Symmetry Tests in Experiments with Portable Antiprotons

Objectives:

Relocation of antiproton precision measurements into a calm measurement environment

Improve single-particle antiproton measurements of the BASE collaboration

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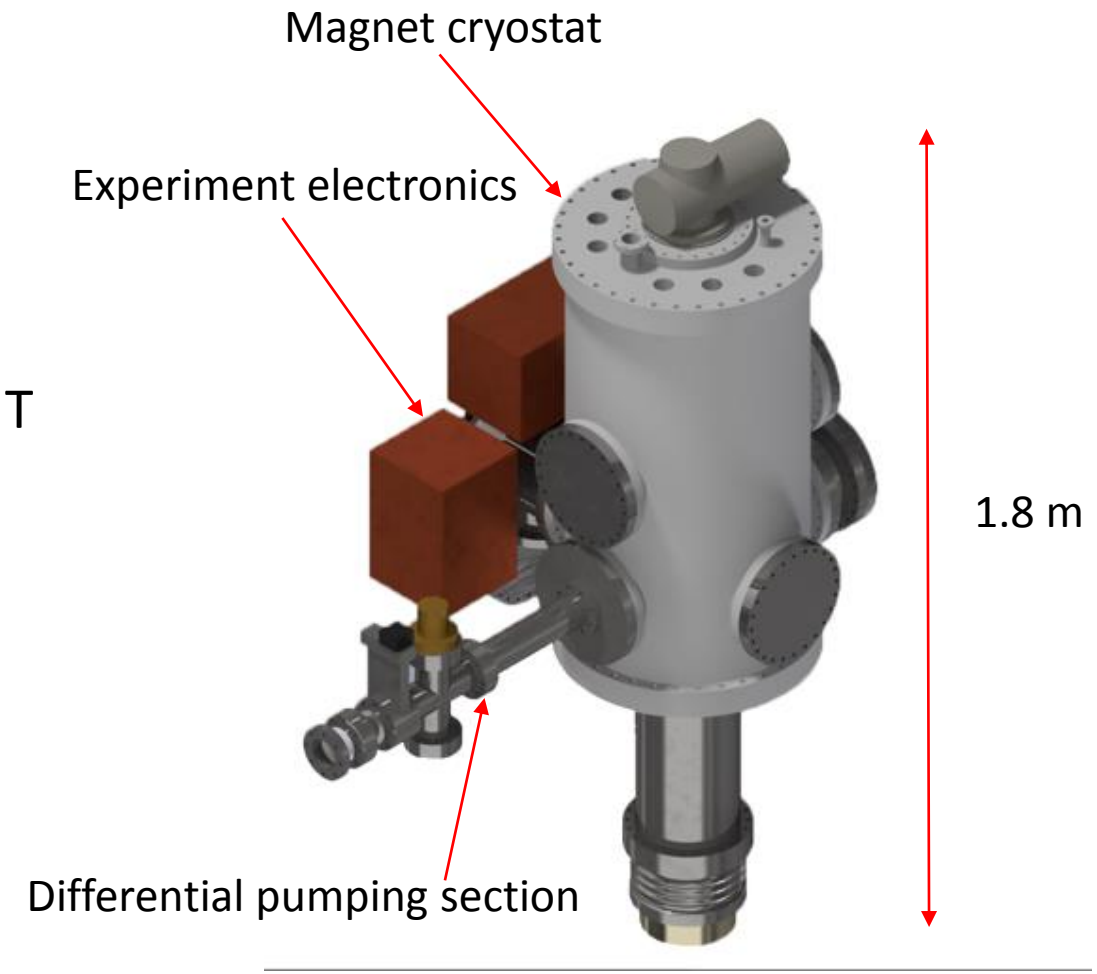
Contract Researcher at RIKEN

