

Requirements of the ESS BLM



**EUROPEAN
SPALLATION
SOURCE**

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CERN, Geneva, 18 Oct. 2011

ESS:

Ion source

Linac

Target

Neutron instruments

5 MW average power

2.5 GeV protons

2.86 ms pulse

50 mA pulse current

14 Hz repetition rate

- similar to SNS, but higher
power and long pulse.

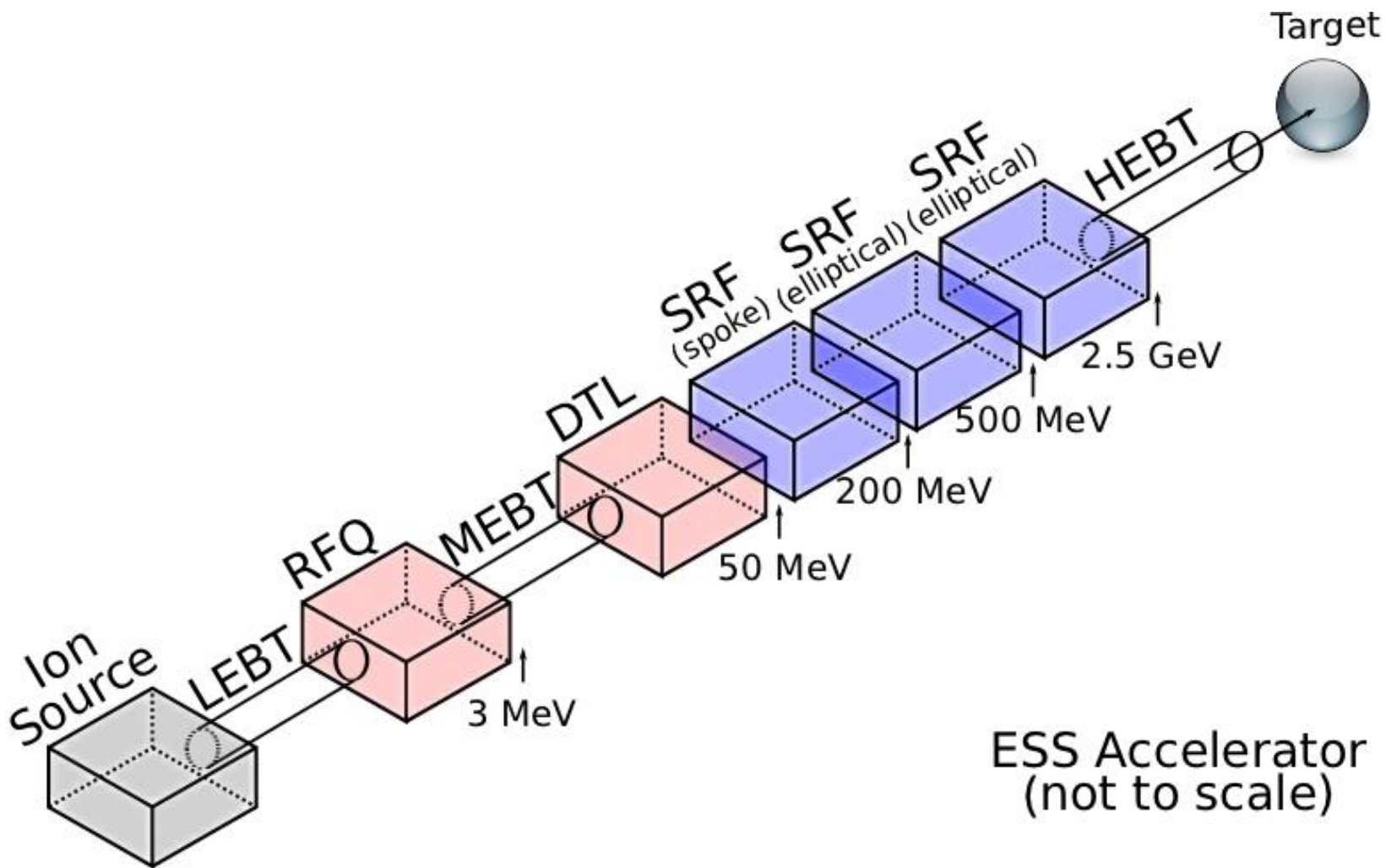
Max-IV

ESS



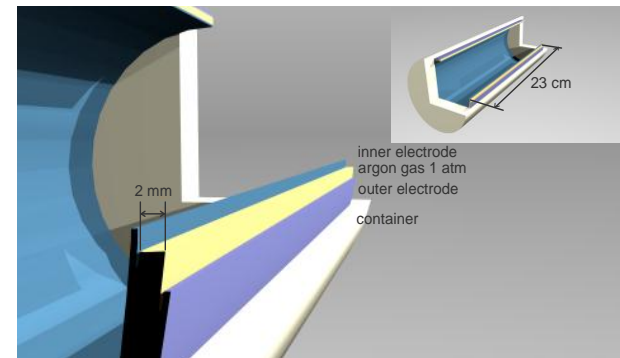
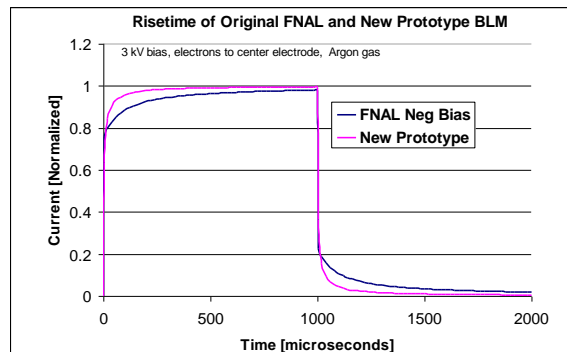


The ESS



BLM requirements

- BLM should produce a beam abort signal in less than $2 \mu\text{s}$.
 - Faster than SNS detector is needed (?);
 - We've redesigned the current SNS ionization chamber (shorter gap in between the electrodes) to achieve faster ion collection time;
 - Prototype quoting/ordering under process;
 - Will test and compare the SNS, LHC and the prototype ionization chamber charge collection times as soon as we get all three;



- DR – large enough to detect slow signals, yet not saturate at high losses.
 - 1 W/m (at 1 foot) -> 100 mR/h beam-off dose rate -> 100 R/h beam-on dose rates!
 - 2 mR/pulse -> 0.69 R/sec during 2.86 msec pulse.
 - @ SNS they never use more than 1000.
- Sensitivity - 70 nA/R/s (or even less) is probably enough.

Cryogenic requirements

- A hybrid design of a cryostat is foreseen for ESS.
 - an operating loss detector might be needed at 70 K / 2 K!

- Physical size of the detector should not be very small – to cover a “large” part of the loss area.