

# LhARA Stage 1 Optimization

William Shields  
([william.shields@rhul.ac.uk](mailto:william.shields@rhul.ac.uk))

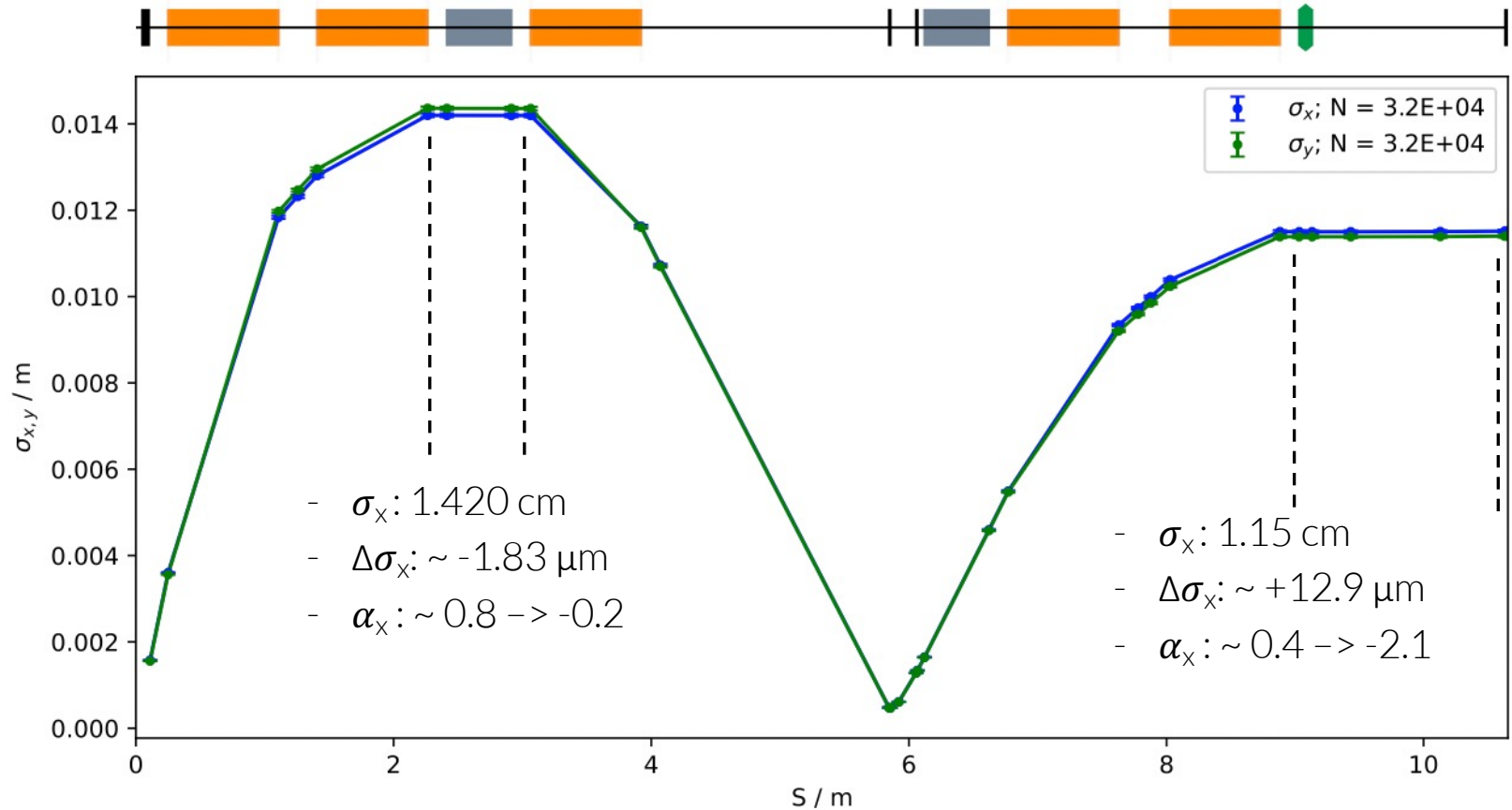
