ELENA transfer lines studies

TE-ABT-BTP

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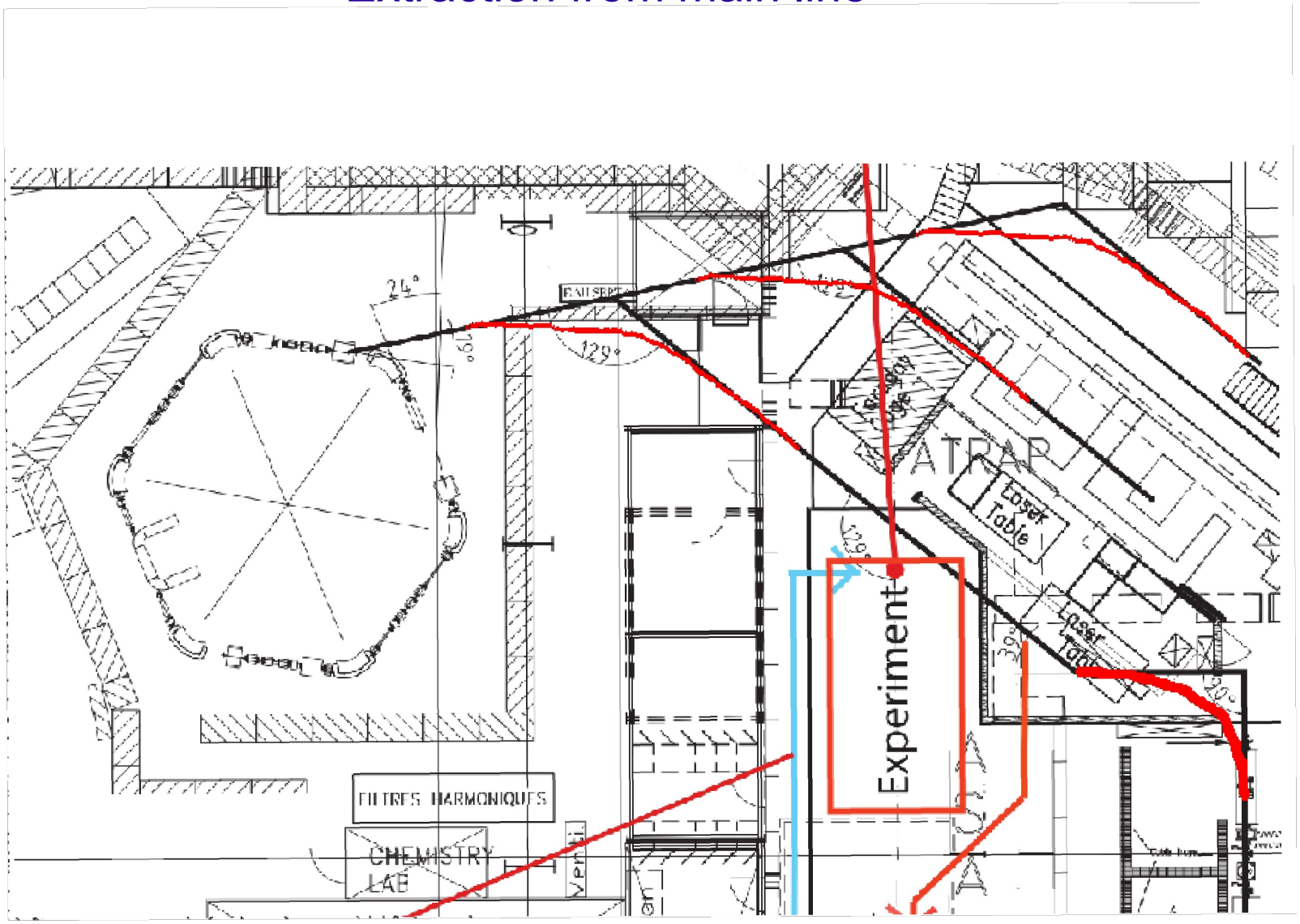
Geometry

- In total about 62 m of transfer lines (excluding Gbar).
- 5 large horizontal bending angles of 51º.
- 2 large vertical bending angles of 90º for ATRAP experiment.
- 4/5 “switch-yards”.

