

Summary of Field Quality Data in D2L105

Animesh Jain

Superconducting Magnet Division

Brookhaven National Laboratory, Upton, NY 11973

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Warm Measurements

- Warm measurements have been completed in all the nine D2 dipoles.
- Harmonics are measured with a 1 meter long mole at 10 axial locations in each aperture.
- Field angle is measured relative to gravity. Systematic error in calibration is removed by measuring field angles from both ends.
- Fiducials are surveyed on the test stand. **Software to express field angles in magnet frame is not completed yet.**
- Integral transfer function is measured with a non-rotating, 10-meter long coil.
- All warm measurements are done before cold test.

Cold Measurements

- Initial plan was to measure only one D2 cold (D2L104).
- Current plan is to do a minimal set of cold measurements in all the remaining D2's (6 total).
- Minimal set consists of a sparse excitation curve at each of the 10 axial positions, in each aperture. Down ramp measurements are done at only one position in each aperture.
- The 19 currents in the sparse loop cover 200A to 6400A, and are carefully chosen to catch all the “features” of a full excitation curve.
- The integral T.F. is obtained from Z-scan only, and can have random errors of up to $\sim 0.1\%$
- **D2L105 has been measured under the minimal plan.**

D2L105 Vs. Mean and Standard Deviation

Integral Normal Harmonics (Warm) at 25 mm

	Left Aperture				Right Aperture			
	D2L Mean	D2L Std.Dev.	105(L)	No. of Sigma	D2L Mean	D2L Std.Dev.	105(R)	No. of Sigma
I.T.F. (T.m/kA)	5.9563	0.043%	5.9605	1.6	5.9563	0.043%	5.9594	1.2
Quadrupole*	-5.43	0.57	-4.62	1.4	5.34	0.57	5.01	-0.6
Sextupole	-3.39	1.37	-4.41	-0.7	-3.39	1.37	-3.62	-0.2
Octupole	0.09	0.15	0.09	0.0	0.09	0.15	0.17	0.6
Decapole	0.57	0.43	0.19	-0.9	0.57	0.43	0.45	-0.3
12-pole	-0.02	0.05	0.04	1.2	-0.02	0.05	-0.11	-1.7
14-pole	0.05	0.10	-0.05	-1.1	0.05	0.10	0.04	-0.1
16-pole	0.00	0.02	0.06	2.6	0.00	0.02	-0.01	-0.7
18-pole	-0.14	0.03	-0.14	-0.3	-0.14	0.03	-0.15	-0.3
20-pole	0.00	0.01	0.00	-0.4	0.00	0.01	-0.01	-1.0
22-pole	-0.64	0.02	-0.62	1.0	-0.64	0.02	-0.63	0.3
24-pole	0.00	0.00	0.00	0.4	0.00	0.00	0.00	-0.6
26-pole	-0.26	0.01	-0.27	-1.1	-0.26	0.01	-0.25	0.9

* Mean values of the normal quadrupole term are treated as aperture dependent.
 All other terms are considered aperture independent.

