SPACE CHARGE AND ELECTRON CONFINEMENT IN HIGH CURRENT LOW ENERGY TRANSPORT LINES: EXPERIENCE AND SIMULATIONS FROM IFMIF/EVEDA AND ESS COMMISSIONING

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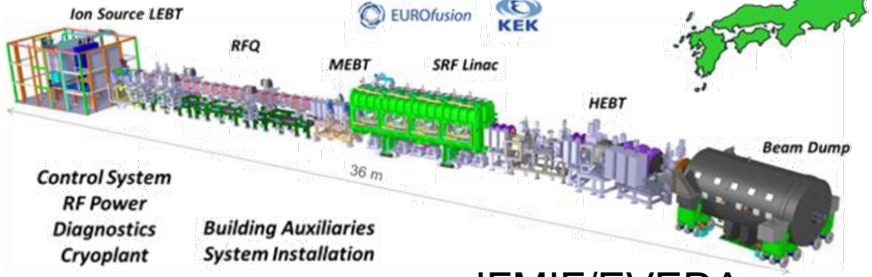
- The two high intensity positive light ions facilities
- General behavior of the phenomena and IFMIF/EVEDA experience with RFQ repeller
- ESS experience with source repeller
- Conclusions

The two facilities



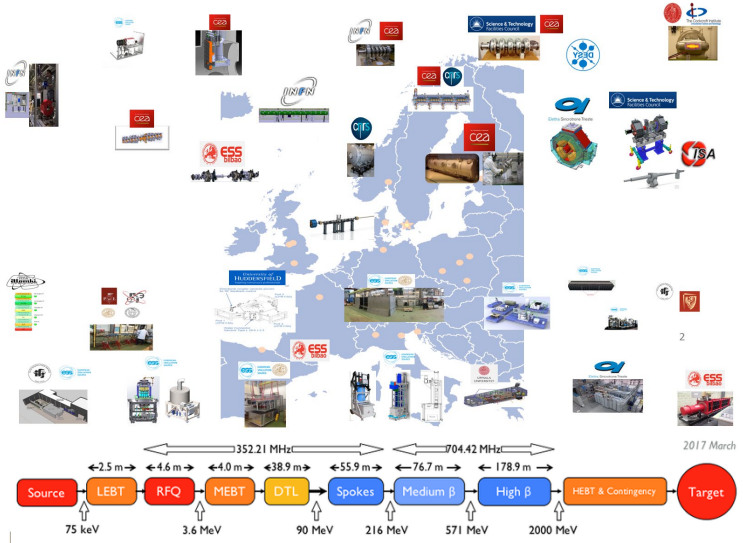
IFMIF/EVEDA

paper TU2AA04, K. Masuda "Commissioning of IFMIF Prototype Accelerator towards CW operation"

IFMIF-DONES

paper TUPOJO01, I. Podadera, "Commissioning plan of the IFMIF-DONES accelerator"

125 mA D^+ @ 40 MeV, CW

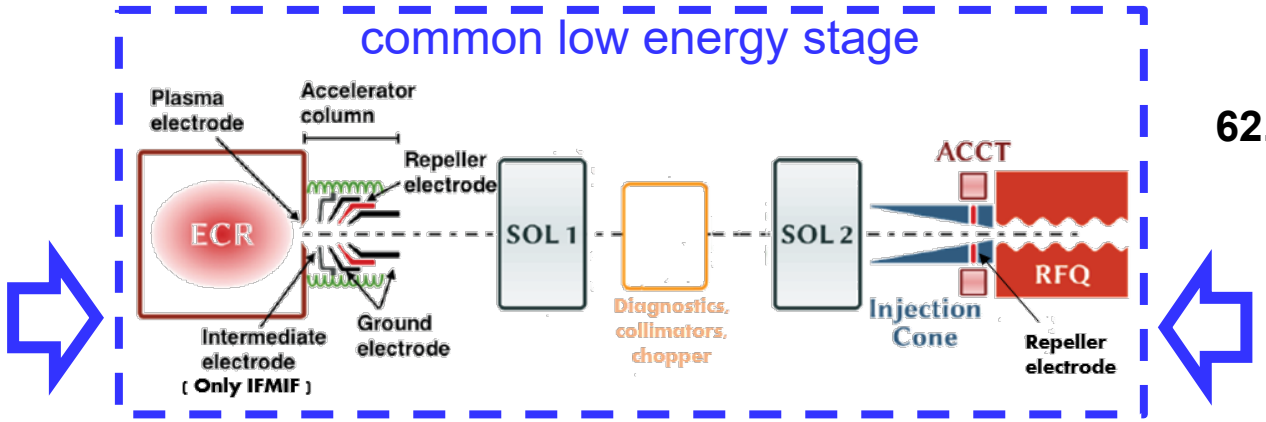


paper MO1PA02, R. Miryamoto, "Beam commissioning of normal conducting part and status of ESS project"