WP6 Meeting

24<sup>th</sup> January 2022



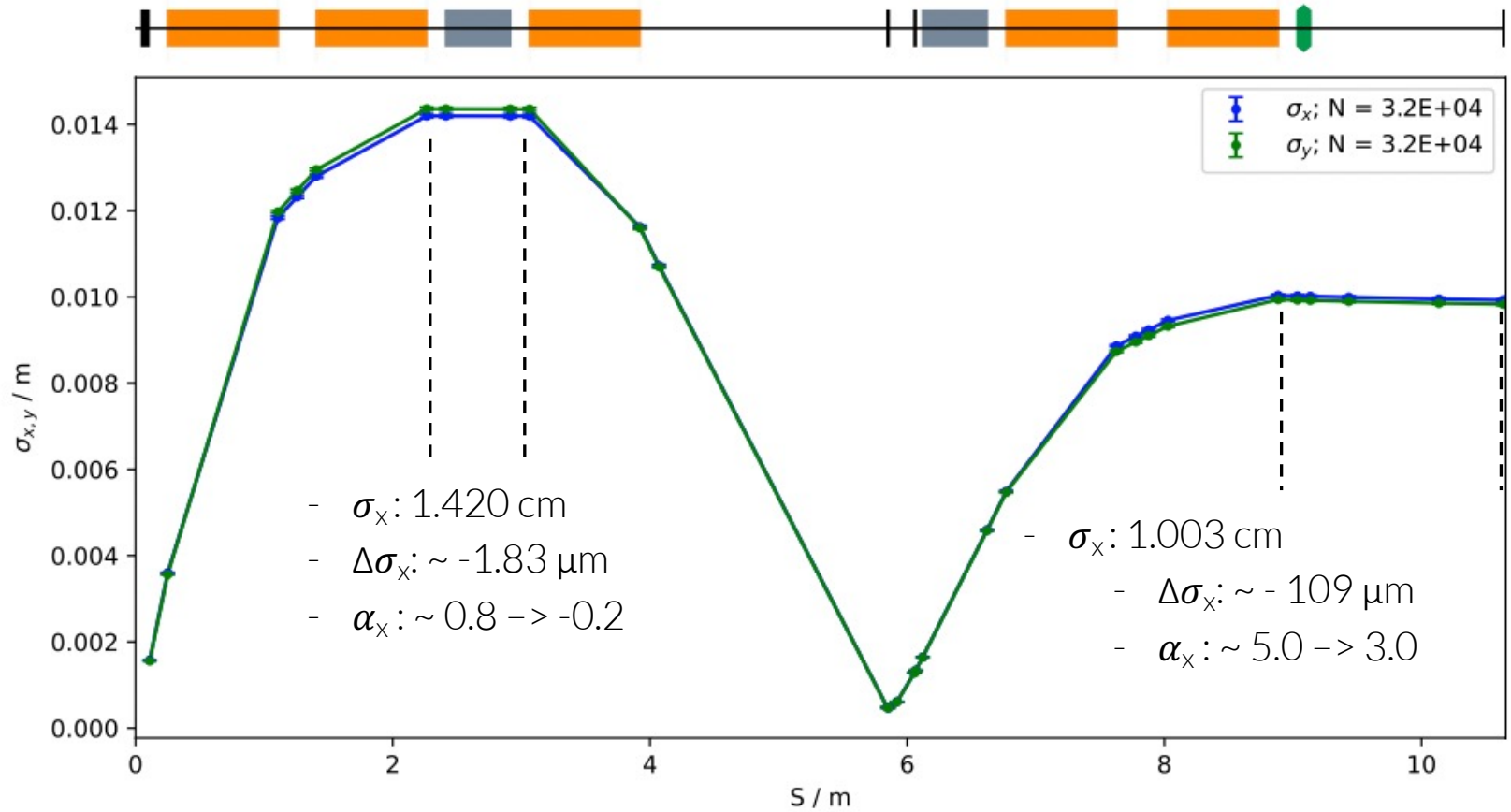
ROYAL  
HOLLOWAY  
UNIVERSITY  
OF LONDON





