# eRHIC Permanent Magnet Quadrupoles PMQ_0005 & PMQ_005A (14-Oct-2015)

Field harmonics are in "units" of $10^{-4}$ of the quadrupole field at a reference radius of 10 mm.

| Quantity | PMQ_0005 Run 2 | PMQ_005A* Run 1_02(†) | PMQ_005A* Run 2(††) | PMQ_005A* Run 3(††) |
|---|---|---|---|---|
| Integrated Gradient (T) | 1.9024 | 1.6501 | 1.6519 | 1.6537 |
| Normal Dipole | -- | -- | -- | -- |
| Normal Quadrupole | 10000.00 | 10000.00 | 10000.00 | 10000.00 |
| Normal Sextupole | -11.95 | **-19.46** | **-0.58** | 0.87 |
| Normal Octupole | 3.61 | 5.61 | 5.21 | 3.12 |
| Normal Decapole | 3.86 | -0.99 | -0.84 | -0.32 |
| Normal Dodecapole | **-190.26** | **-1.03** | -1.06 | 0.55 |
| Normal 14-pole | 1.03 | 1.25 | 1.04 | -0.03 |
| Normal 16-pole | -1.31 | -1.47 | -1.52 | -0.24 |
| Normal 18-pole | 0.07 | 0.12 | 0.13 | 0.05 |
| Normal 20-pole | **-2.91** | **0.44** | 0.40 | -0.01 |
| Normal 22-pole | -0.01 | -0.03 | -0.01 | 0.01 |
| Normal 24-pole | 0.04 | 0.05 | 0.03 | -0.09 |
| Normal 26-pole | -0.02 | -0.01 | -0.01 | -0.03 |
| Normal 28-pole | 0.12 | -0.12 | -0.12 | 0.02 |
| Normal 30-pole | 0.00 | 0.00 | 0.00 | 0.00 |

| Quantity | PMQ_0005 Run 2 | PMQ_005A* Run 1_02(†) | PMQ_005A* Run 2(††) | PMQ_005A* Run 3(††) |
|---|---|---|---|---|
| Field Angle (mr) | -- | -- | -- | -- |
| Skew Dipole | -- | -- | -- | -- |
| Skew Quadrupole | -- | -- | -- | -- |
| Skew Sextupole | -5.28 | **-6.42** | **-0.63** | -1.92 |
| Skew Octupole | -18.51 | -21.20 | -21.18 | **-1.45** |
| Skew Decapole | -8.52 | -4.02 | -4.23 | **-0.70** |
| Skew Dodecapole | **-4.96** | **0.22** | 0.32 | -1.07 |
| Skew 14-pole | 0.85 | 0.07 | -0.16 | -0.51 |
| Skew 16-pole | -0.13 | -0.31 | -0.33 | -0.30 |
| Skew 18-pole | 0.10 | -0.05 | -0.06 | -0.22 |
| Skew 20-pole | 0.01 | 0.24 | 0.23 | 0.00 |
| Skew 22-pole | 0.00 | 0.00 | 0.01 | 0.06 |
| Skew 24-pole | 0.01 | -0.01 | -0.02 | -0.03 |
| Skew 26-pole | 0.01 | 0.00 | 0.01 | 0.00 |
| Skew 28-pole | 0.00 | 0.00 | 0.00 | 0.02 |
| Skew 30-pole | 0.00 | 0.00 | 0.00 | 0.00 |

*** PMQ_005A is magnet built from magnets taken from PMQ_0005 and installed in a modified holder to reduce 12-pole**

(†) ***Magnet was measured with the magnet rotated 90 deg. about its axis, and flipped end-for-end, as compared to PMQ_005 measurements. The data were transformed in post-processing to correspond to the old orientation.***

(††) **Runs 2 & 3 are measurement in PMQ_005A with two iterations of iron shims to reduce unallowed field harmonics.**

***(Note: Magnet name used for tesing was ERHIC-PMQ_0105 to avoid non-numeric serial number).***