Design status of the transportable trap

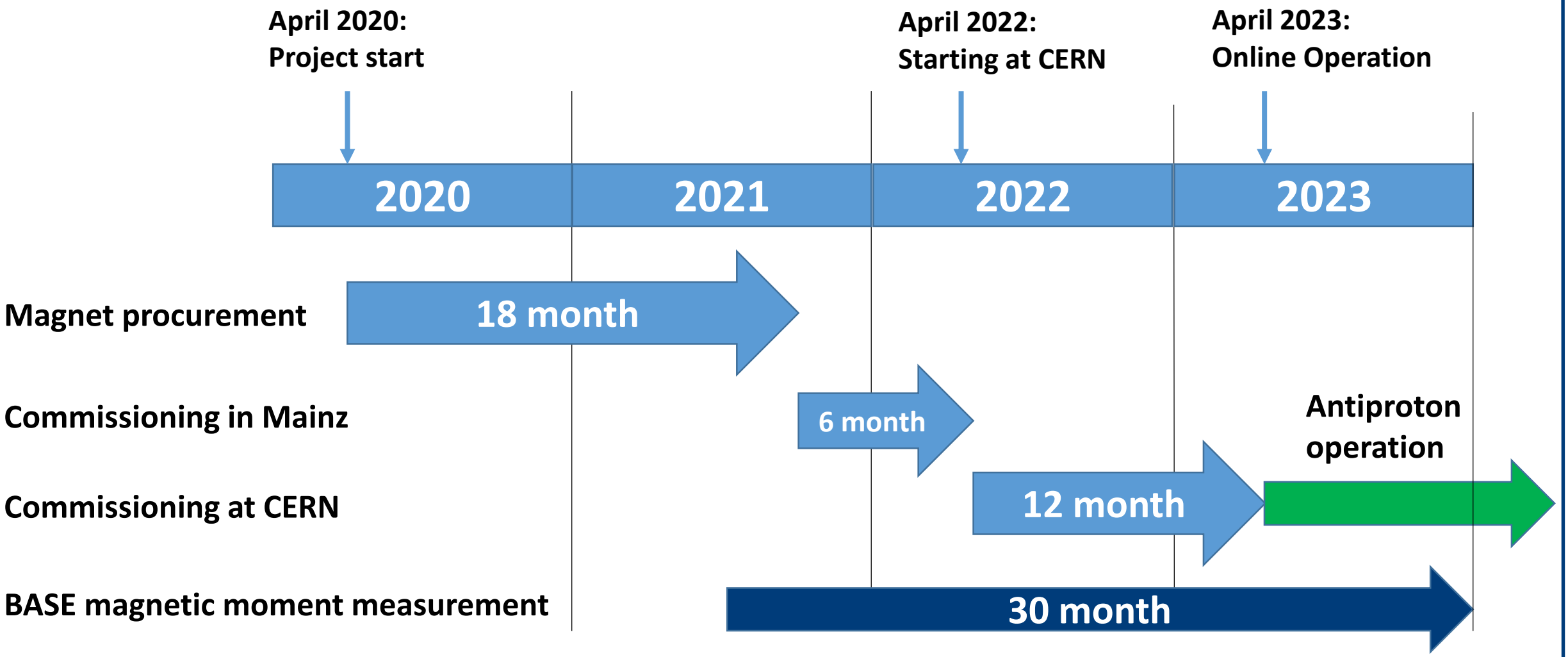
- Portable reservoir trap containing 100 to 10000 antiprotons
- Supplies non-destructive single-particle experiments with the reservoir trap technique

- „Compact“ design: 10 cm cold bore magnet with 1 T
- Weight below 1000 kg
- One cryocooler (10 kW power) + 8 h LHe buffer

