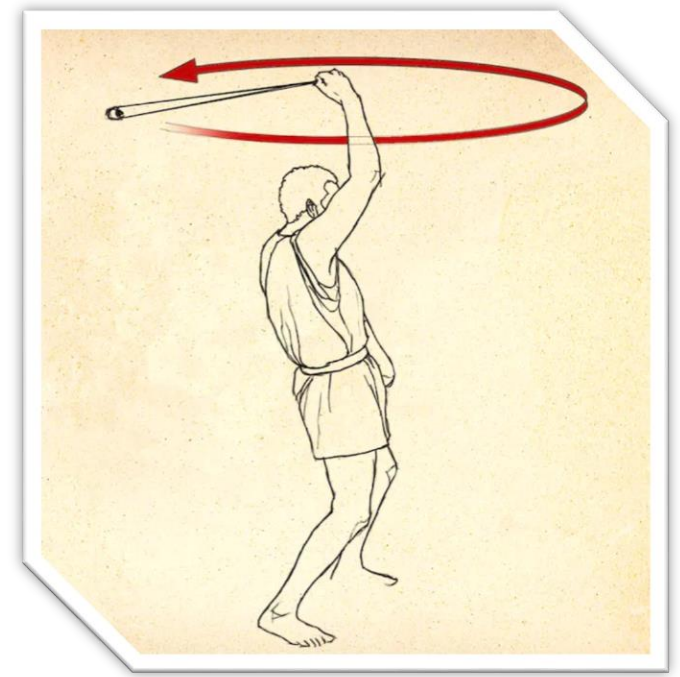
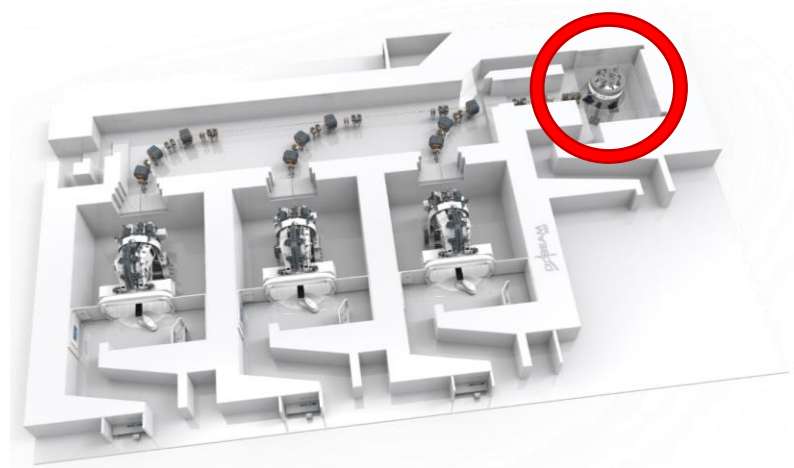
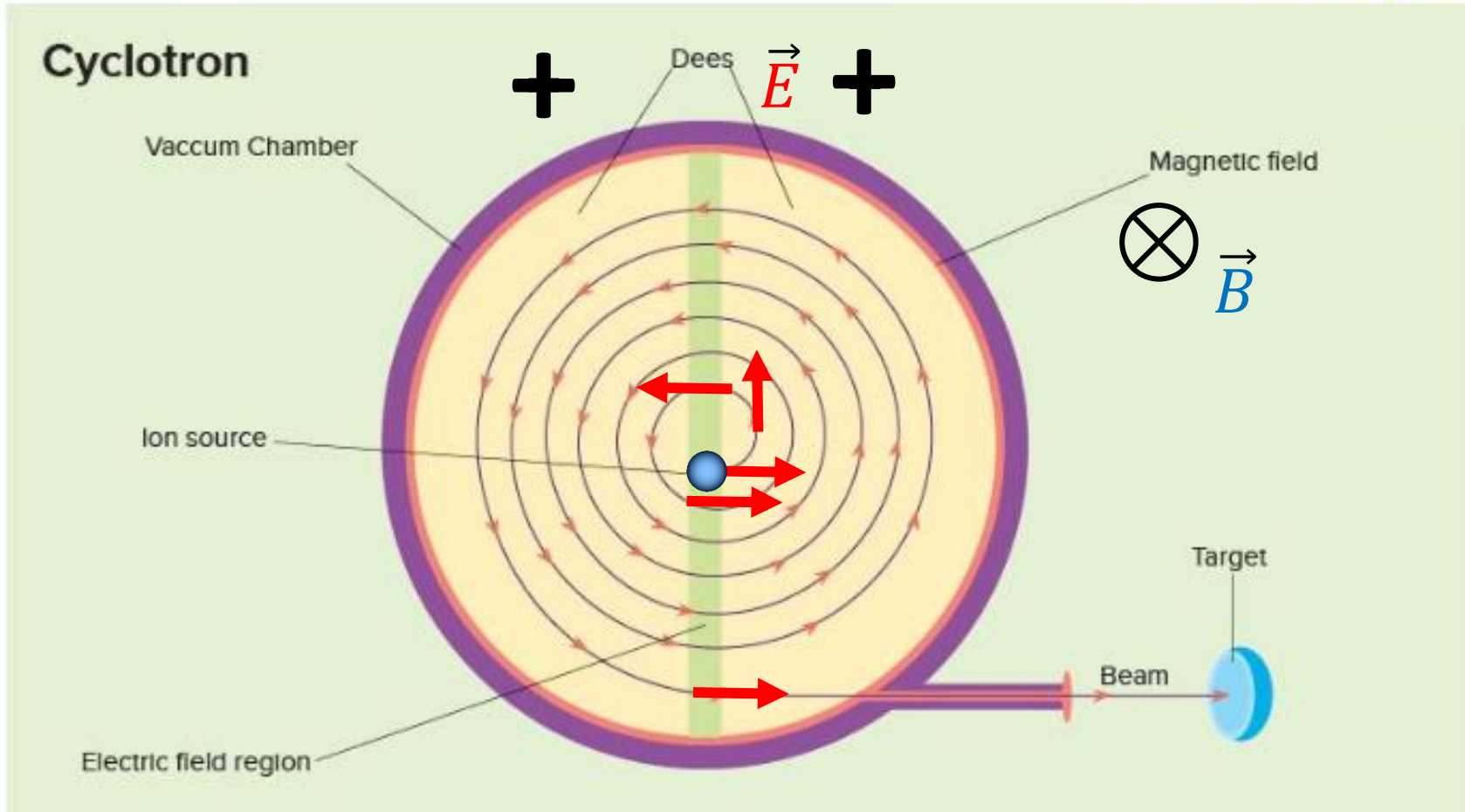
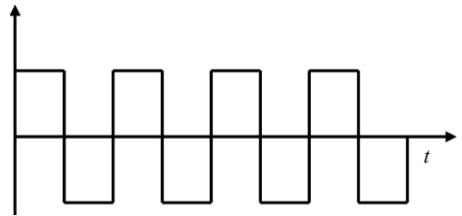
Satt under høy spenning ioniserer gassen



