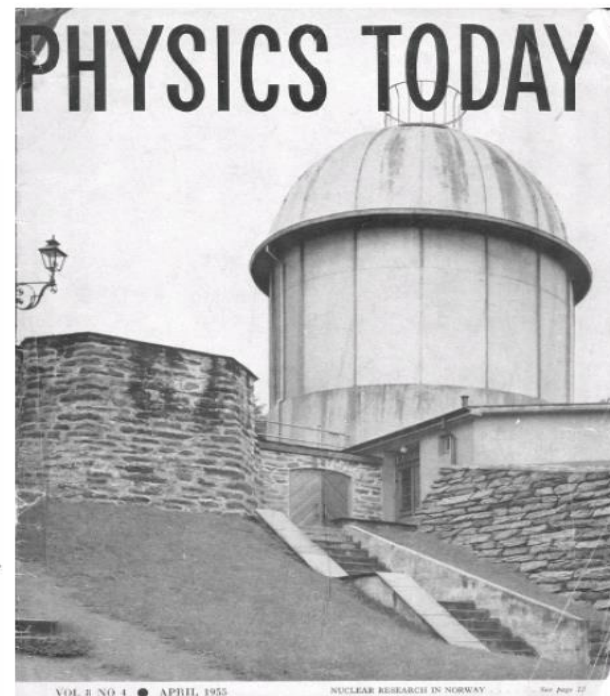
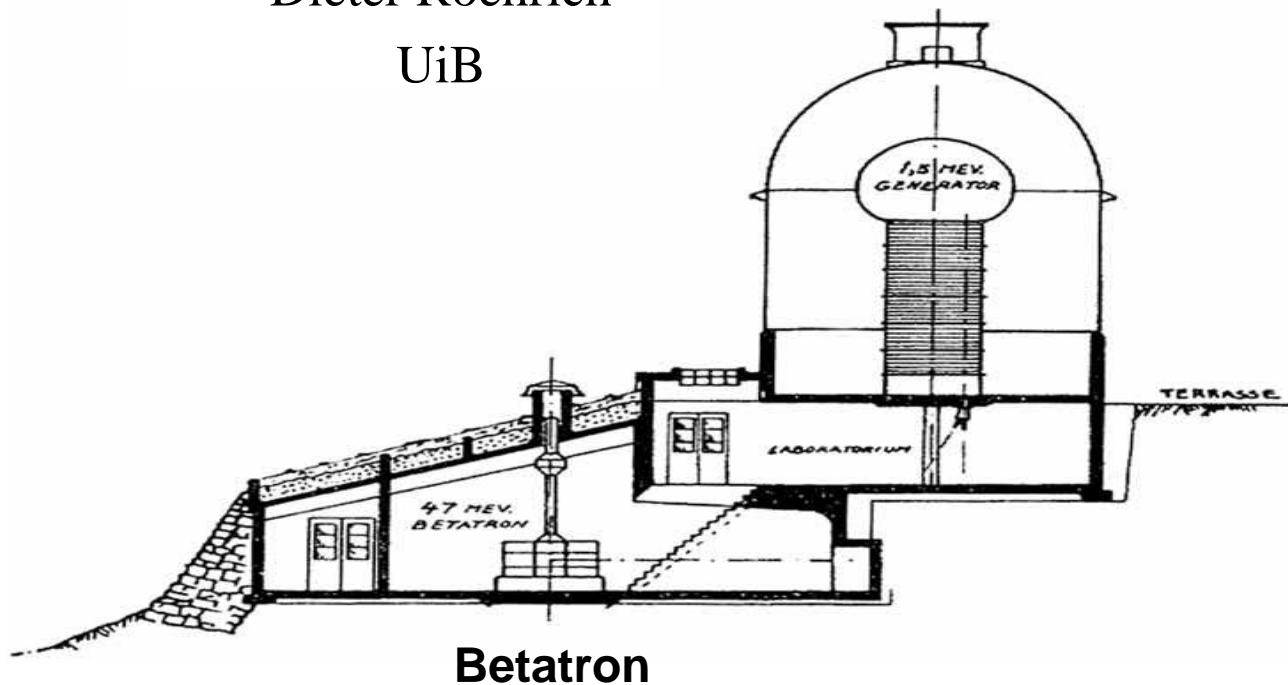


Nuclear Physics @ UiB – from basic research to medical applications

Dieter Roehrich

UiB



Van de Graaff accelerator
@ UiB, 1954

Betatron – a circular induction accelerator

- Rolf Widerøe's PhD, Aachen, 1927

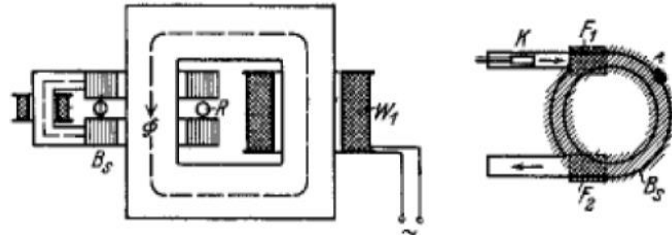
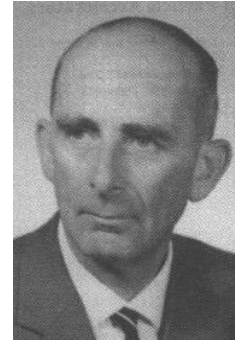


Bild 11. Wirkungsweise des Strahlentransformators.