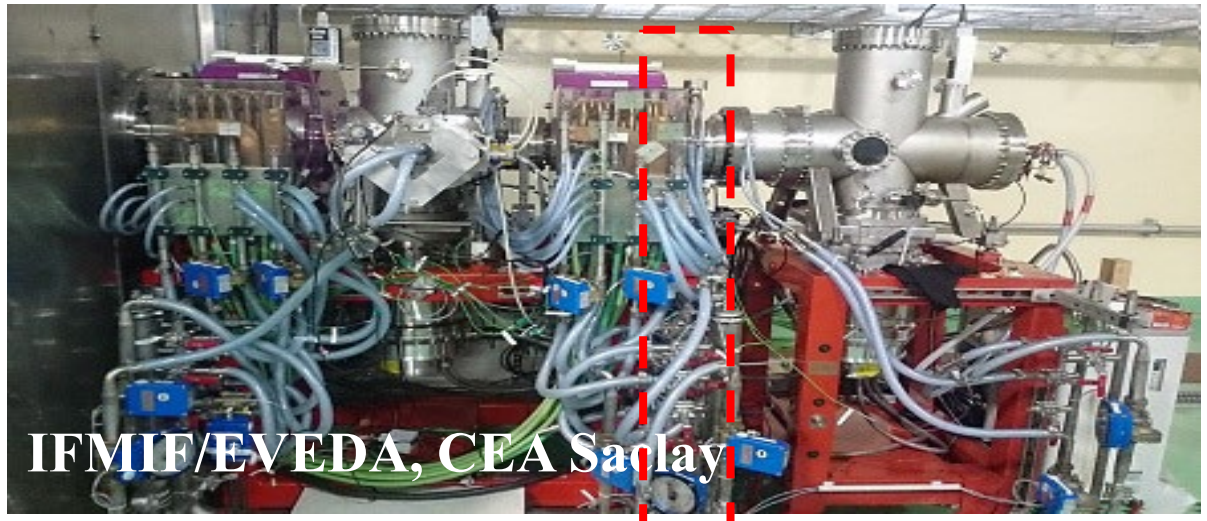
paper TUOPA01, B. Jones, "Beam Commissioning to 21.3 MeV at the European Spallation Source"