Geometry

Extraction from main line

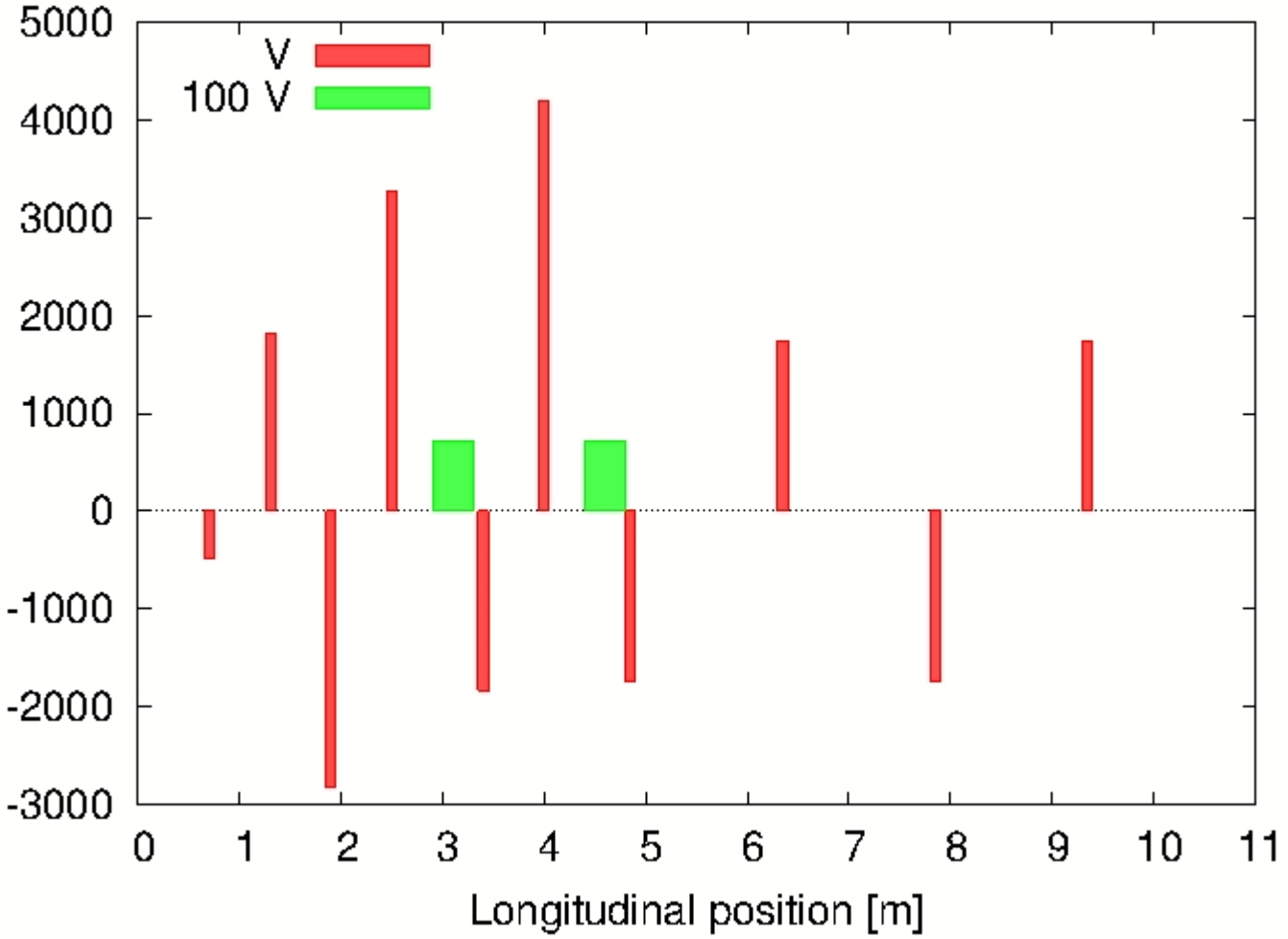


Geometry

- Possible constraints:
  - ALPHA
  - ASACUSA 1
  - Additional experiment (Zone LNE01)
  - ATRAP 1 & 2(?) (height of focal point)