Die Beschleunigung in Wirbelfeldern würde sehr hohe Spannungen erzeugen können. Das Verfahren scheidet daran, daß die Möglichkeiten fehlen, die Elektronen auf einer Kreisbahn zu binden. Die Lösung dieser Frage scheint zur Zeit große Schwierigkeiten zu bereiten.



Über ein neues Prinzip zur Herstellung hoher Spannungen

Von der Fakultät für Maschinenwissenschaft der Technischen Hochschule zu Aachen

zur Erlangung der Würde eines Doktor-Ingenieurs

angebracht

Dissertation

verfasst von

Rolf Widerøe, Oslo

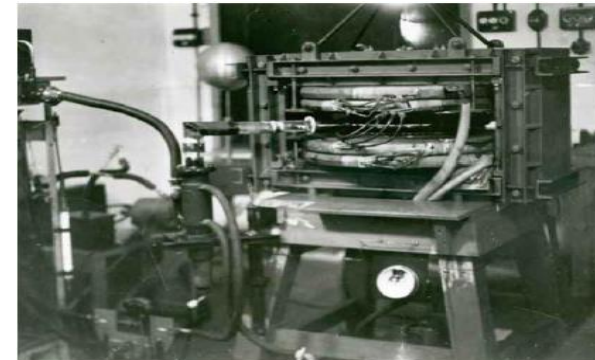
betreut Professor Dr.-Ing. W. Ringwalski
Korreferent Professor Dr. E. Fritze

Tag der mündlichen Prüfung: am 20. Dezember 1927

Sonderdruck aus Archiv für Elektrotechnik 1928, Bd. XXI, Heft 4
(Verlag von Julius Springer, Berlin W 9)

- Did not manage to get it working in 1927 – built the first radio frequency linear accelerator (LINAC) instead

Widerøe's
first (15 MeV)
Betatron
1943-45



Van de Graaff electrostatic accelerator

- **Bergen Van de Graaff**
 - first machine built by Odd Dahl for cancer treatment (1939)
 - first nuclear physics machine (1950)

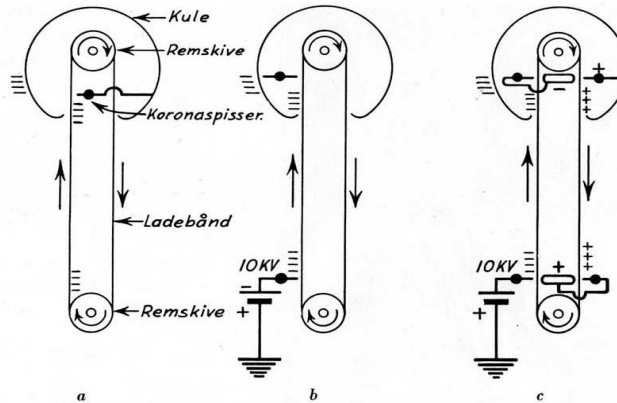


Fig. 1. Prinsippet for elektrostatiske høyspenningsgeneratore. a) Ladningen frembringes ved en gnidningsprosess og tilføres høyspennings Elektroden ved hjelp av et løpende bånd. b) Ladningen frembringes ved at båndet passerer et jonisert område og belegges med joner. Elektroden E har høyspenning i forhold til jord. c) Begge båndparter er aktive. Venstre bånddel tilfører kulen negativ ladning og den høyre transporterer positiv elektrisitet fra kulen til jord.