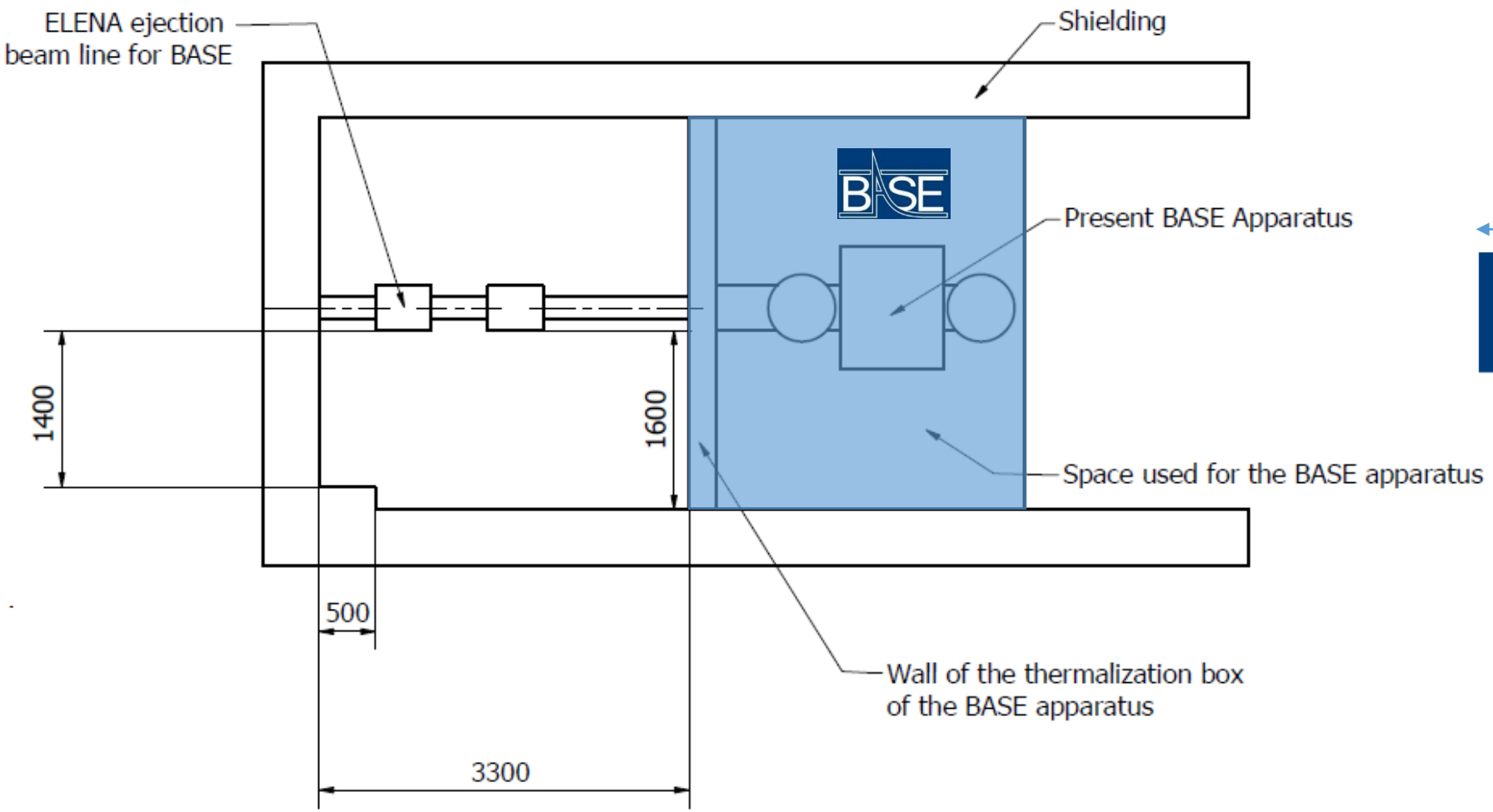
- Requires cooling water for the compressor
- Emergency power connection desired
- Requires differential pumping section with inlet pressure on the 10^{-11} mbar level

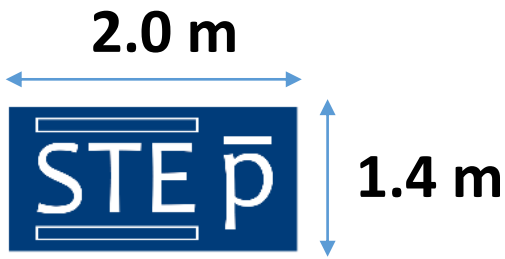


Project plan: antiproton transport before LS3



Where can we load antiprotons?