Hydrogenplasma

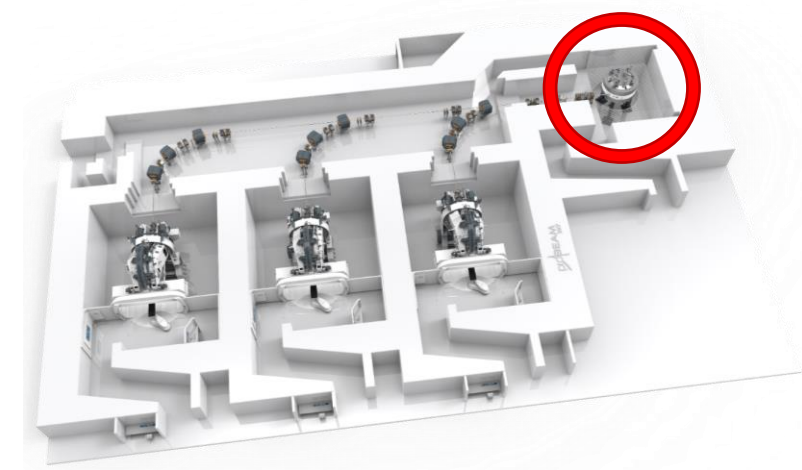


Syklotron



Syklotron

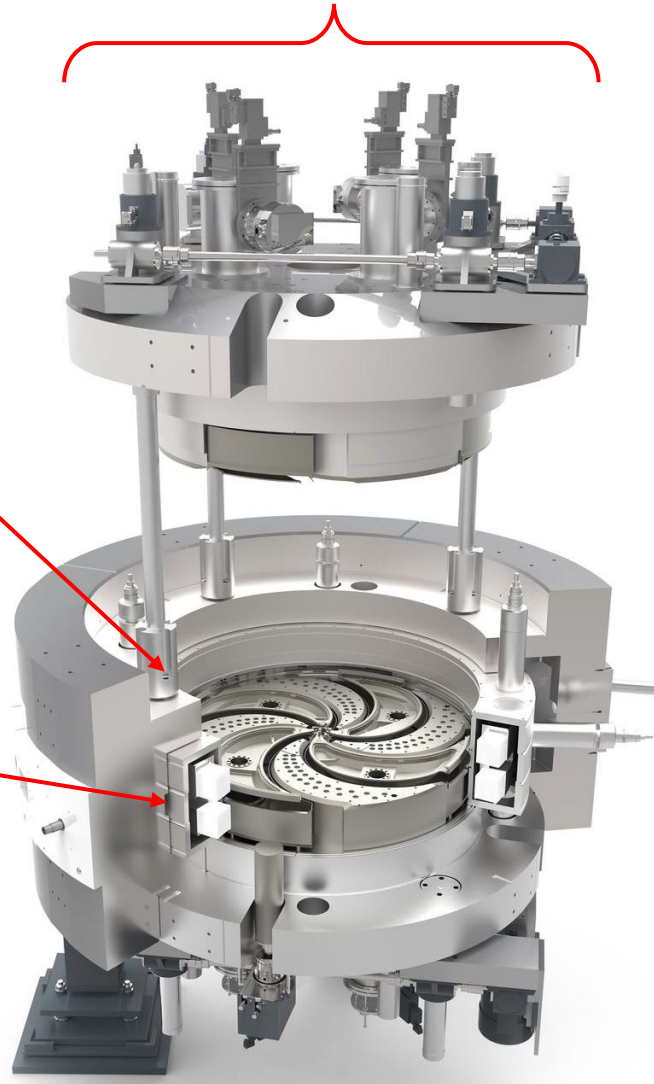
3,2 meter diameter



Protonene går
ca 650 ganger rundt

Superledende magneter
Nedkjølt av flytende
Helium (4° Kelvin)