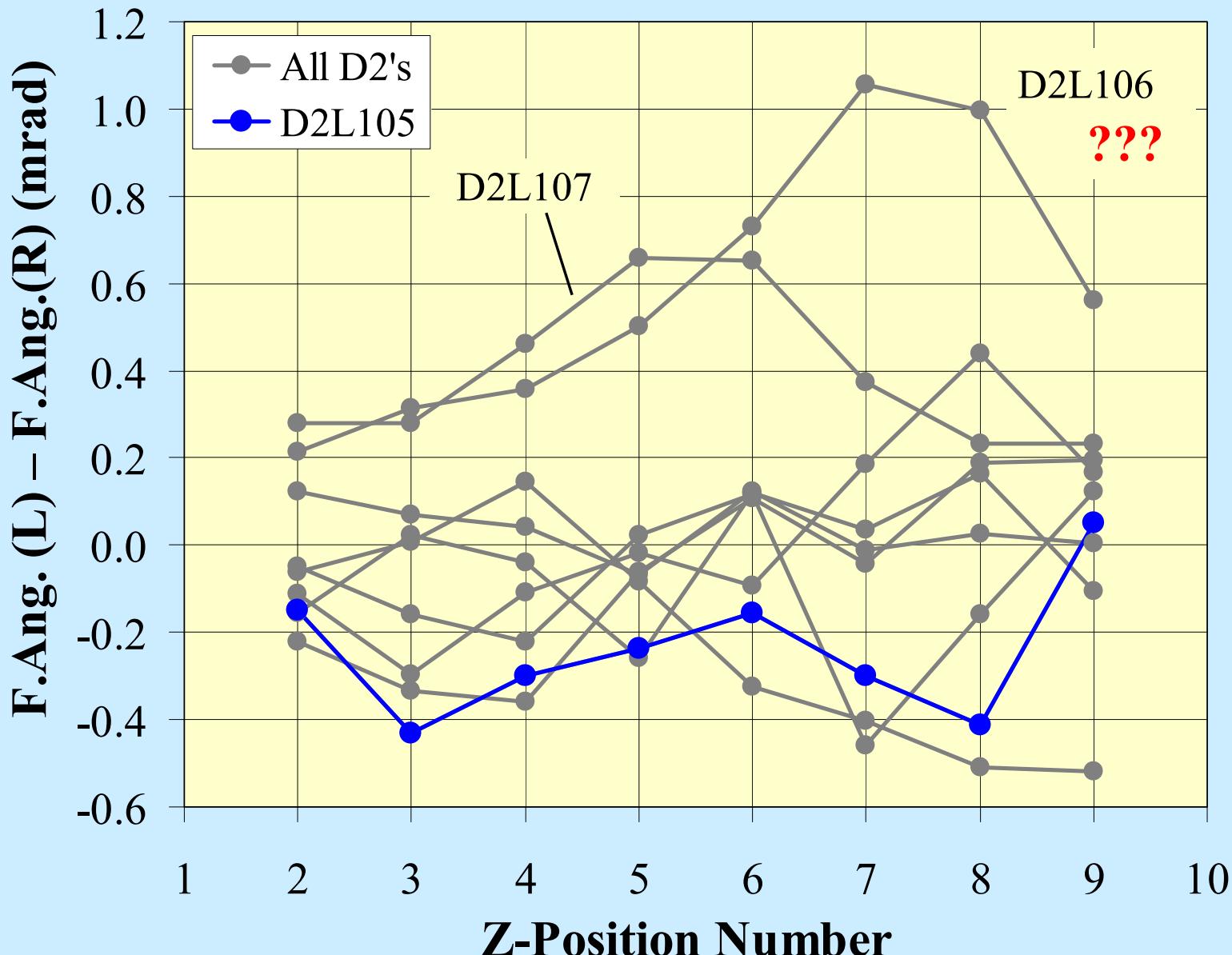
D2L105 Vs. Mean and Standard Deviation

Integral Skew Harmonics (Warm) at 25 mm

	D2L Mean	D2L Std.Dev.	105(L)	No. of Sigma	105(R)	No. of Sigma
Fld. Angle (mrad)	-0.55	0.25	-0.59	-0.1	-0.43	0.5
Quadrupole	-0.08	1.86	-0.91	-0.4	-1.67	-0.9
Sextupole	-1.12	0.34	-1.46	-1.0	-1.44	-1.0
Octupole	0.14	0.64	0.26	0.2	-0.10	-0.4
Decapole	0.16	0.11	0.10	-0.5	0.24	0.8
12-pole	0.04	0.18	-0.12	-0.9	0.06	0.1
14-pole	-0.08	0.03	-0.07	0.5	-0.04	1.4
16-pole	0.02	0.05	0.01	-0.2	0.08	1.4
18-pole	0.02	0.01	-0.01	-2.3	0.02	-0.2
20-pole	0.02	0.02	0.02	-0.3	0.04	1.0
22-pole	0.00	0.01	-0.01	-0.2	-0.01	-0.7
24-pole	0.01	0.01	0.00	-0.6	0.01	-0.3
26-pole	0.01	0.01	0.02	1.5	0.00	-0.7

