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Summary of the Session on:

Future of TRIUMF Cyclotron

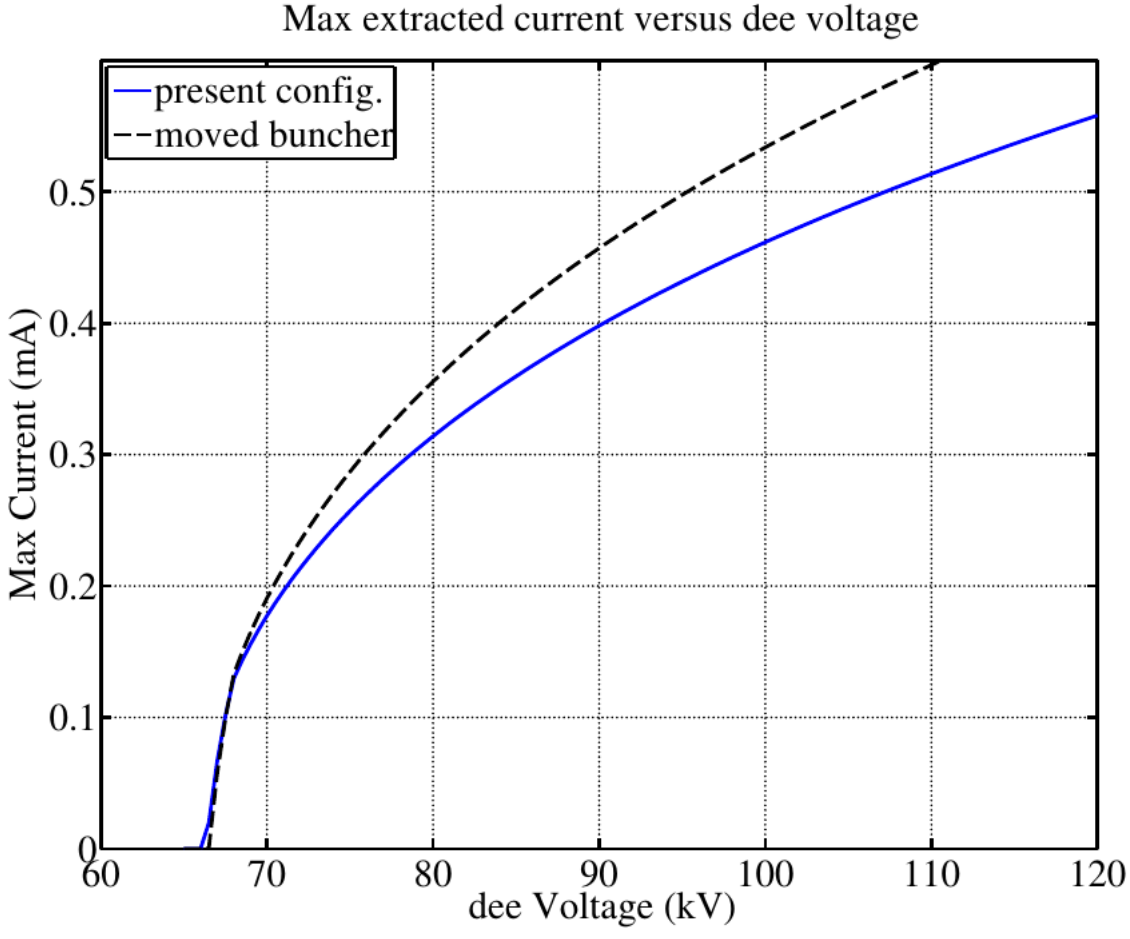
Future of Cyclotrons at TRIUMF

Thomas Planche

Rick Baartman

Path towards 500 μA output from the 500 MeV cyclotron:

$500\,\mu$A average at 90% pulser requires $550\,\mu$A in pulse and therefore at least $V_D \sim 110\,$kV