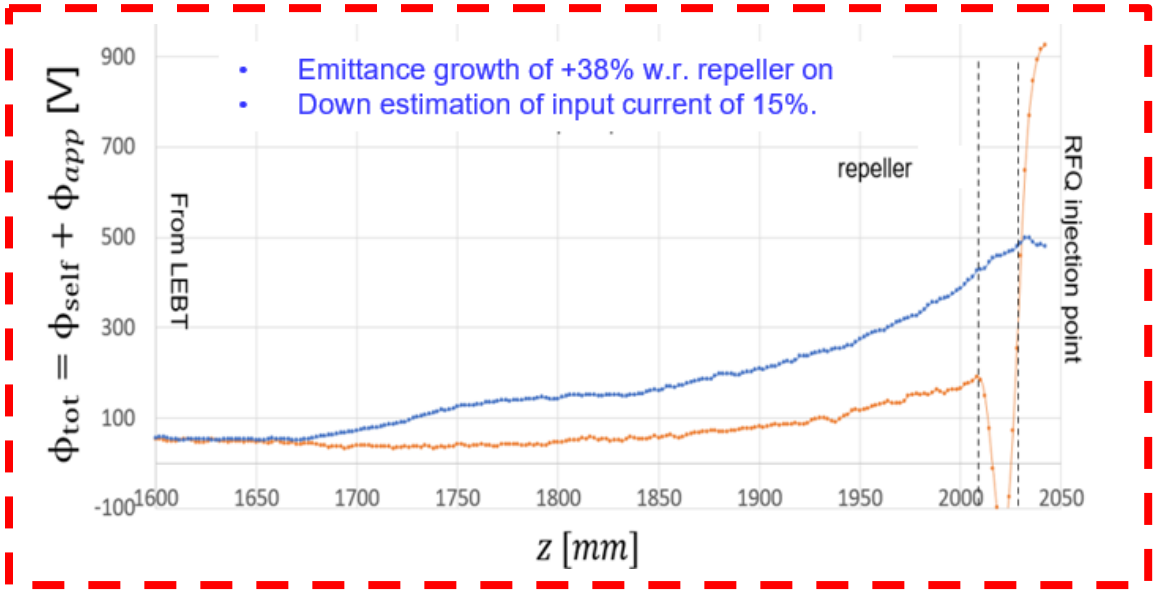
ESS facility

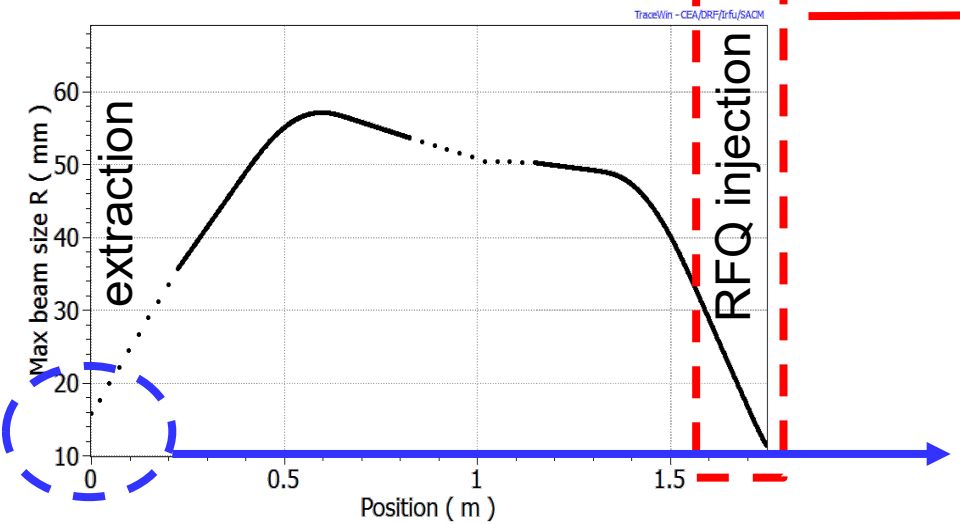
62.5 mA H^+ @ 2000 MeV, 4% D.C.