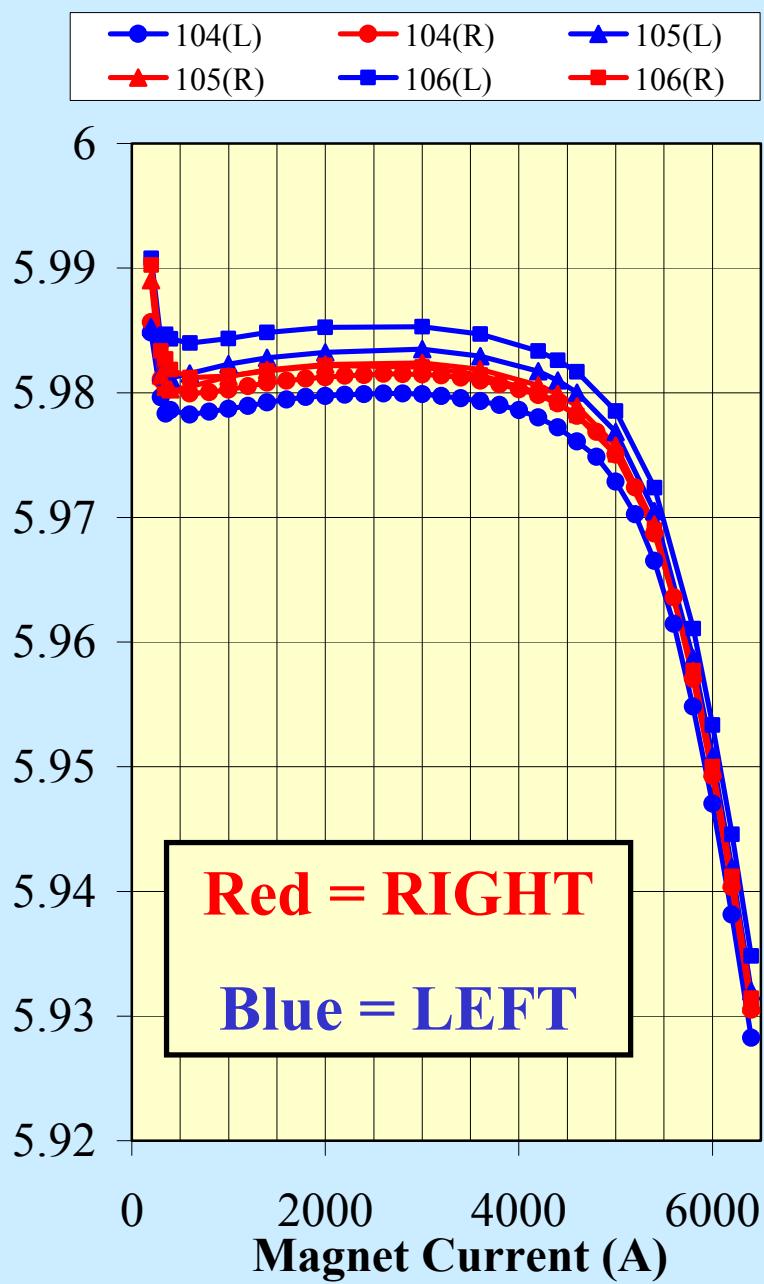
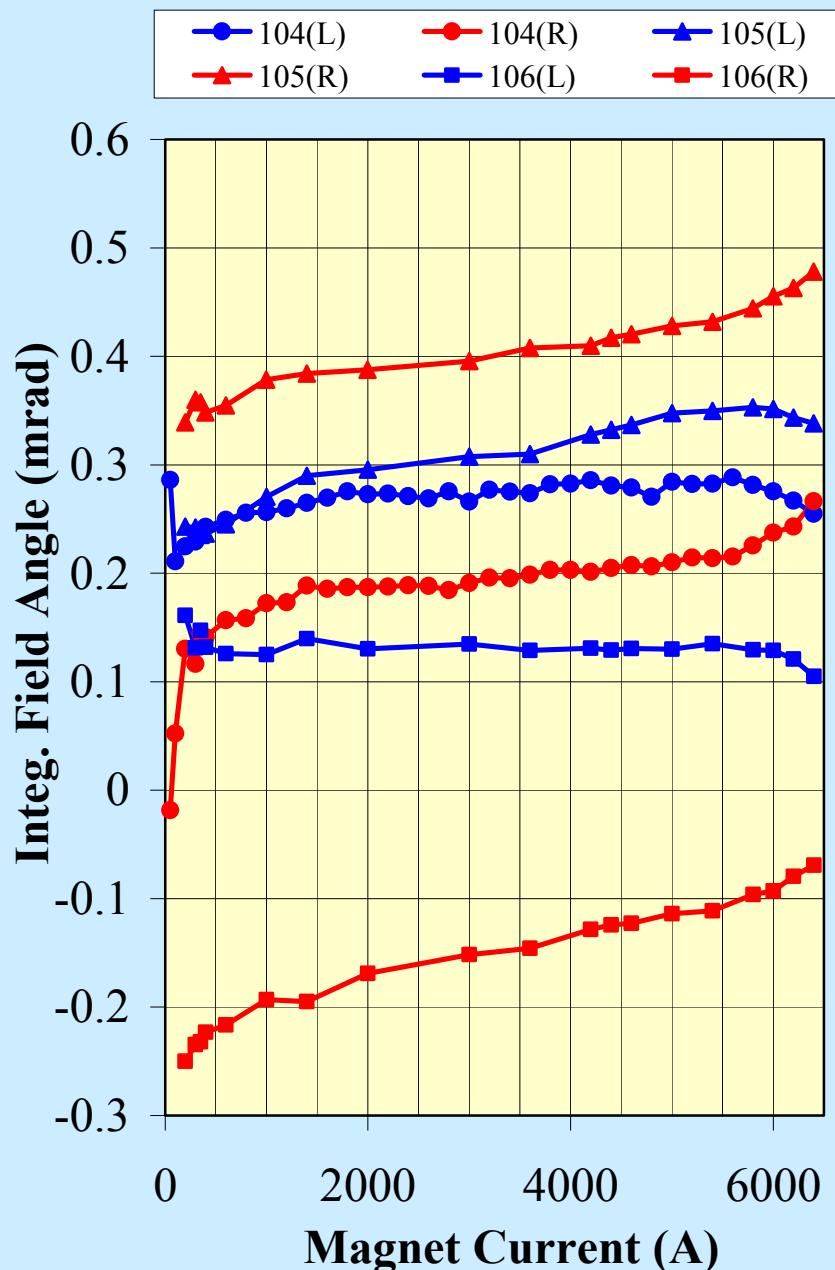
All other terms are considered aperture independent.

