Problems and prospects of the Tandem Accelerator with Vacuum Insulation


Budker Institute of Nuclear Physics
high rate of acceleration – 25 keV/cm

accelerator

$H^-$ source

2 MeV protons

$1 \text{ m}$
1\textsuperscript{st} specific problem

- high-voltage strength gaps due to the large stored energy

- Happy breakdowns at stored energy of 50 J did not lead to the gaps detraining

- Happy required voltage of 1 MV has been obtained
strong input electrostatic lens

😊 acceleration of the ion beam without significant losses
Energy – $2 \pm 0.002$ MeV
Current – $1.6 \pm 0.007$ mA
Duration – more 1 h

$I$ – начало подачи газа в обдирочную мишень с частотой открывания клапана 1/10 Гц, 2 – 1/7 Гц, 3 – 1/5 Гц; 4 – пробой по полному напряжению, 5 – выключение подачи газа, 6 – выключение источника
Energy – 2 ± 0.002 MeV
Current – 1.6 ± 0.007 mA
Duration – more 1 hour
Fluxes of charged particles in accelerating gaps
Not good enough vacuum conditions in the beginning of the acceleration of the ion beam
Current in accelerating gap

$I, \text{мкА} \quad 2500$

$P, \text{Pa}$

1 – with cryopump
2 – without cryopump

3rd common problem
Dose rate

$D$, мкЗв/ч

$D$, мкЗв/ч vs $I$, мкА

3rd common problem
Глава 1. Ускоритель …

1.6. Экспериментальное …

Current of positive ions

1– внутренний диск
2 – внешний диск
3 – сетка
4 – инжекционное отверстие

1– ток на внутренний диск
2 – ток на внешний диск
3 – ток ионного пучка на выходе (уменьшен в 10 раз)
Fluxes of charged particles in accelerating gaps

- to install a cooling aperture and to put a cryopump at the input of the accelerator
- to reduce the gas flow to the accelerating gap from the stripper:
  + to tilt the stripper
  + to put the turbo molecular pump inside the high-voltage electrode
We propose a radical improvement of the accelerator concept. It is proposed to abandon the separate placement of the accelerator and the power supply and connecting them through the bushing insulator.
Prospects

The aim:

😊 2.5 MeV 3 mA 1 h proton beam
😊 BNCT