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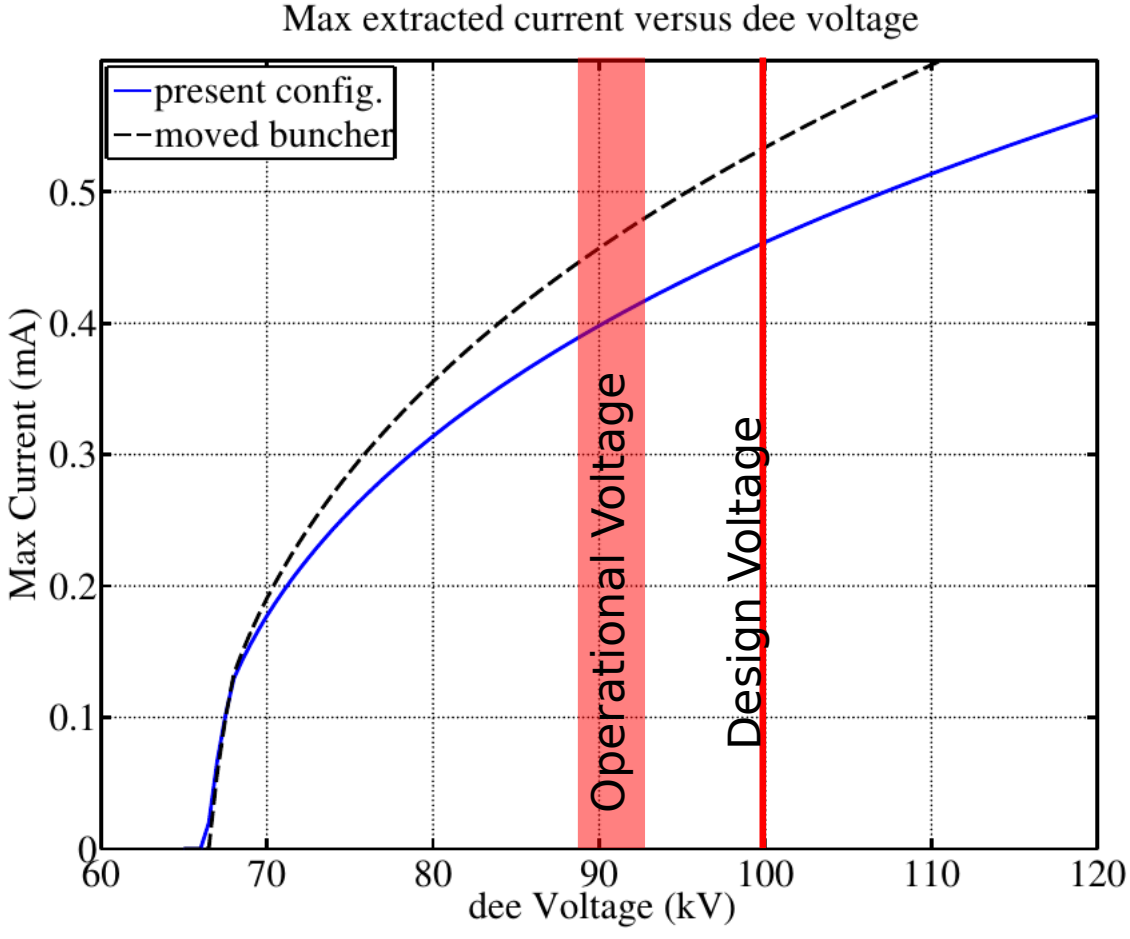
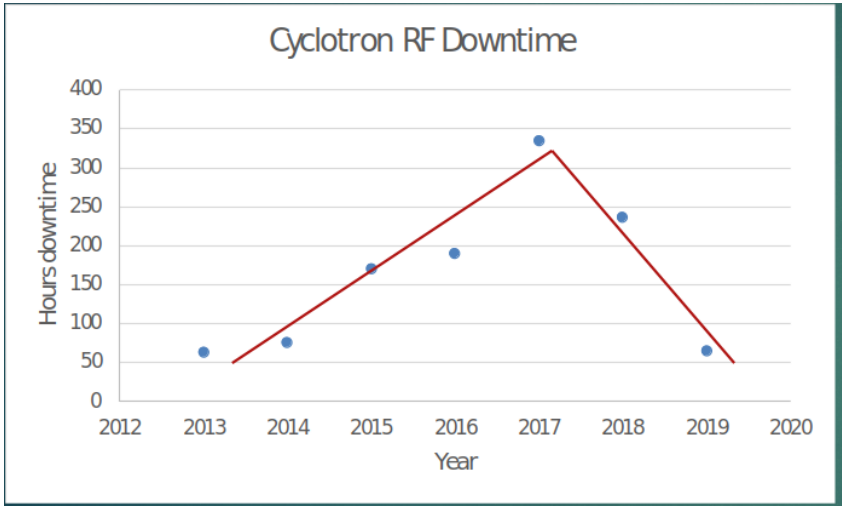