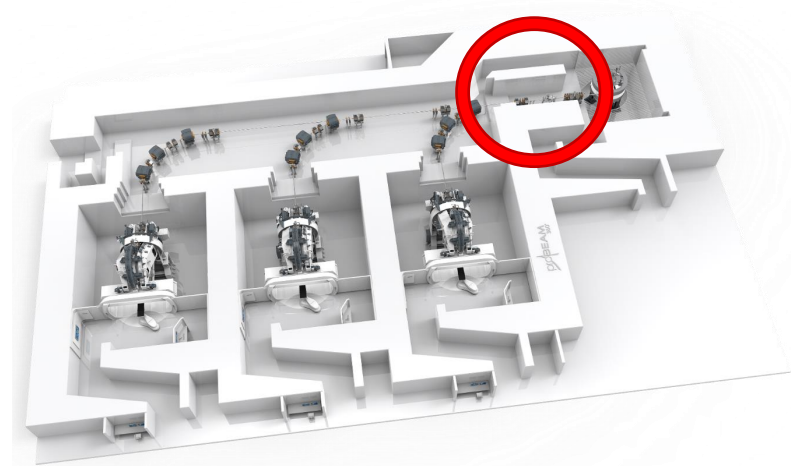
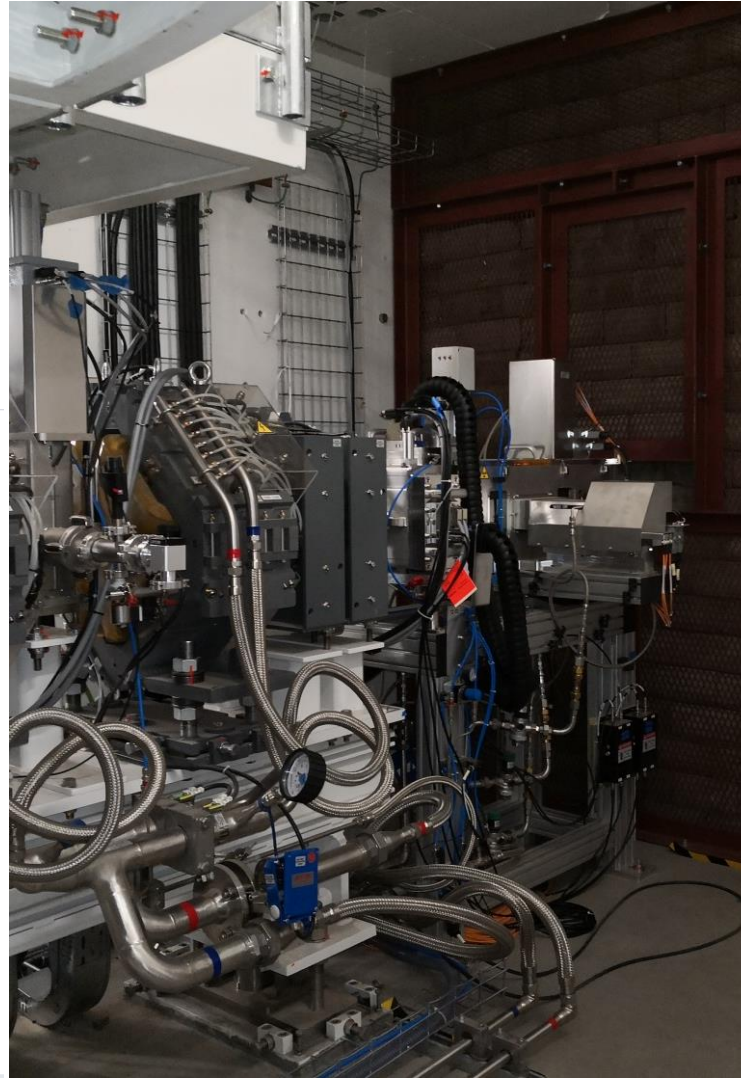
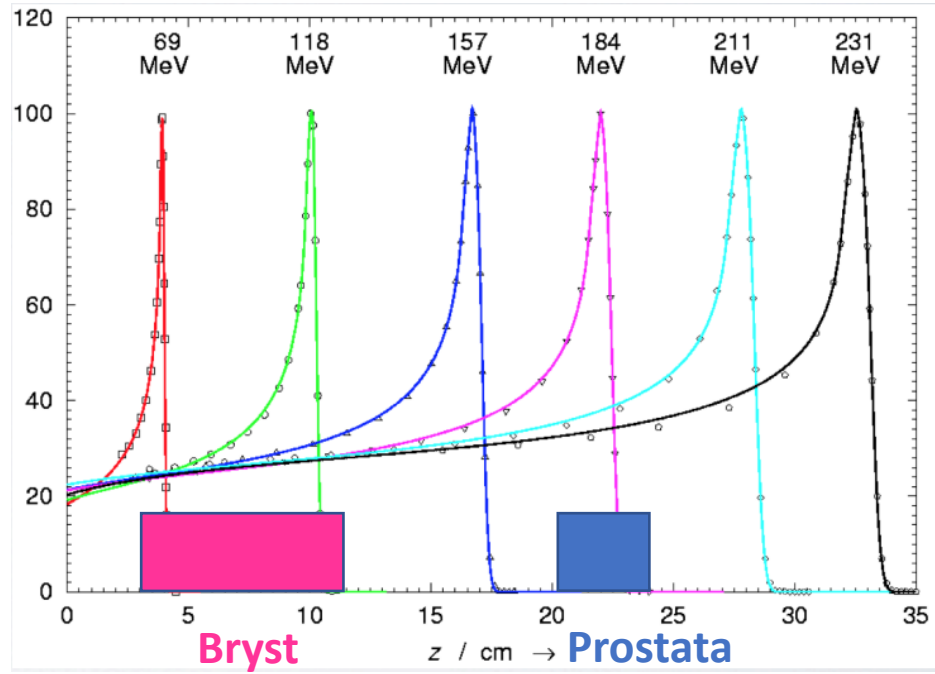
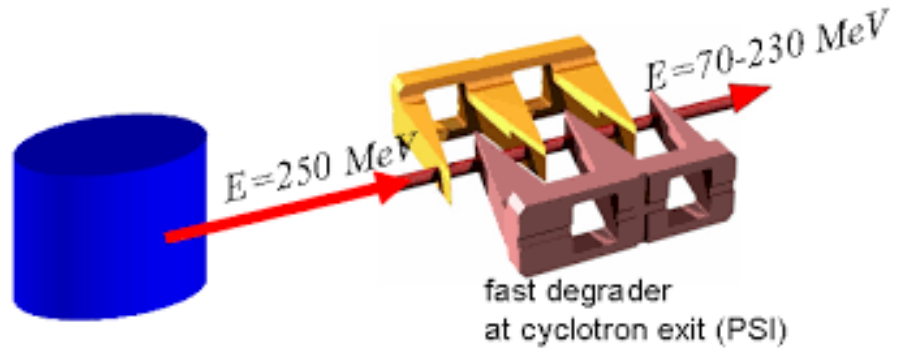
Ca 90 tonn totalt



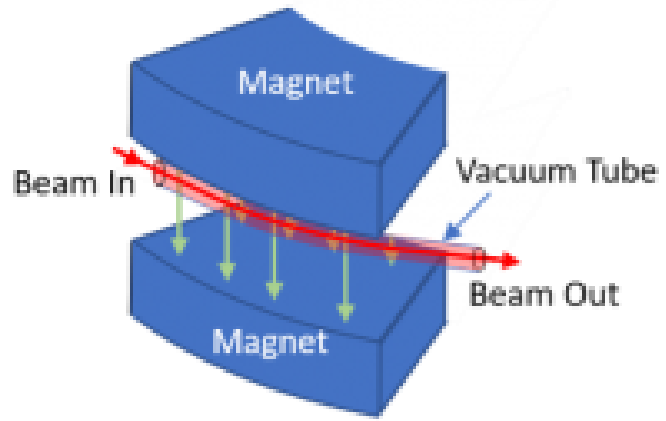
Energi: 226 MeV dvs
 $2/3$ av lysets hastighet!



