|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Quantity (Unit)** | **Acceleration (HMMD1)** | | | | **Deceleration (PBMD2)** | | |
|  | **C1** | | **C2** | | **C1** | **C2** | |
| Injection time (ms) | 1029 | | | | 2727 | | |
| Extraction time (ms) | 1229 | | | | 30000 | | |
| Excitation current (A) | 34.8 | | | | 276 | | |
| Measured B-train field   (G) | 454.6 | | | | 3593 | | |
| Excitation current (A) | 37.8 | | | | 38 | | |
| Measured B-train field (G) | 492.7 | | | | 493 | | |
| Field marker value, (G) | 450 | 3400 | 450 | 3400 | 3400 | | |
| Field marker trigger time, (ms from C0) | 535.2 | 2328 | 535.0 | 2327.7 | 2315.0 | | 2314.4 |
| Ramp rate at field marker value   (G/s) | 1000 | 6500 | 1000 | 6500 | 1600 | | |
| Current drift (A/s) | 0.00054 | | | | | | |
| Current jitter @ marker time (A) | 0.0028 | | | | | | |
| Nominal c\barurrent-to-field ratio (G/A) | 13.01 | | | | | | |
| Effective coil width for operational chain (m) | 2.8415 | | 2.8601 | | 2.8415 | 2.8601 | |

**ELENA FIRESTORM Performance Evaluation – Dec 2018**

A. Cycle and system parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Quantity (Unit)** | | **Acceleration (PBMD1)** | | | | **Deceleration (PBMD2)** | |
|  | | **C1** | | **C2** | | **C1** | **C2** |
| Correlation of measured chains | Gain | 0.9992 | | | | | |
| Offset (G) | 2.084 | | | | | |
| Measured average drift rate (G/s) | | 0.010 0.015 | | -0.063 0.021 | | 0.010 0.015 | -0.063 0.021 |
| Average drift at injection (G) | | 0.0049 0.0074 | | -0.031 0.010 | | 0.0041 0.0062 | -0.026 0.0087 |
| Average drift at extraction (G) | | 0.0069 0.010 | | -0.044 0.015 | | 0.28 0.42 | -1.74 0.58 |
| Measured St. dev.noise level (G) | | 0.029 0.001 | | | | | |
| Measured peak-to-peak noise level (G) | | 0.138 0.005 | | | | | |
| Marker signal amplitude (V) | | 0.16  0.02 | 0.94 0.05 | 0.18  0.02 | 1.03 0.05 | 1.7 0.03 | 1.7 0.03 |

B. Quality indicators

2 RMSE of fit = 1.67 G over 40 cycles

C. Stability parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Quantity (Unit)** | **Acceleration (PBMD1)** | | | | **Deceleration (PBMD2)** | |
|  | **C1** | | **C2** | | **C1** | **C2** |
| Measured field repeatability/reproducibility @ injection (G) | 0.039 | | 0.043 | | 0.041 | 0.043 |
| Measured field repeatability/reproducibility @ extraction (G) | 0.041 | | 0.044 | | 0.37 | 0.54 |
| Marker jitter **repeatability**, () | 60.1 | 9.7 | 69.6 | 10.3 | 21.5 | 34.0 |
| Marker relative **repeatability**  () | 1.3 | 0.19 | 1.5 | 0.20 | 0.10 | 0.16 |
| Random error at injection, (T) |  |  |  |  |  |  |
| Random error at extraction, , T) |  |  |  |  |  |  |

D. Beam parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Quantity (Unit)** | **Acceleration (PBMD1)** | | **Deceleration (PBMD2)** | |
|  | **C1** | **C2** | **C1** | **C2** |
| Revolution frequency @ inj (kHz) | N/A | | 1043.4 0.063 | N/A |
| Revolution frequency @ intermed. (kHz) | 371.2 0.008 |
| Revolution frequency @ ext (kHz) | 144.0 0.107 |
| Mean radial position @ inj (mm) | -0.353 0.008 |
| Mean radial position @ intermed. (mm) | -0.430 0.017 |
| Mean radial position @ ext (mm) | 1.596 0.110 |
| Mean radial loop freq @ inj (Hz) | 34.4 55 |
| Mean radial loop freq @ intermed. (Hz) | -95 48 |
| Mean radial loop freq @ ext (Hz) | 116 153 |
| Scaling error () | 6.3 |
| Offset error (G) | -0.013 |
| Systematic error @ inj () (G) | 0.0097 |
| Systematic error at ext () (G) | -0.0099 |