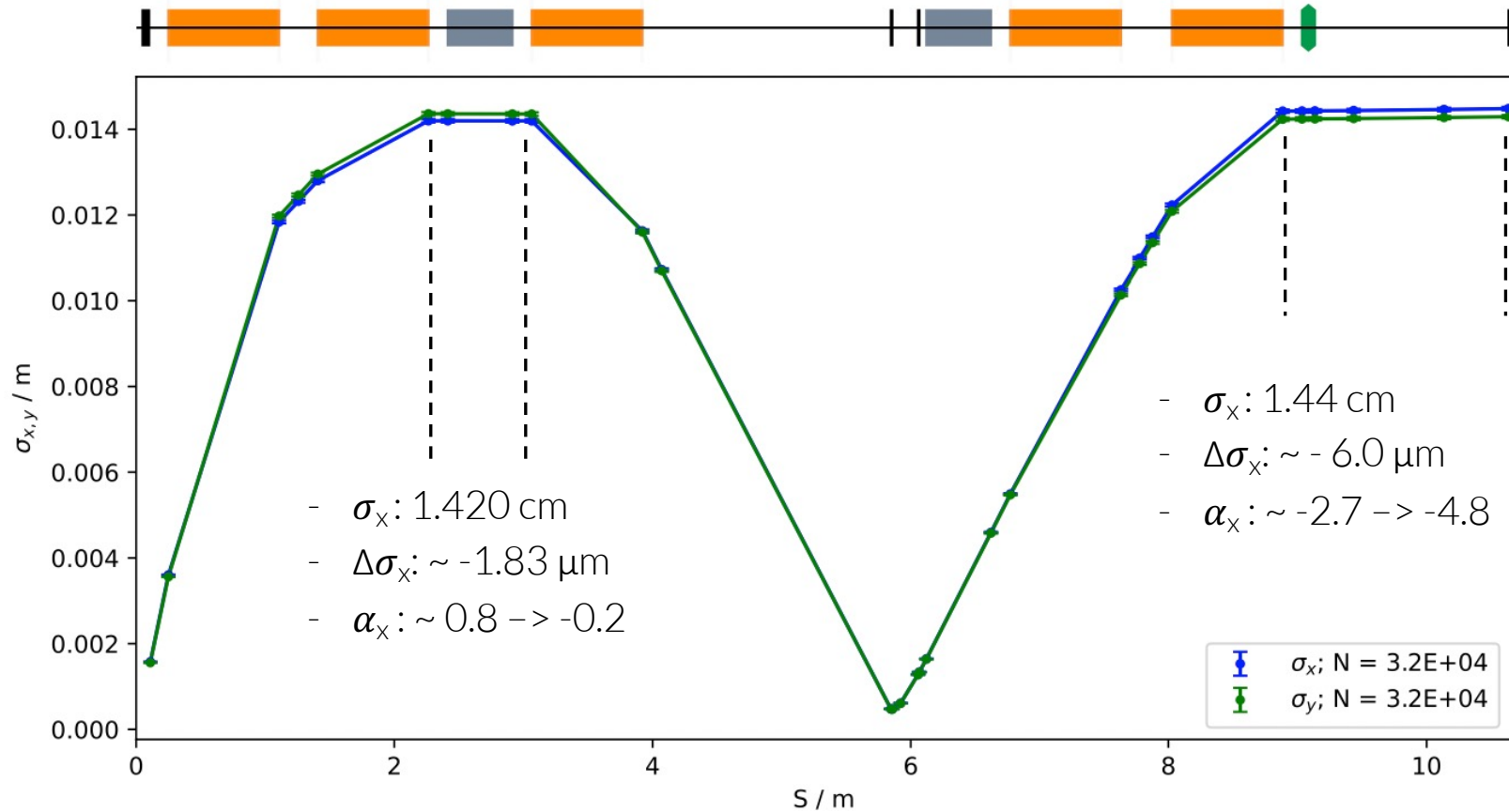
- All 5 solenoid strengths optimised
  - Including space charge
- Parallel beam in straight section
- GL3 focus at stage 1 collimator exit
- Near parallel beam after GL5

- Solenoid B fields:
  - GL1: 1.389076 T
  - GL2: 0.589422 T
  - GL3: 0.815074 T
  - GL4: 0.809765 T
  - GL5: 0.591352 T