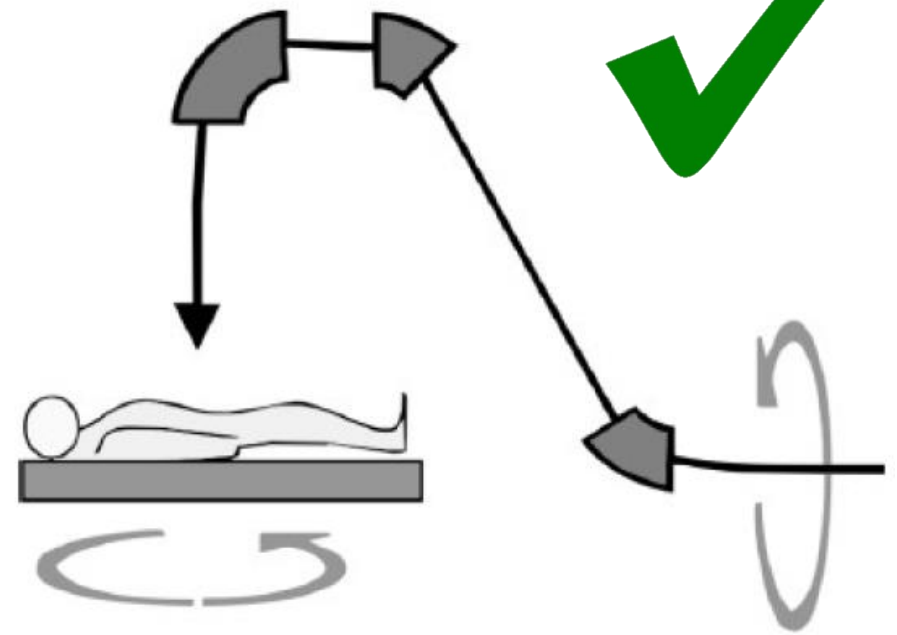
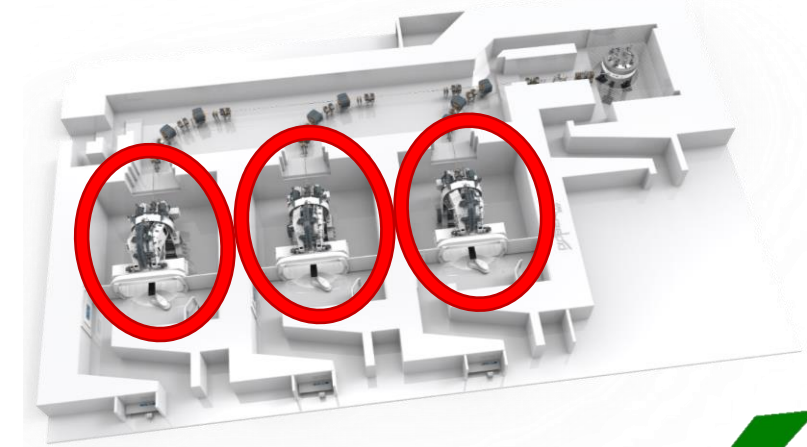
Energivelger