Field Angle Alignment in D2 Dipoles

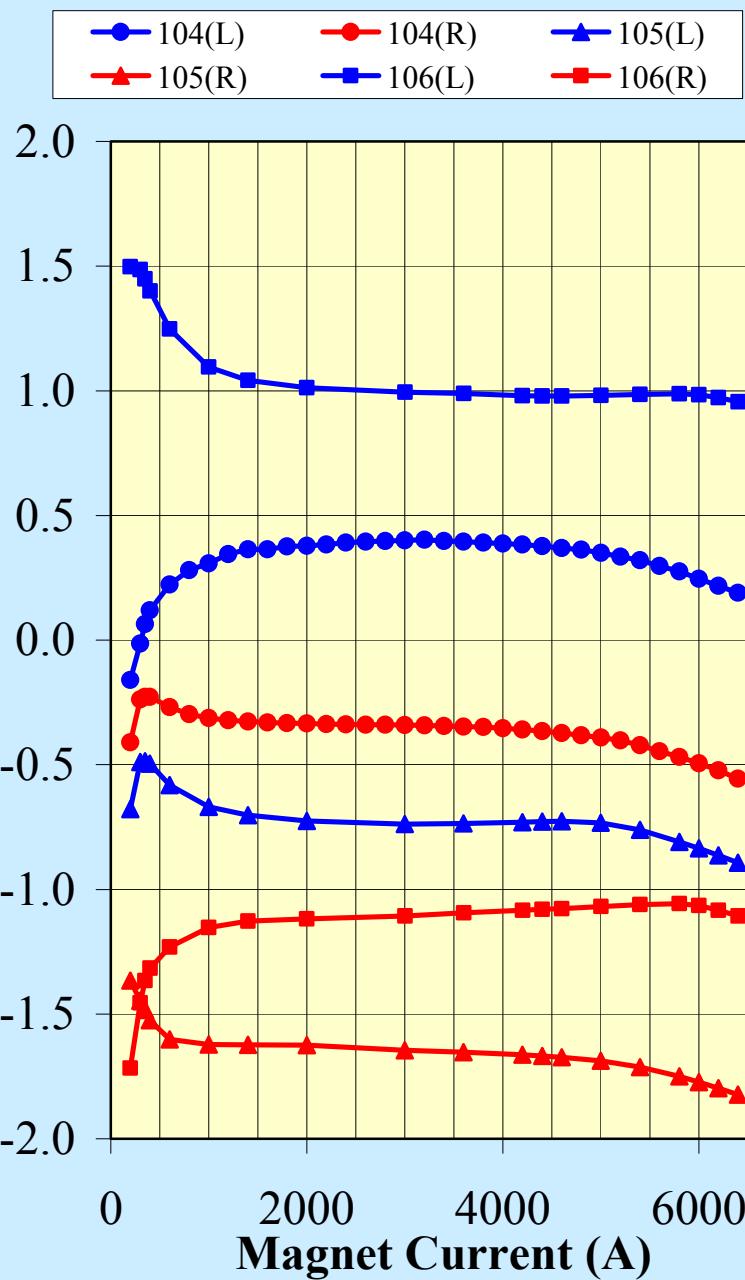
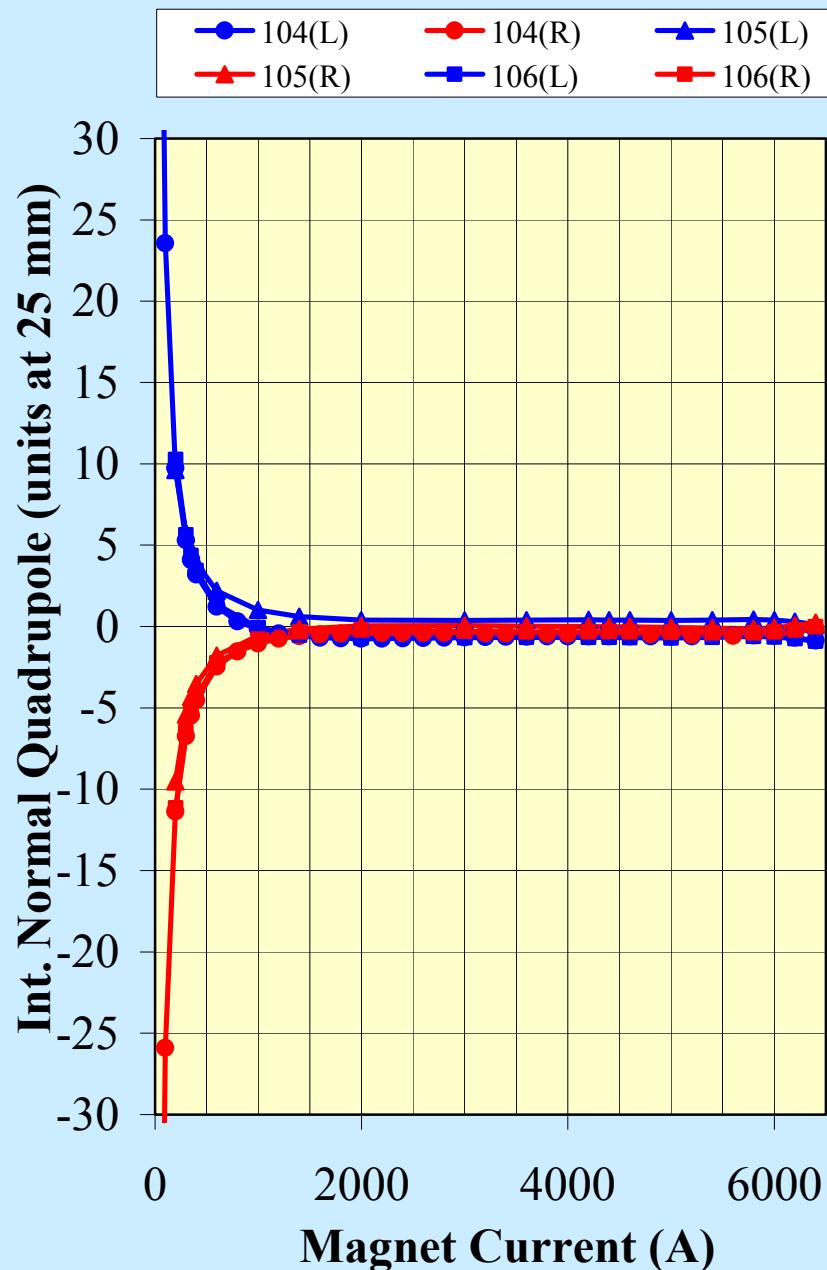