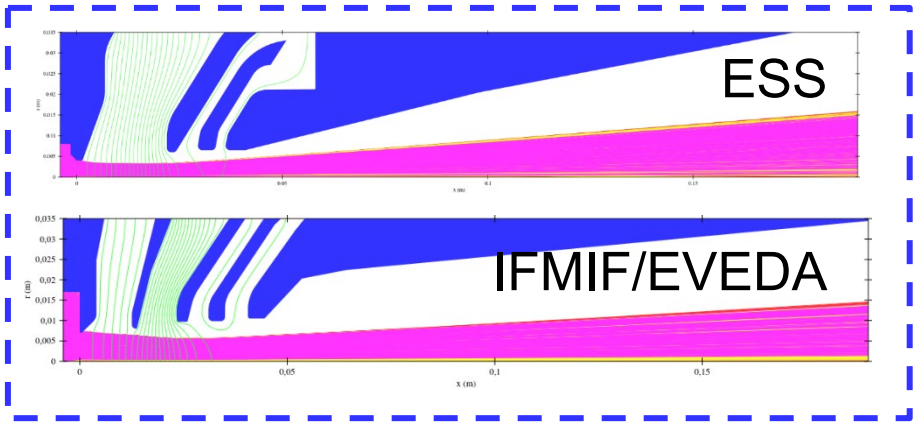


General behavior and IFMIF/EVEDA experience with RFQ repeller







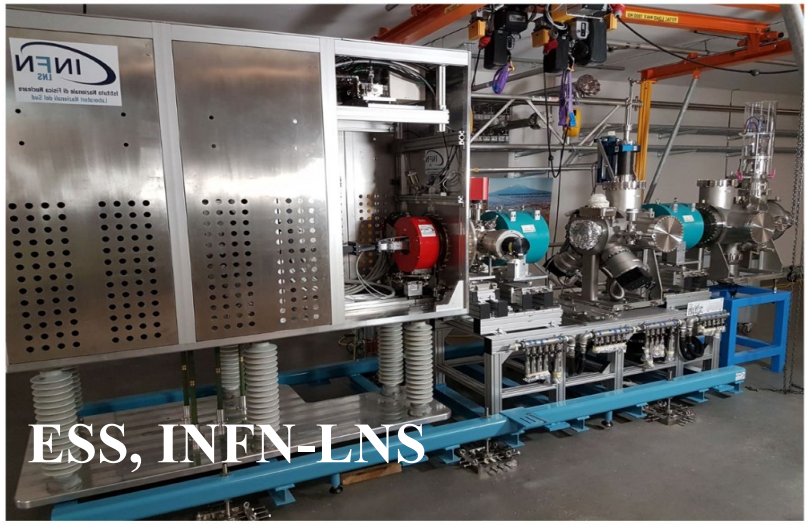


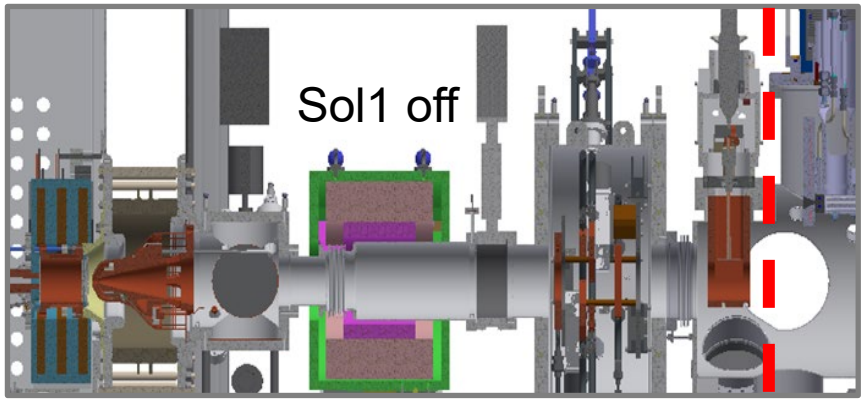
Systematic measurements for ESS LEBT repeller shown in **paper TUPOPA04, D. Noll "First Beam Matching and Transmission studied on the ESS RFQ"**

Self-field potential has a maximum in two points:

