A Prototype Compact Accelerator-based Neutron Source (CANS) for Canada

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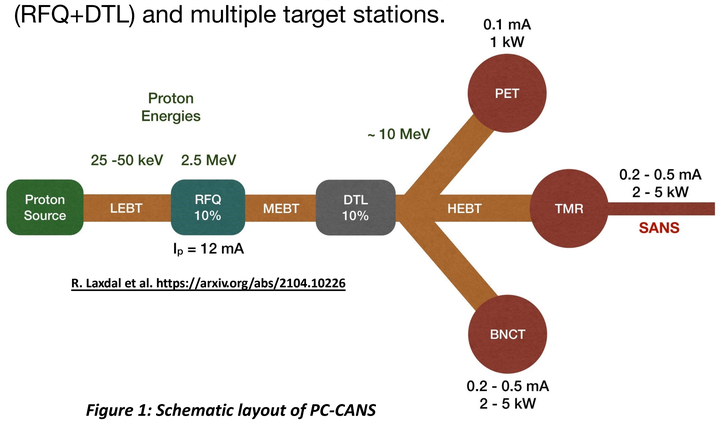
INTRODUCTION

- TRIUMF, in collaboration with the University of Windsor and the Canadian neutron community is engaged in the design of the PC-CANS.
- PC-CANS will be located at the University of Windsor and will produce neutrons for science and BNCT, and PET isotopes.
- PC-CANS is based on a high intensity linear accelerator (RFQ+DTL) and multiple target stations.



R. Laxdal et al. https://arxiv.org/abs/2104.10226

Figure 1: Schematic layout of PC-CANS

LINAC DESIGN

- Beam dynamics design studies are being done assuming a peak current of 20mA with a strawman frequency of 352MHz.
- The RFQ accelerates unbunched proton beam from source potential to 3MeV with high transmission – beam dynamics studies with PARMTEQ are in progress.
- The DTL will accelerate bunched proton beams from 3MeV to 10MeV – multi-particle simulations in PARMILA code are in progress – both Alvarez and CH structures are being considered.
- A pulsed switchyard is envisaged to take the ~100-500Hz pulses from the LINAC and distribute them to three beamlines. The pulse selection would be by fast kicker and septum magnets.

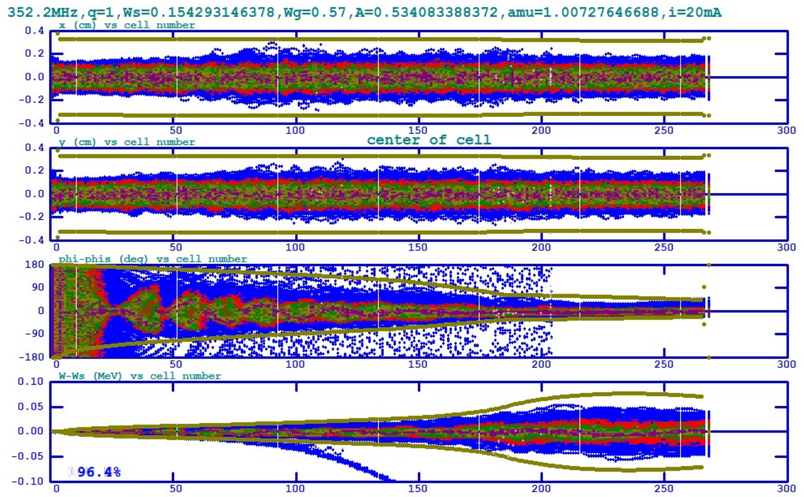


Figure 2: Transport through the RFQ: beam profiles in x,y, φ - φs, and W - Ws vs cell number, in PARMTEQ