Current Dependence of Integral Harmonics (Absolute Values)

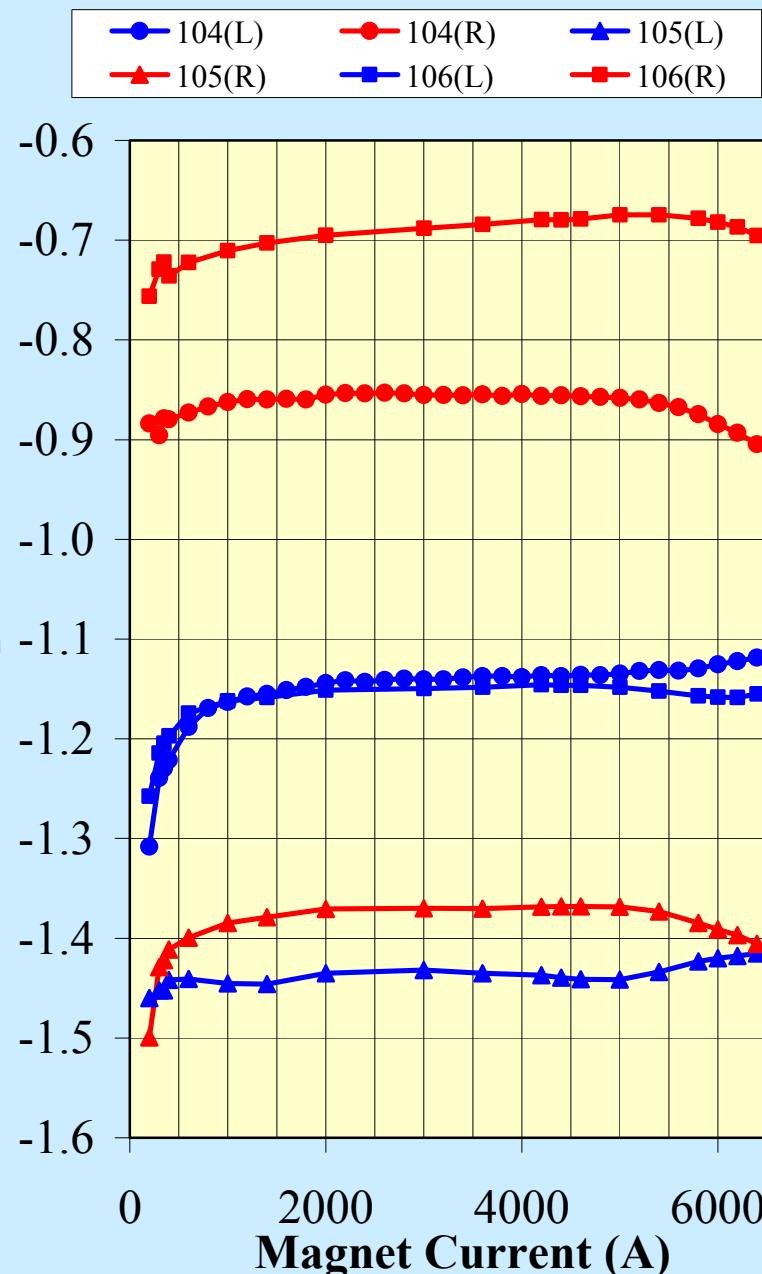