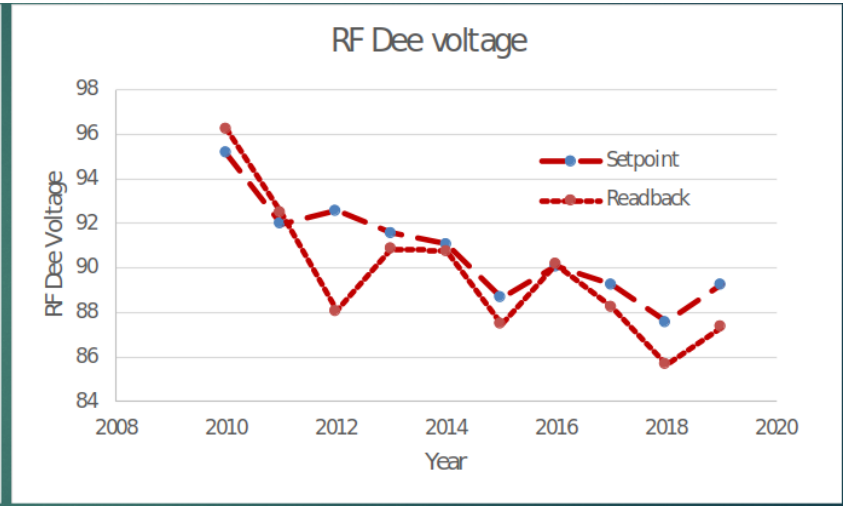
Discussion Summary

- What is our goal? 400 μA will be required when BL4N comes online. 500 μA is attainable if there is a need ($$).
- Gain is a non-linear function of the RF Dee voltage.
- Ultimate limit outside of the graph, somewhere around 3/4 of a mA).
- Redesign of the Bunching System – a highly non-linear space-charge problem – can be part of the horizontal section upgrade.
- Discussed further hardware required for high-power: tuning dump, water-cooled flags, etc.

Vladimir Zvyagintsev

Cyclotron rf performance over the past decade:





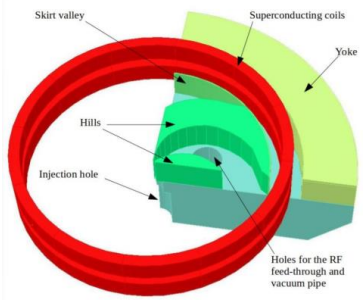
Vladimir Zvyagintsev + Discussions

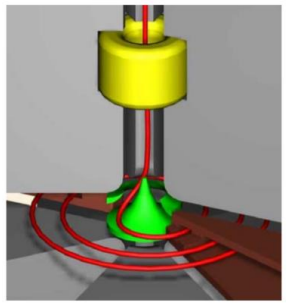
Path towards 100 kV:

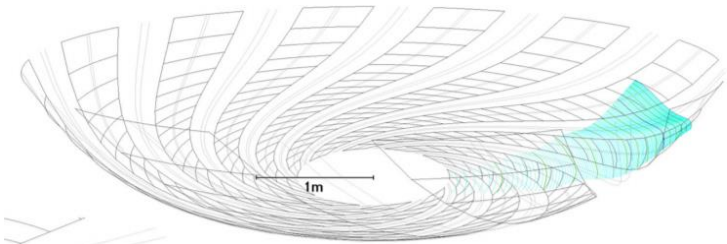
- Voltage limitation from RF sparks in the resonator
- Going back to reliable operation at 95 kV: requires work on the rf fast protection (Ramona).
- Requires dedicated RF development time, and possibly extra diagnostics.
- Requires hardware investment (several 100 k$), some of it is covered in the 5YP, but not all.

Cyclotron Center of Excellence

- Design a H_2^+ compact cyclotron, in which beam could be stripping extracted with very high efficiency.
- Study novel injection method to achieve high intensity and high energy beam injection, like high intensity inner ion source, magnetic inflector[1] and central region with permanent magnets.
- Explore the feasibility of the 3D cyclotron[2], which promises a CW acceleration above 1 GeV using a compact cyclotron.







1. William Kleeven, CAS 2013
2. Stephen Brooks, IPAC'14

Discussion Summary

- Our objective design and eventually build a 100 to 150 MeV H2+ cyclotron (if investors can be found).
- Although we have identified possible international partners and sources of funding, we should look for more partners.

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Thank you
Merci