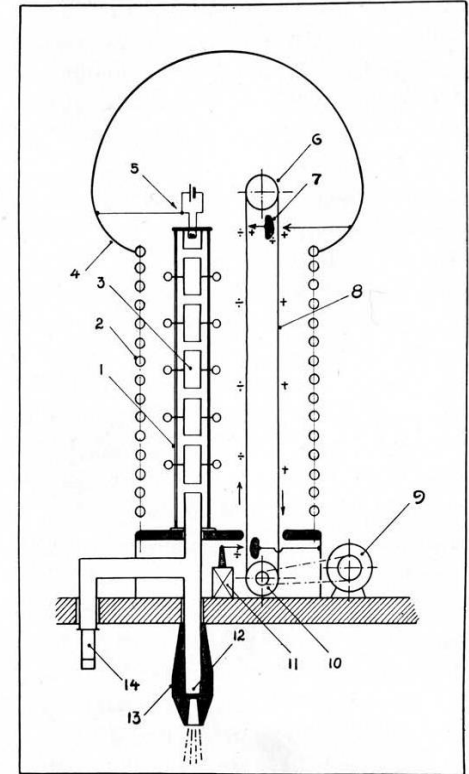
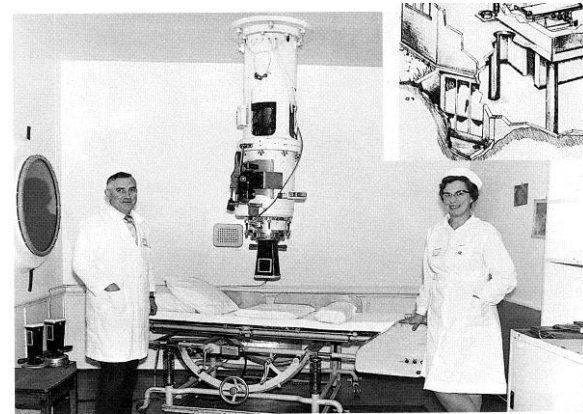
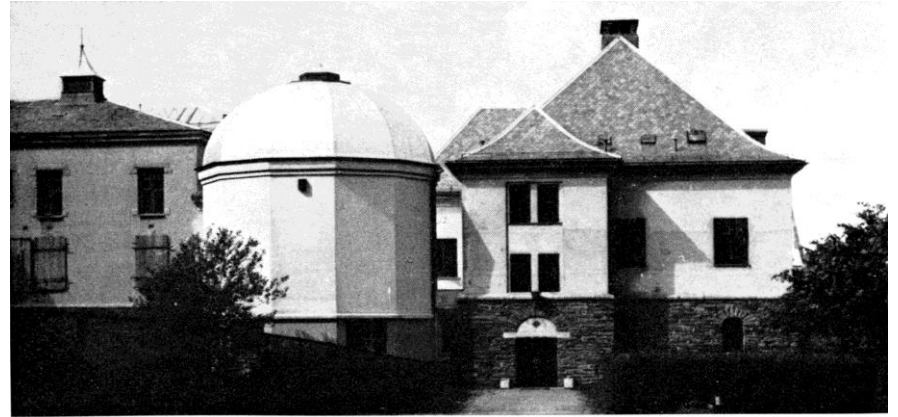
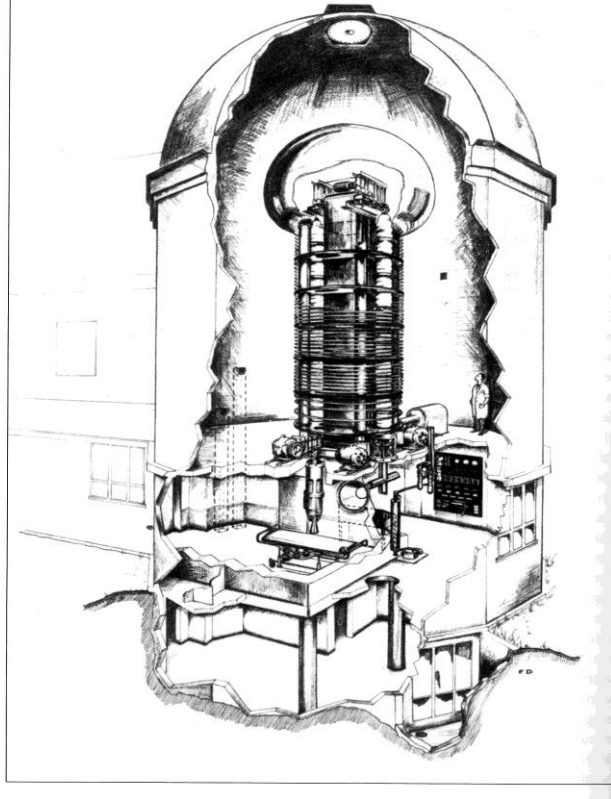


Fig. 7. Skjematiske fremstilling av en karakteristisk elektrostatiske «Super-röntgeninstallasjon».

Van de Graaff accelerator @ HUS

(Figur 1.)



Betatron – inspiration for cyclotron

- Ernest Lawrence at Berkeley, 1932
11-inch proton cyclotron: 1.2 MeV



not being able to read German easily, I merely looked at the diagrams and photographs of Weidner's apparatus and from the various figures in the article readily realized understood ~~the~~ his general approach to the problem - i.e. the multiple acceleration of the positive ions by ^{appropriate} application of radio frequency oscillating voltages to a series of cylindrical electrodes

Bergen proton therapy facility

Føretaksmøtet la til grunn at alternativet med etablering av mindre, regionale protonanlegg er eit godt alternativ for raskt å kunne tilby protonbehandling i Noreg og på lengre sikt mogeleg etablering av eit felles karbonanlegg i Noreg.

**Protokoll frå
føretaksmøte
Helse Vest RHF**

27. september 2013



**Odd Harald Odland
Project leder
proton centre**

Installation and commissioning in 2024