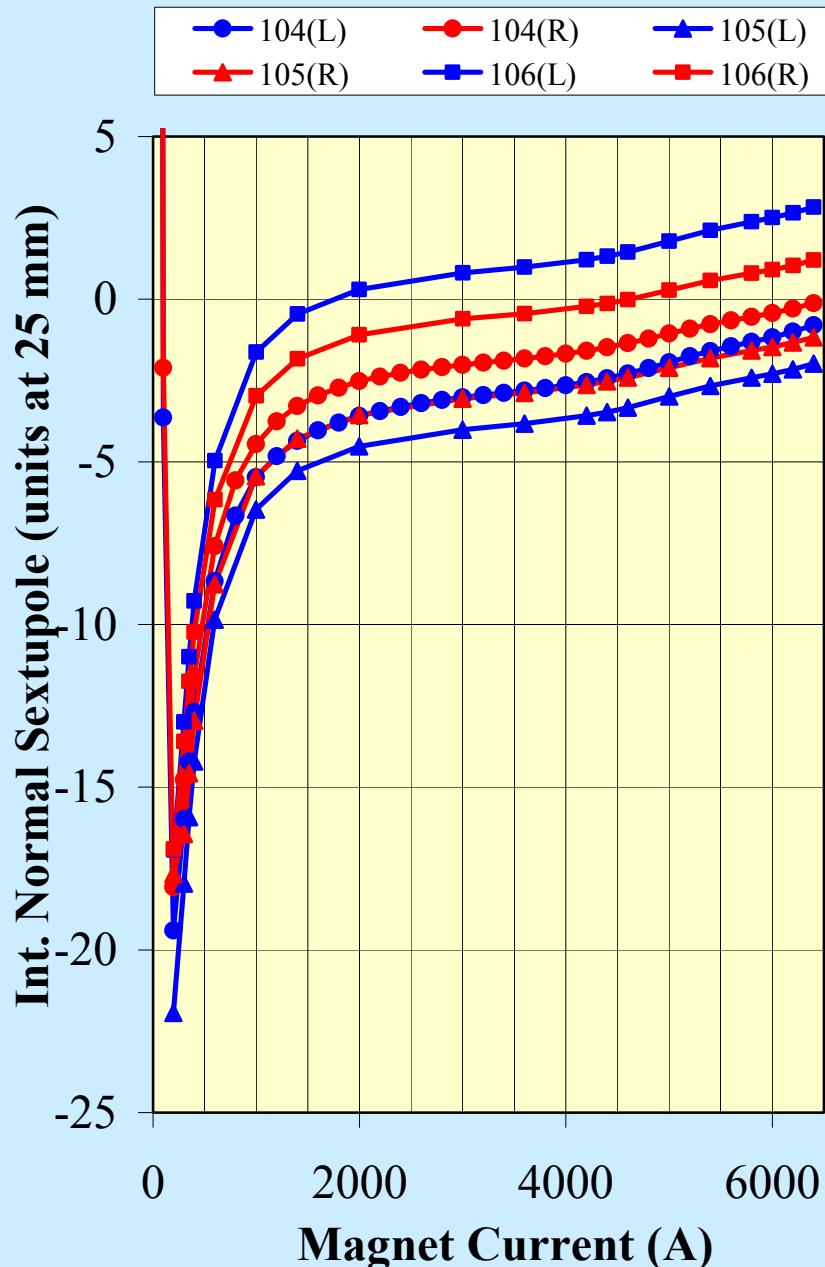
Integral Field Quality in D2L Dipoles