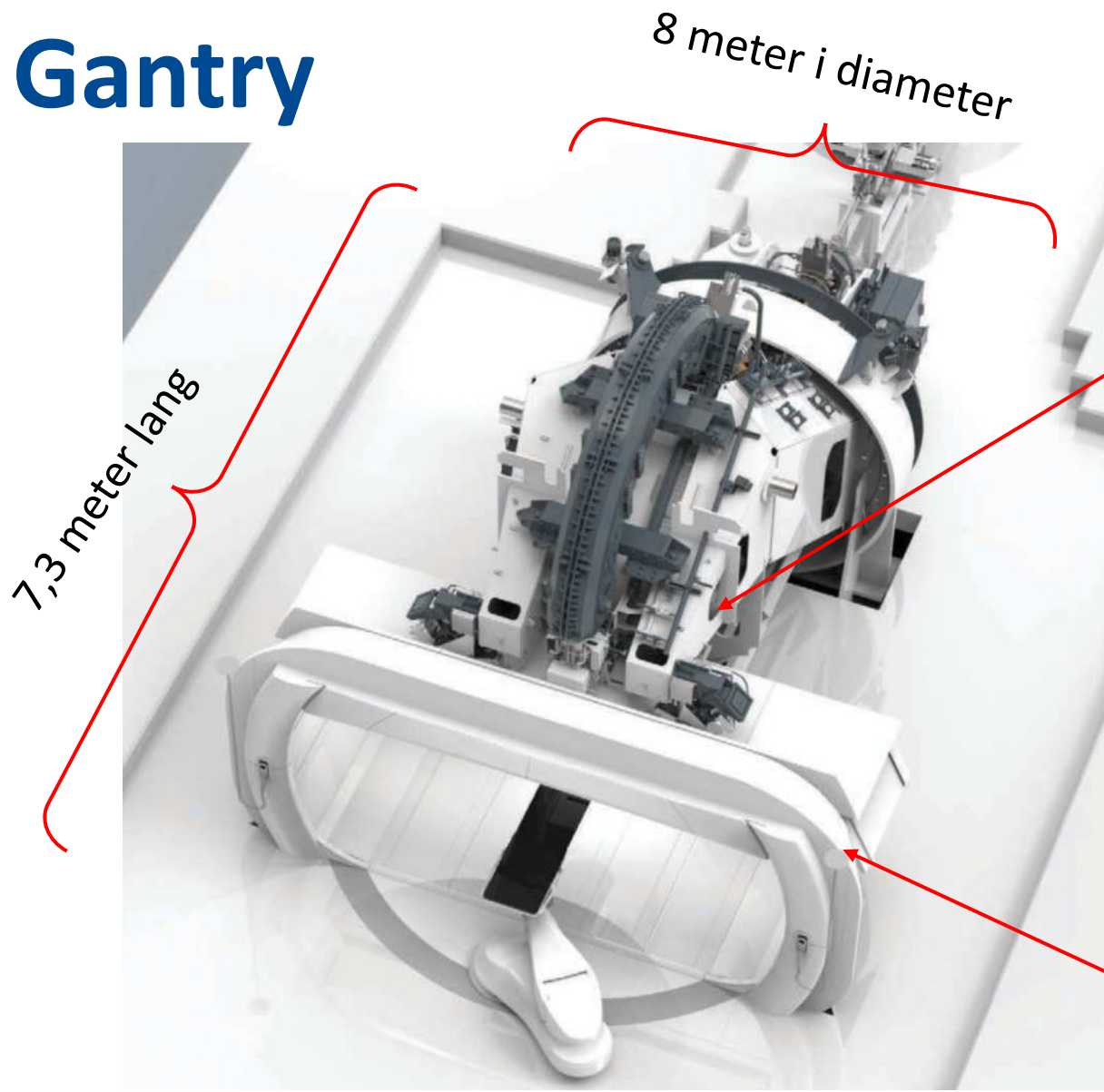
Beamline



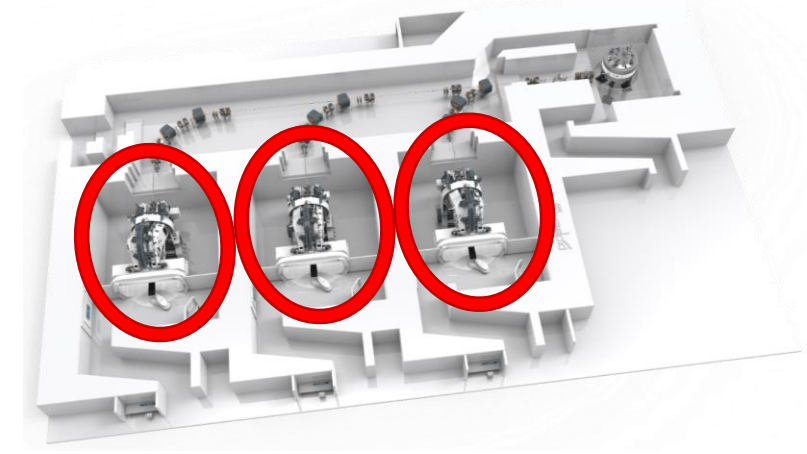
Gantry