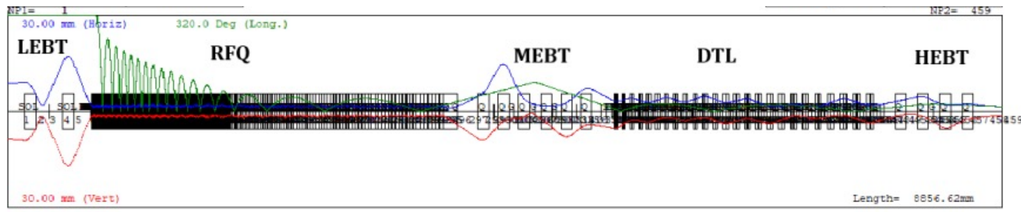


Figure 3: End to end simulation of p-LINAC in Trace-3D code

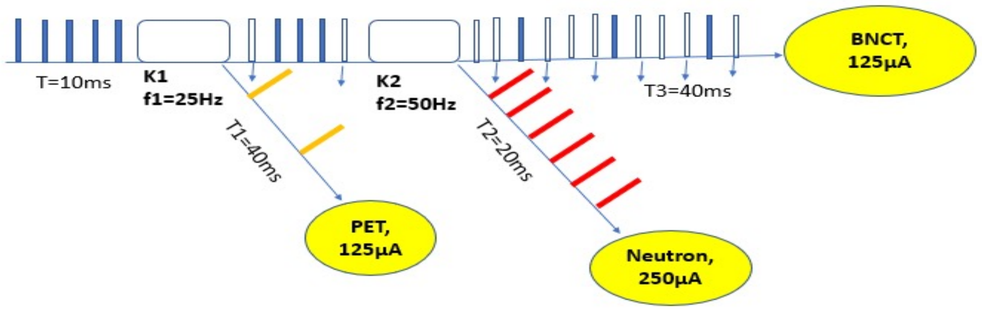
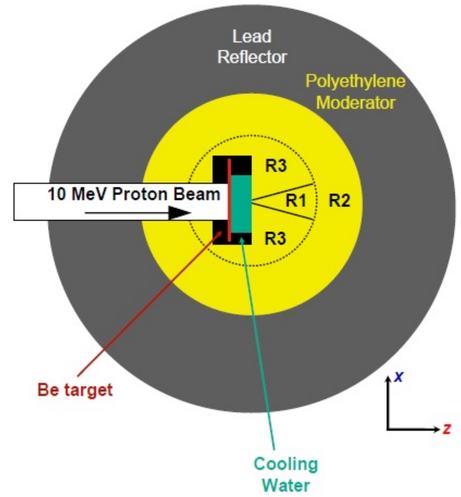


Figure 4: Multiplexer design in the HEBT section

TARGET STATION DESIGN



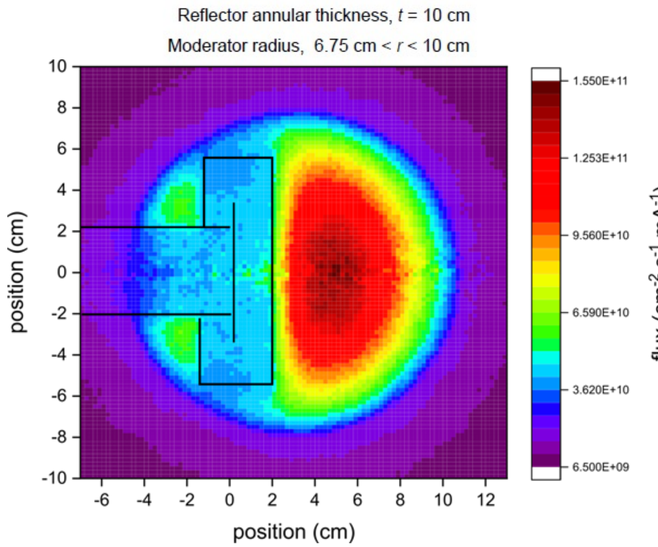


Figure 5: Target simulations design are in progress.

Discovery, accelerated