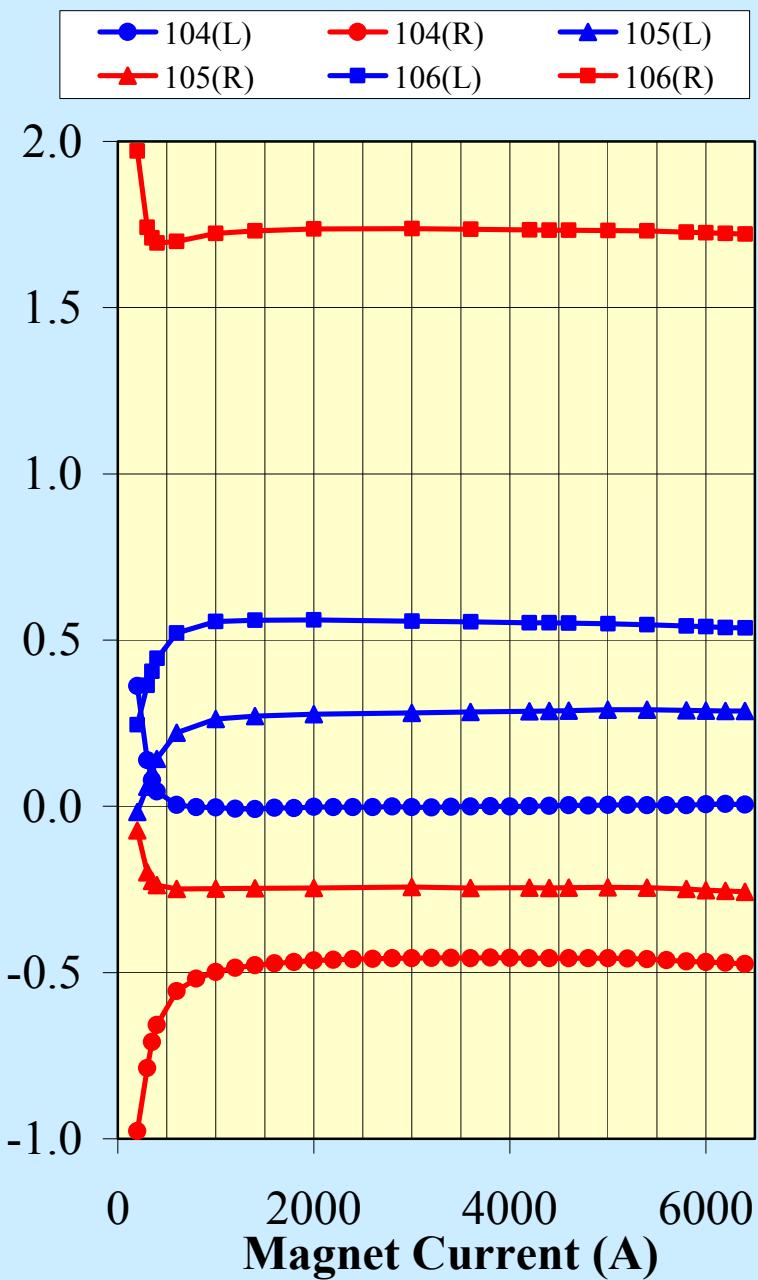
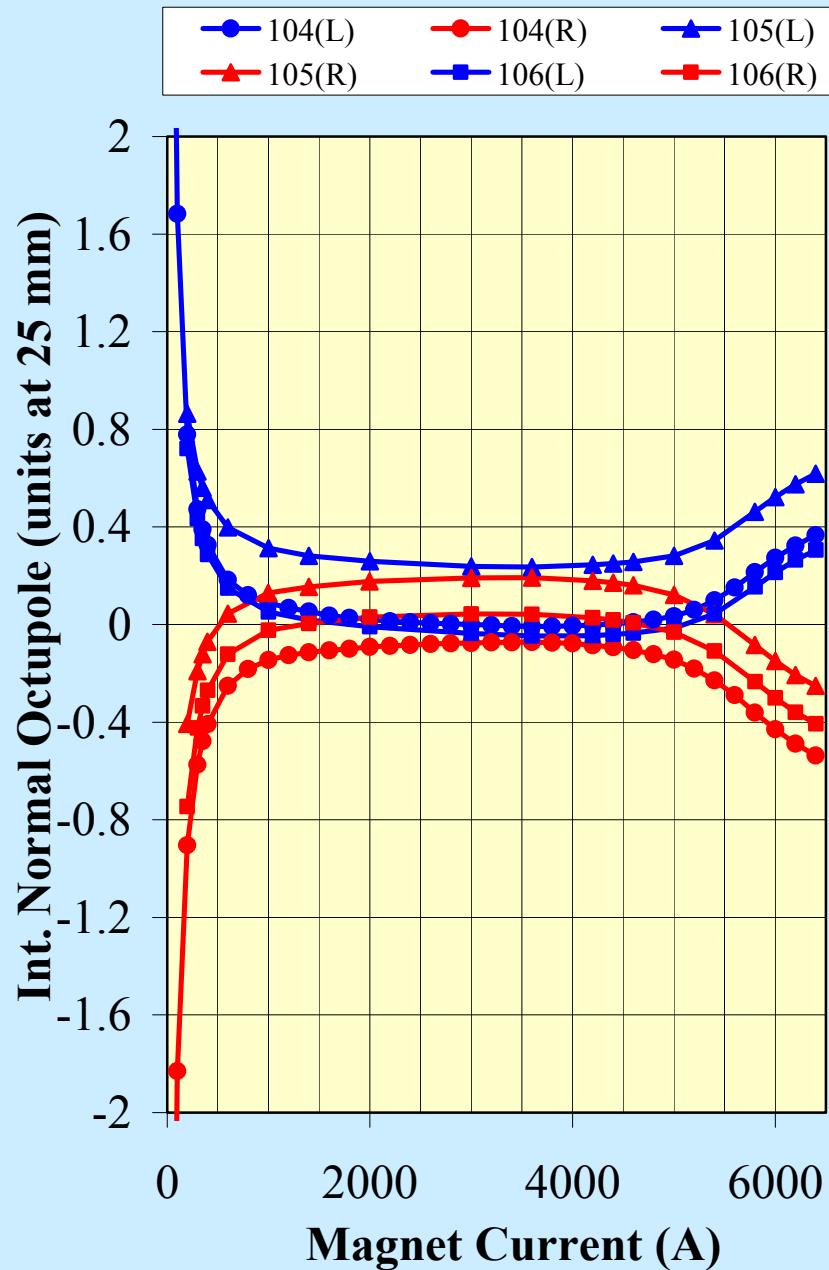
Integral Field Quality in D2L Dipoles