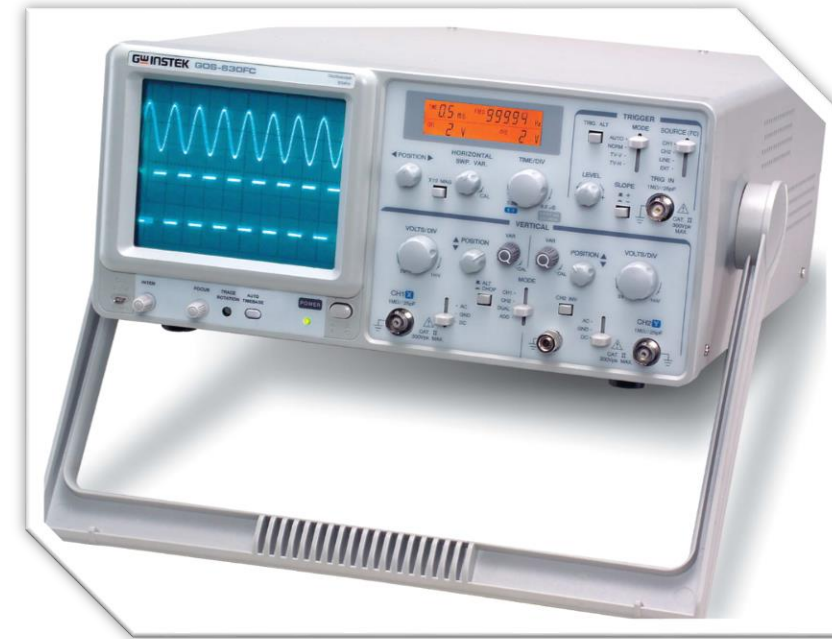
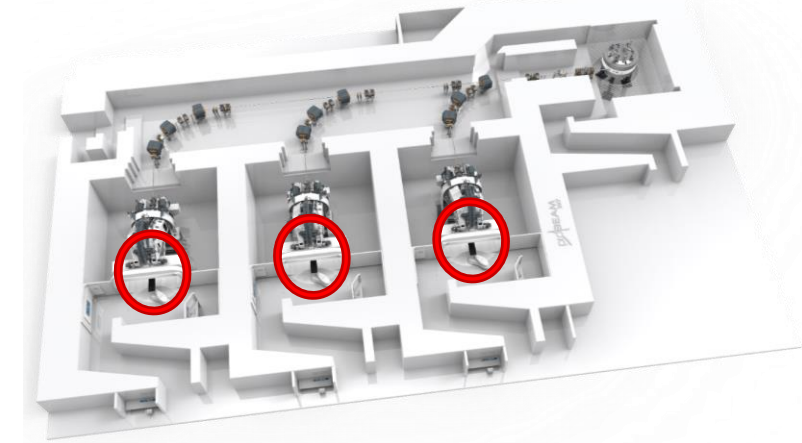
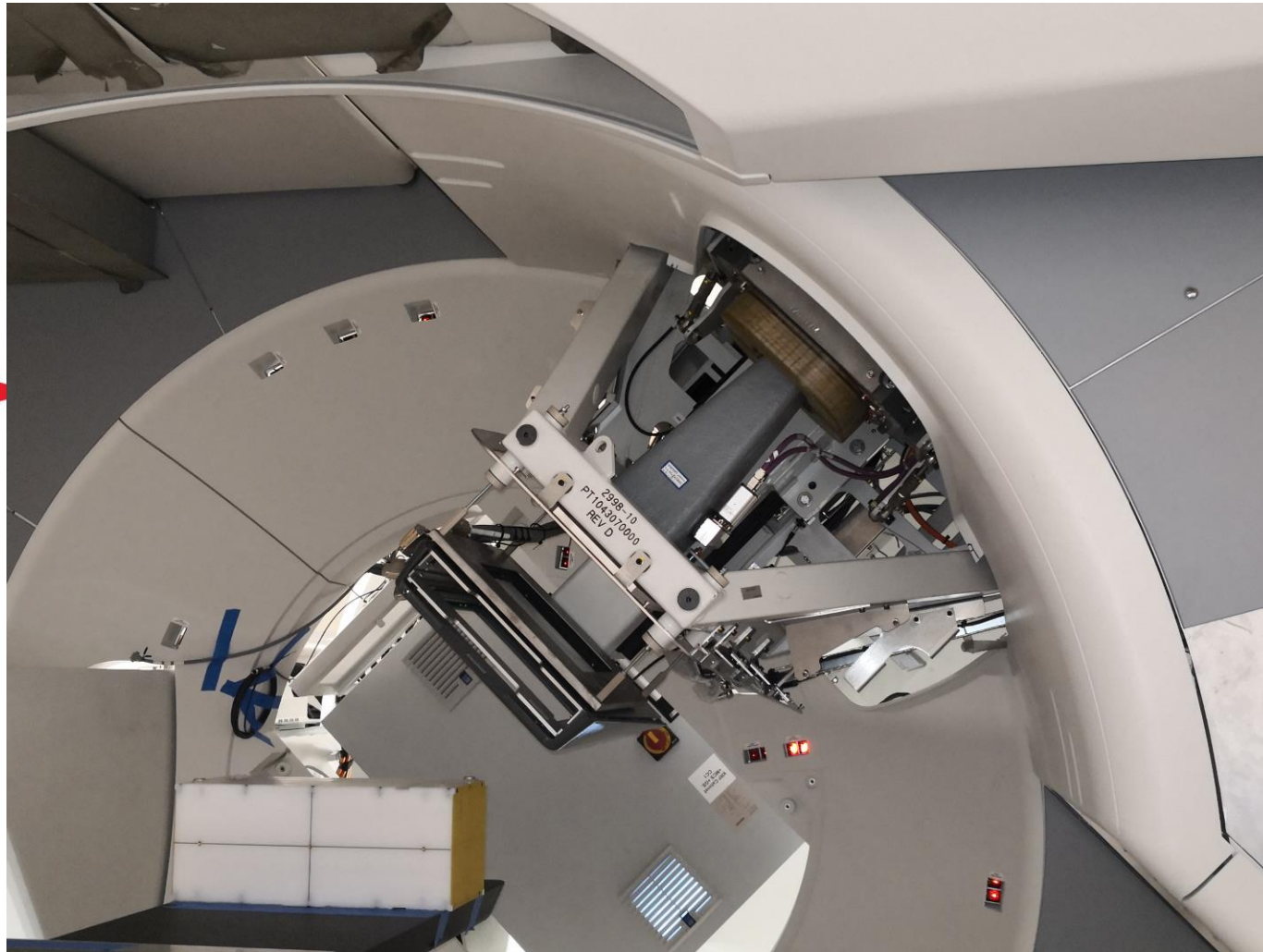
Gantry