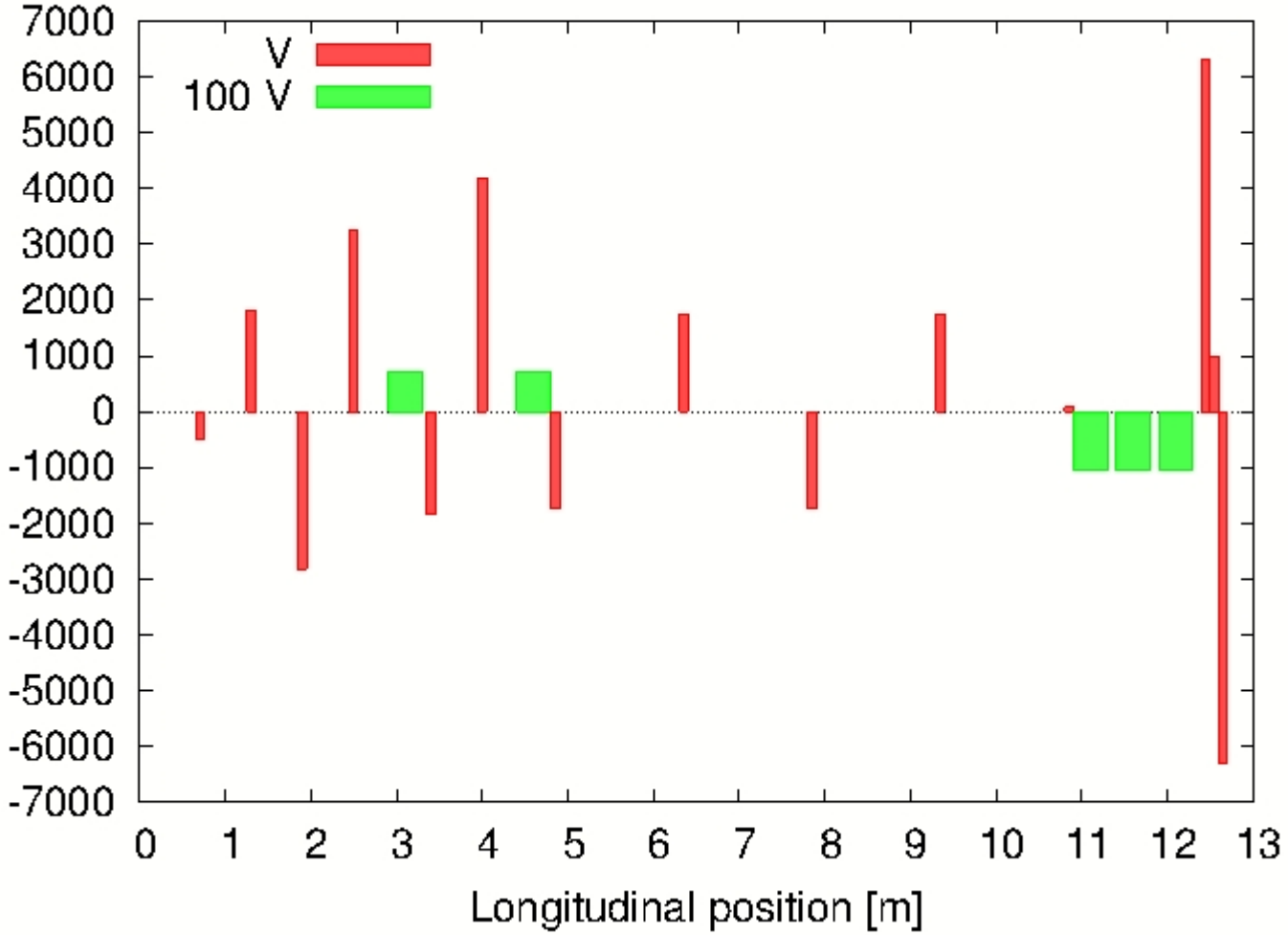
Layout

Current extraction line (ASACUSA, ATRAP, AEGIS)



Layout

Vertical line to ATRAP



Aperture considerations

- Aperture guideline:
  - 200 mm diameter pipe dimension.
- Electrode distance:
  - 60 mm
  - Has to be investigated if we can keep it with the high momentum spread.
- Sensitivity studies on field, alignment errors and magnetic stray fields will define these values

Power converters

(preliminary)

- Dipoles (n=~30,L=40 cm):
  - ~6 bends for two vertical lines of ATRAP.
  - ~24 bends for lines ASACUSA, ATRAP, AEGIS, ALPHA.
  - Voltage range between 9 kV and 20 kV (for 1 m bend).
  - Any limit on power converters (20 kV reasonable?)
- Orbit correctors (n=~60,L=~10 cm):
  - ~30 orbit correctors in the FODO cells (~15 per plane).
  - ~30 orbit correctors in the matching and triplet sections (~15 per plane).

Power converters
(preliminary)

- Quadrupoles (n=~66,L=10cm):
  - ~30 quadrupoles at a Voltage of ~1700 V.
  - ~18 quadrupoles for matching sections (Voltage range between 400 V and 5000 V).
  - ~6 triplet assemblies (Voltage range between 800 V and 7000 V).
  - Any limit on power converters (>15 kV?).

Conclusions

- Basic geometry has been defined:
  - Some constraints are identified.
  - Has to be explored if ALPHA can go under ATRAP. Depending on the magnetic measurements.
  - Dense population of elements near matching sections and triplets/bends.
    - > Need to carefully look into space for vacuum pumps.
- Basic count for number dipoles, quadrupoles and orbit correctors.