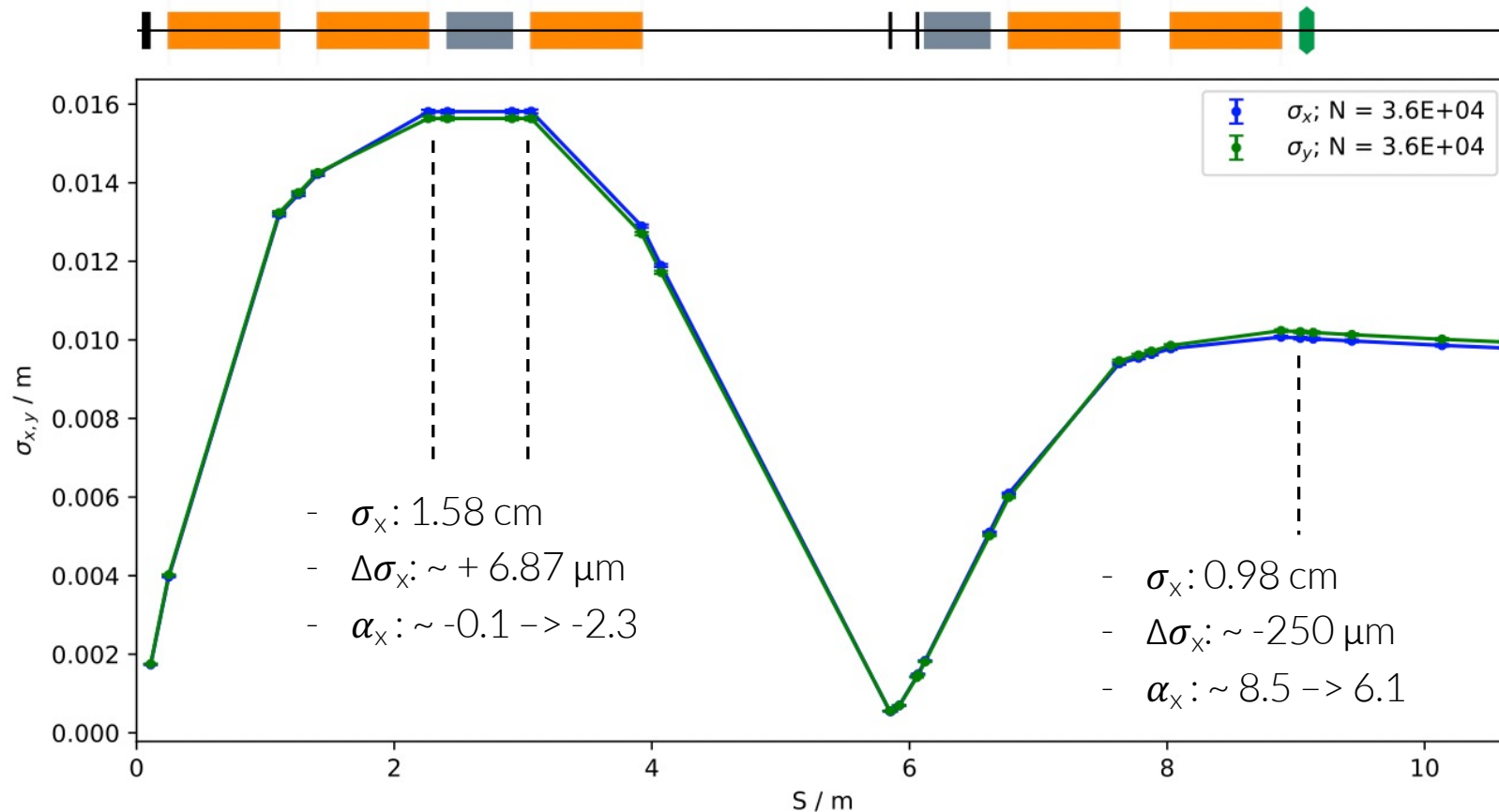
- Solenoid B fields:

- GL1: 1.389076 T
- GL2: 0.589422 T
- GL3: 0.815074 T
- GL4: 1.008967 T
- GL5: 0.416168 T



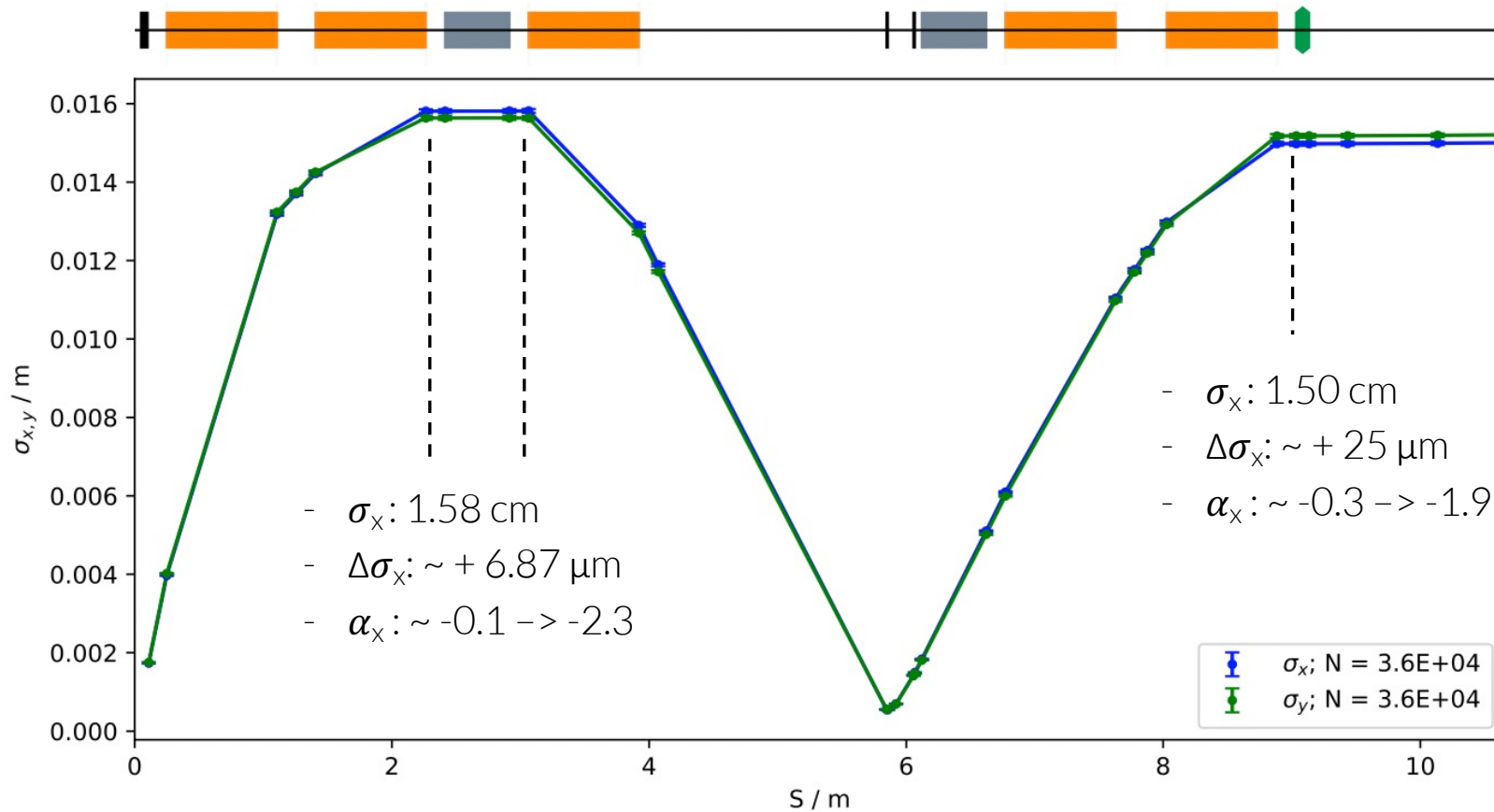
- Solenoid B fields:

- GL1: 1.389076 T
- GL2: 0.589422 T
- GL3: 0.815074 T
- GL4: 0.450186 T
- GL5: 0.728041 T



- All 5 solenoid strengths optimised
  - Including space charge
- Parallel beam in straight section
- GL3 focus at stage 1 collimator exit
- Near parallel beam after GL5

- Solenoid B fields:
  - GL1: 1.400000 T
  - GL2: 0.575971 T
  - GL3: 0.814950 T
  - GL4: 1.008967 T
  - GL5: 0.416168 T