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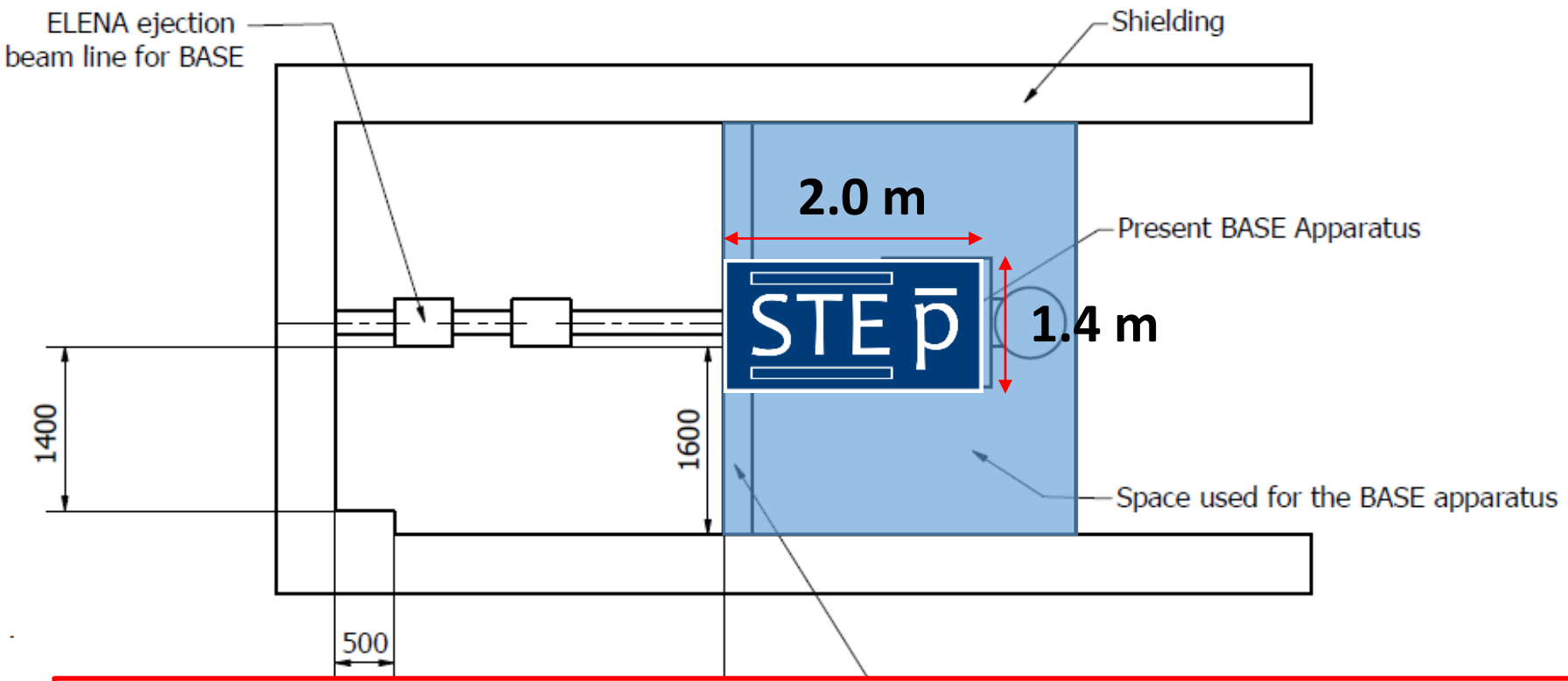
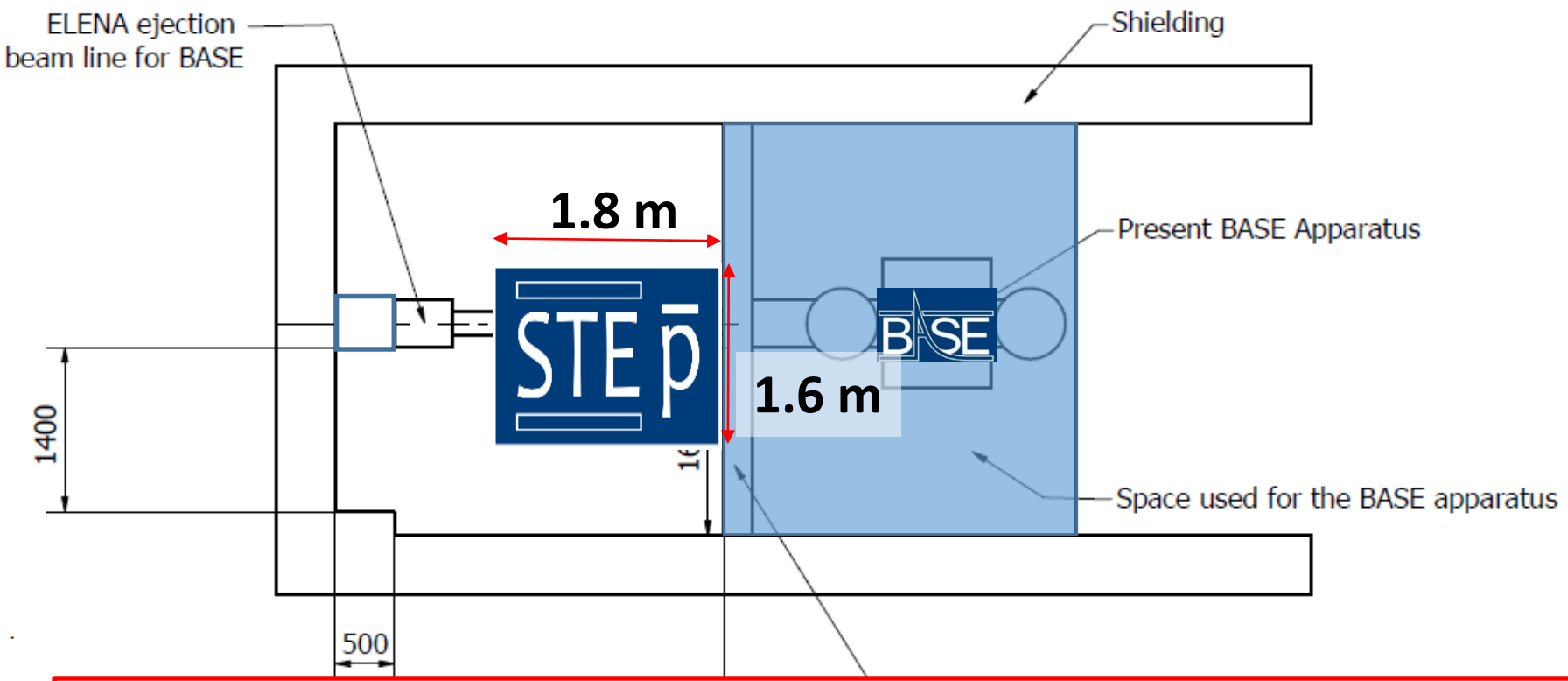