Kan rotere 360 grader rundt pasienten



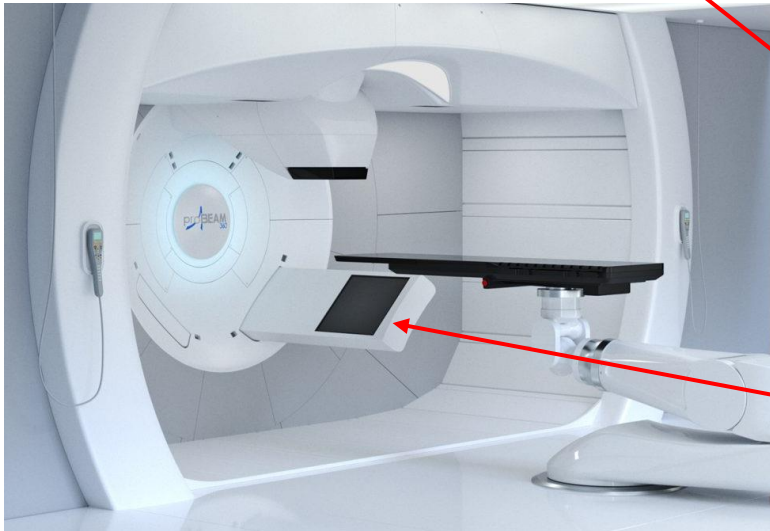
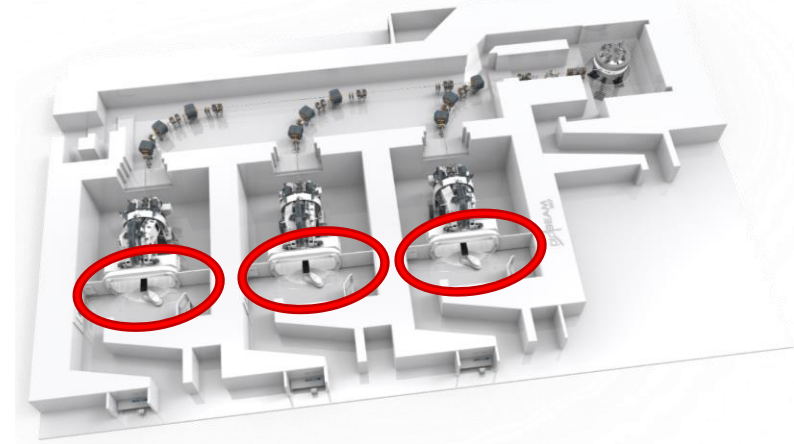
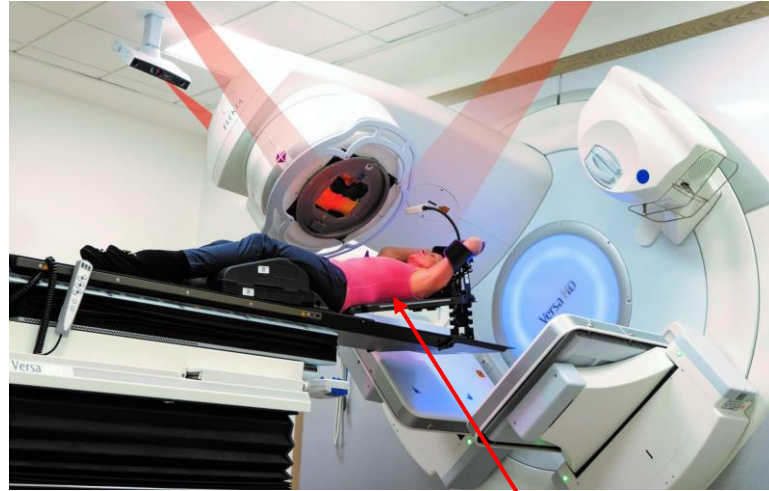
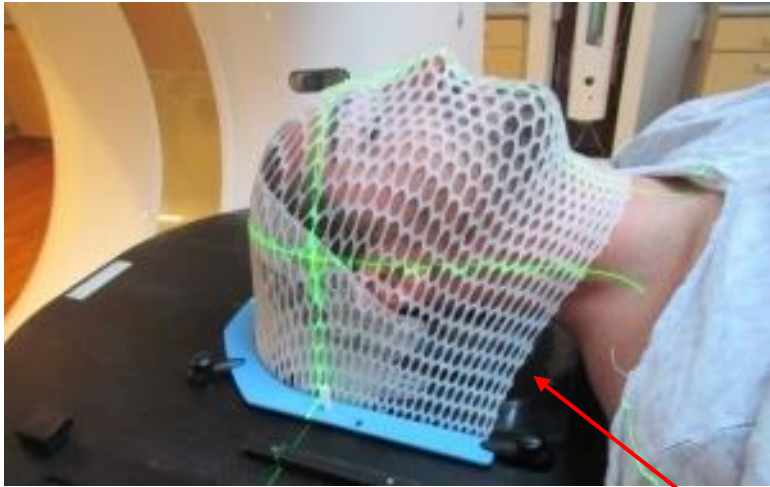
Nozzle



er
energy



Fiksering av pasient



Overflatescanning

Persontilpasset masker

kV røngten og CBCT







Takk for meg



Spørsmål?