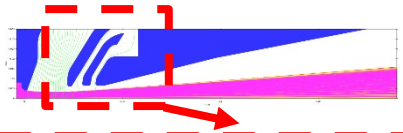
- At extraction
- At RFQ injection

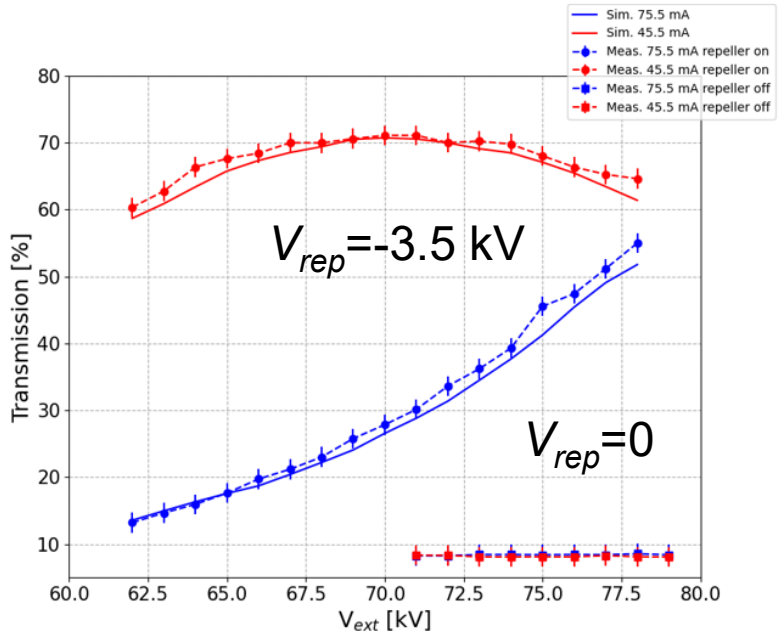
ESS experience with source repeller

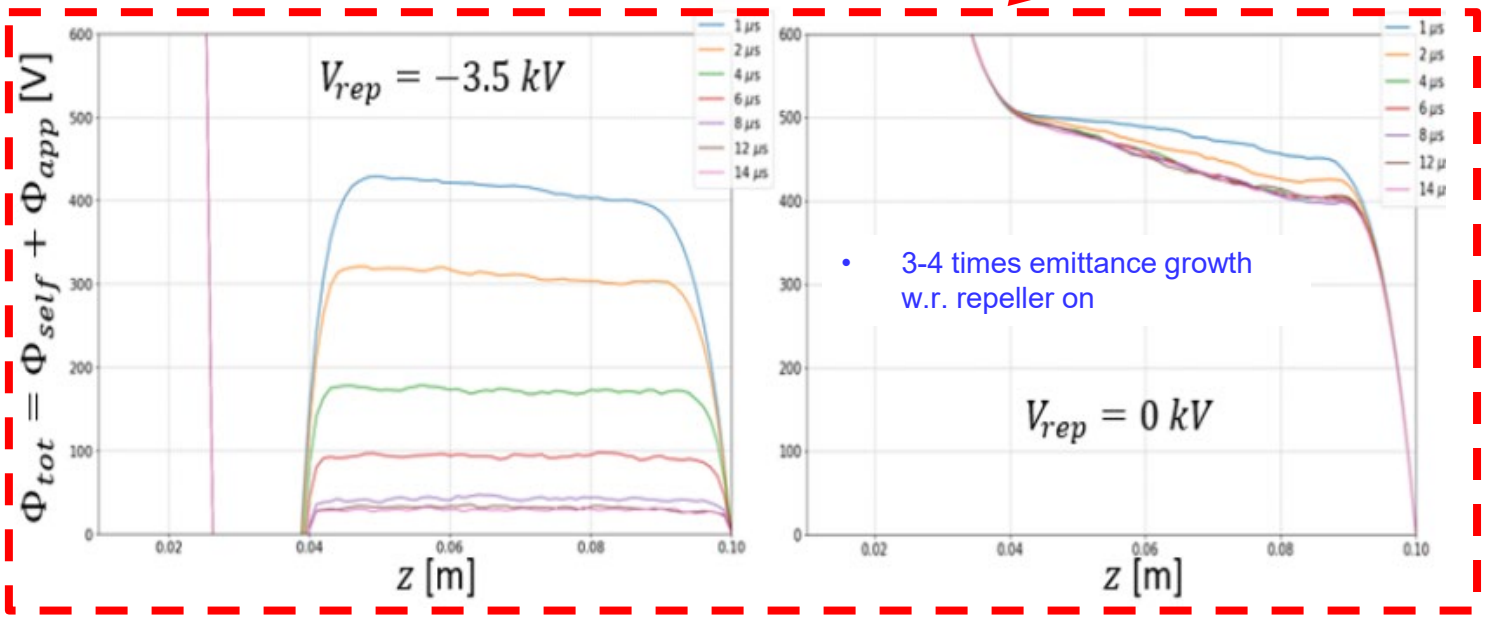




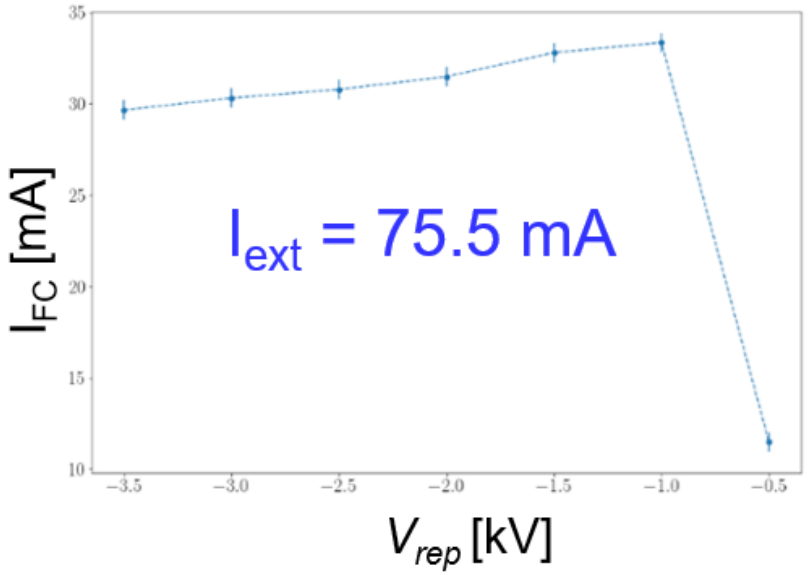
FC







- 3-4 times emittance growth w.r. repeller on



Conclusions

- Repellers play an essential role in the space-charge compensation of the LEBT, disrupting the electron flows that can compromise that.
- Fine tuning their values can boost the performances of the low energy stage

Thanks to LIPAc and ESS teams

Thank you for your attention