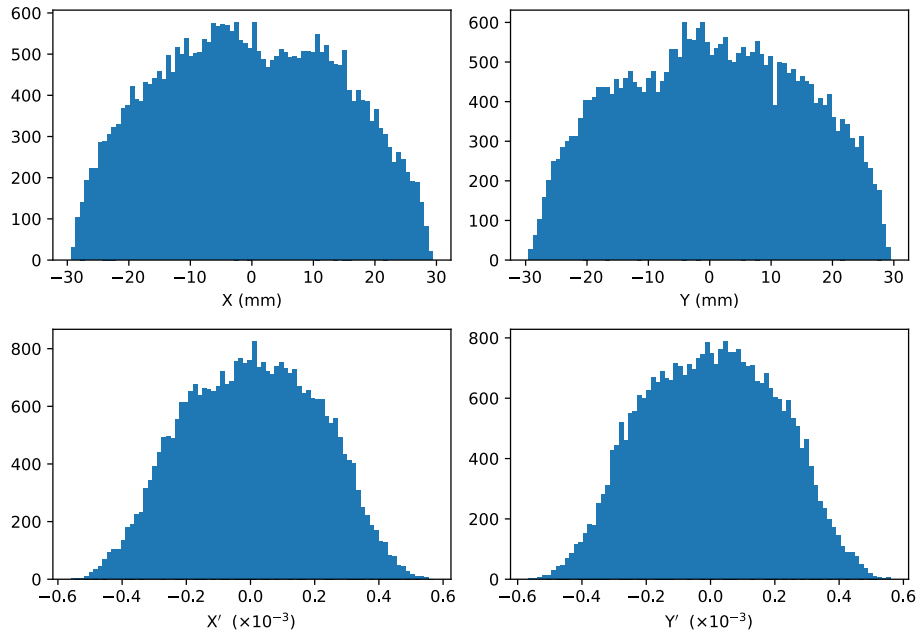


- Solenoid B fields:

- GL1: 1.400000 T
- GL2: 0.575971 T
- GL3: 0.814950 T
- GL4: 0.547434 T
- GL5: 0.705141 T

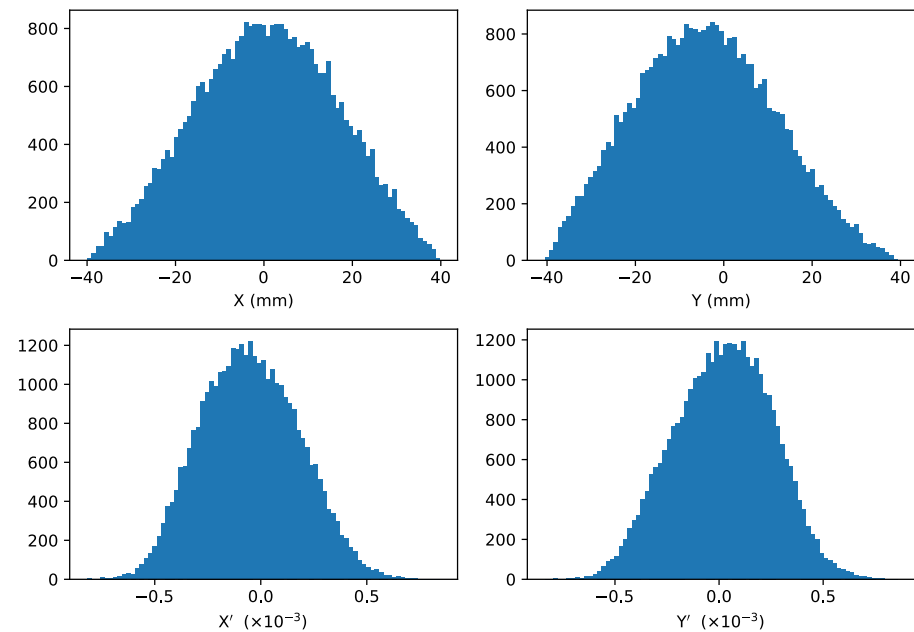
- Sampled beam:

Coordinates at Position =2.914 m



- SCAPA beam:

Coordinates at Position =2.914 m



- Non-gaussian beam in straight section

- Done:
  - Found optimised solutions for stage 1 operation with space charge
    - HT sampled & SCAPA beams
- Ongoing:
  - Continued optimization – beam size flexibility.
  - Continued optimization – stage 2 operation.
- Todo:
  - Model beams with full energy spread (missing files)
    - Both limited to 15 MeV +/- 2 %
  - Update models with JP modifications
  - Develop OPAL model of FFA – need JP input.