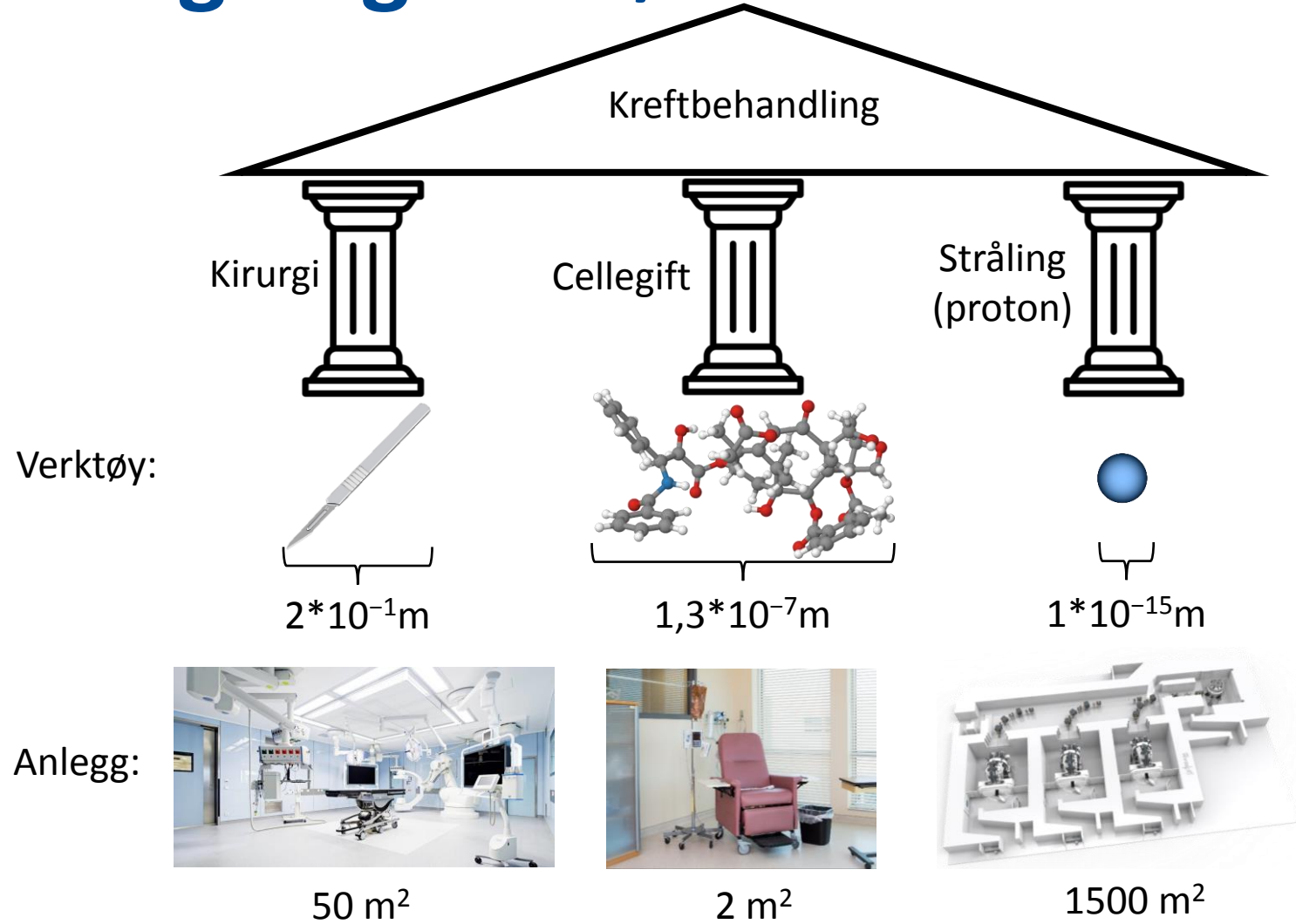


Dette skjer når Nødvarsel testes

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- Når du mottar testen vibrerer telefonen og spiller av en høy, sireneaktig lyd i ca. 10 sekunder.
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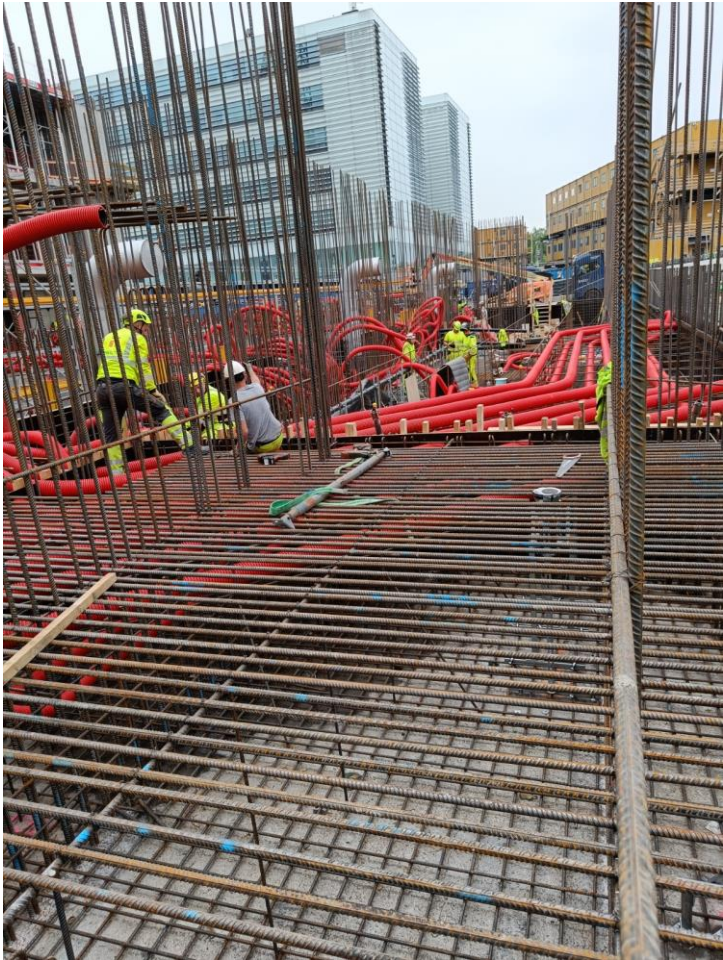
Sammenligning av størrelse



Stort bygg
- Lite verktøy!



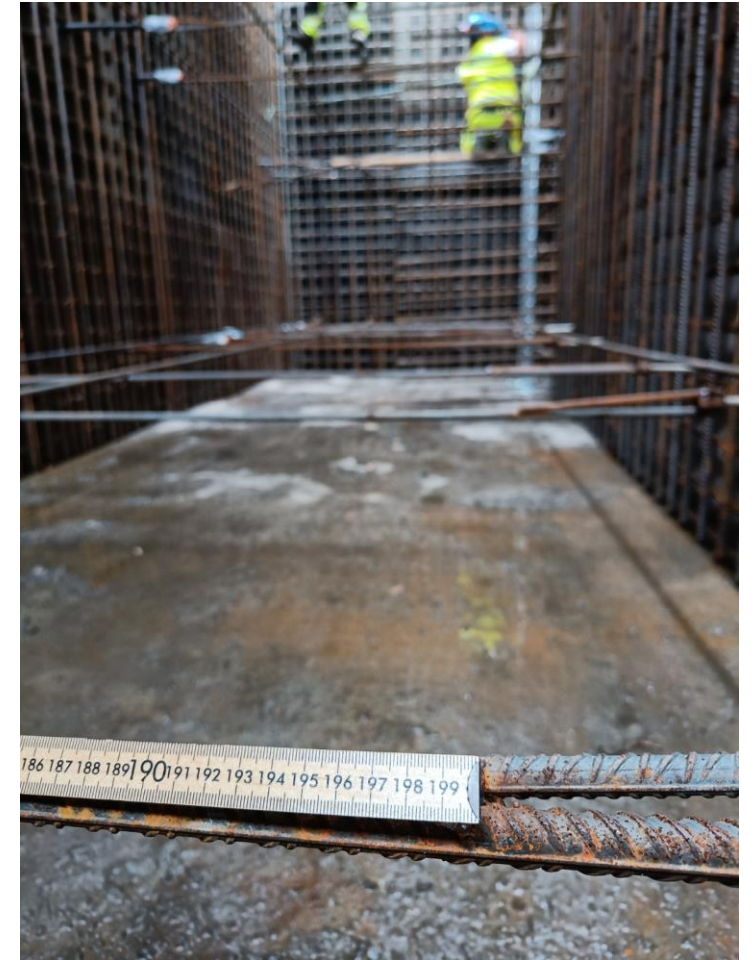
Strengt krav til strålevern



Mye stål og betong i vegg og dekker



Alle rør og føringer bygges inn



De tykkeste veggene er 3,5 meter

Jobbmuligheter i Oslo og Bergen

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🕒 Posted 14 Days Ago
R-18435

[Onsite Service Engineer, Proton Solutions - Oslo, Norway](#)

📍 Remote - Norway
🕒 Posted 14 Days Ago
R-15293

[Onsite Service Engineer, Proton Solutions - Bergen, Norway](#)

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🕒 Posted 14 Days Ago
R-18436

[Site General Manager \(Onsite\) Proton Solutions - Bergen, Norway](#)

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Apply

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Together, we can beat cancer.
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