Interference with BASE physics program

Earliest implementation of STEP after the next magnetic moment measurement

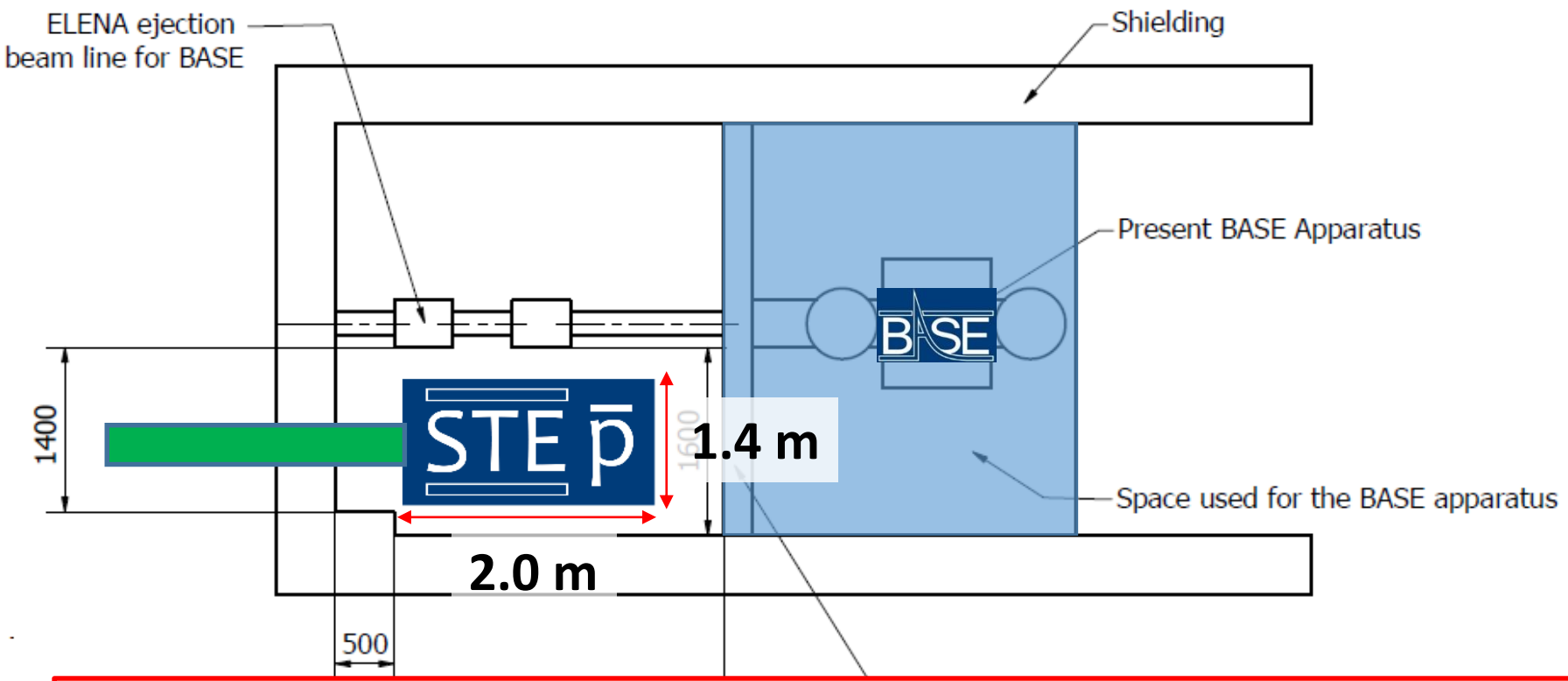
Where can we load antiprotons?



Move ELENA beamline elements further upstream?

Transportable trap assembly compact in length

Where can we load antiprotons?



Have a second extraction beamline in the BASE area?

Independent operation of the BASE and STEP trap systems

Thanks & Conclusions

- Improve precision measurements of antiprotons by providing a more stable magnetic field and noise environment
- Long-term plan to operate antiproton experiments in a CERN offline laboratory and in collaborating institutes

- STEP core team:
  Steffen Gravanovic (MS), Daniel Popper (MS), Christian Smorra (PI)
  Open PhD positions
- Support by the BASE collaboration, Stefan Ulmer, Klaus Blaum, Jochen Walz
- Funding:

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