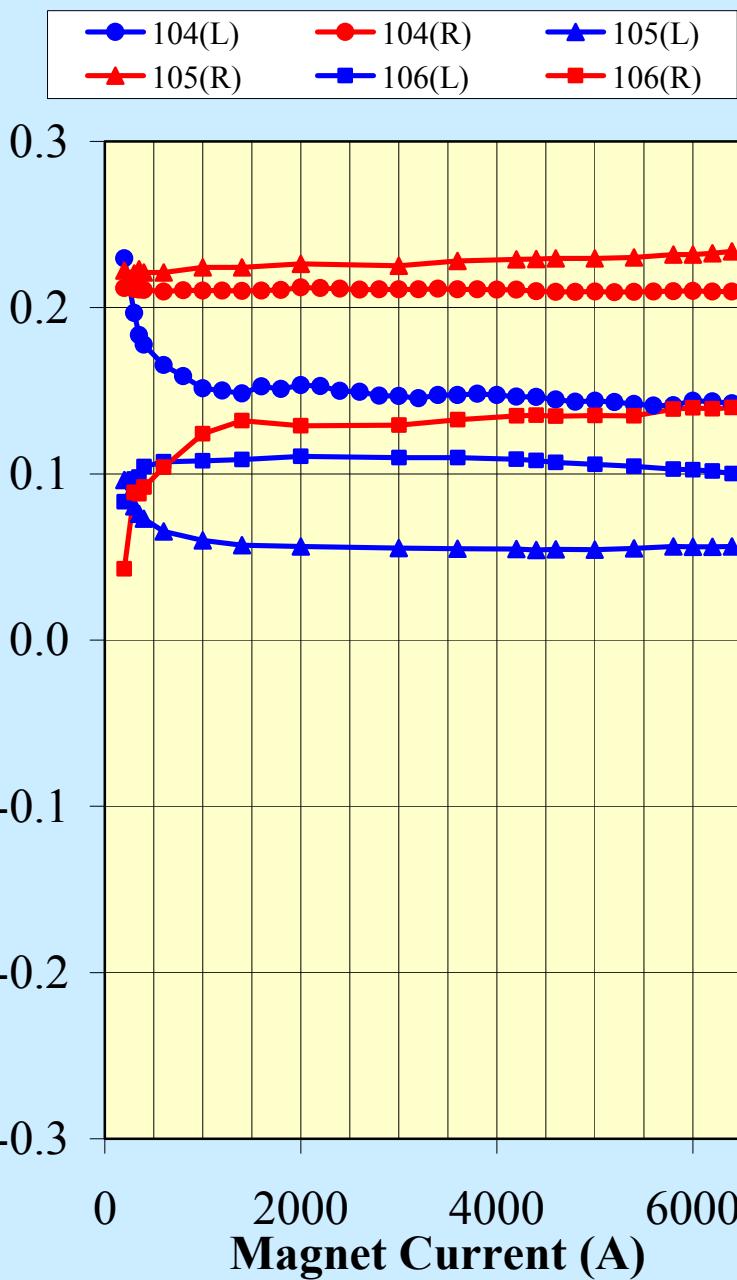
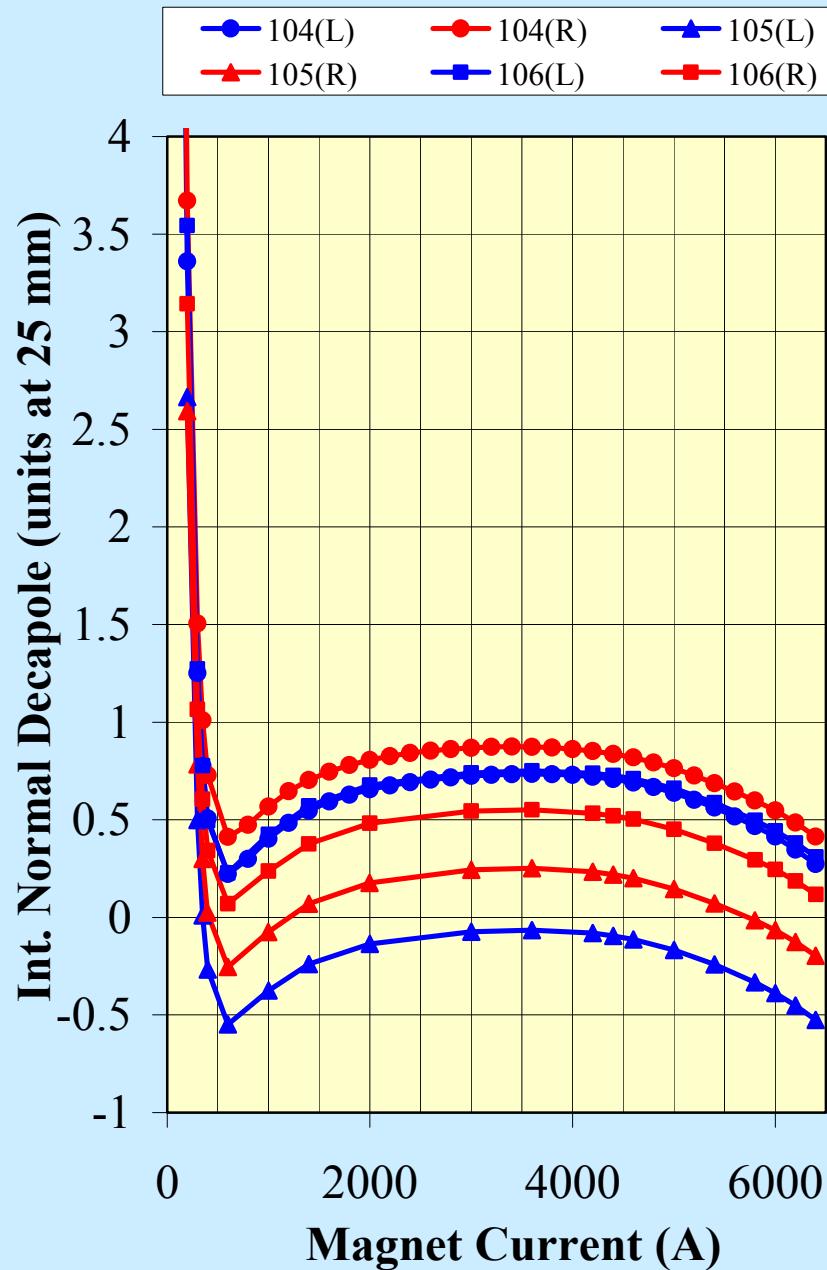
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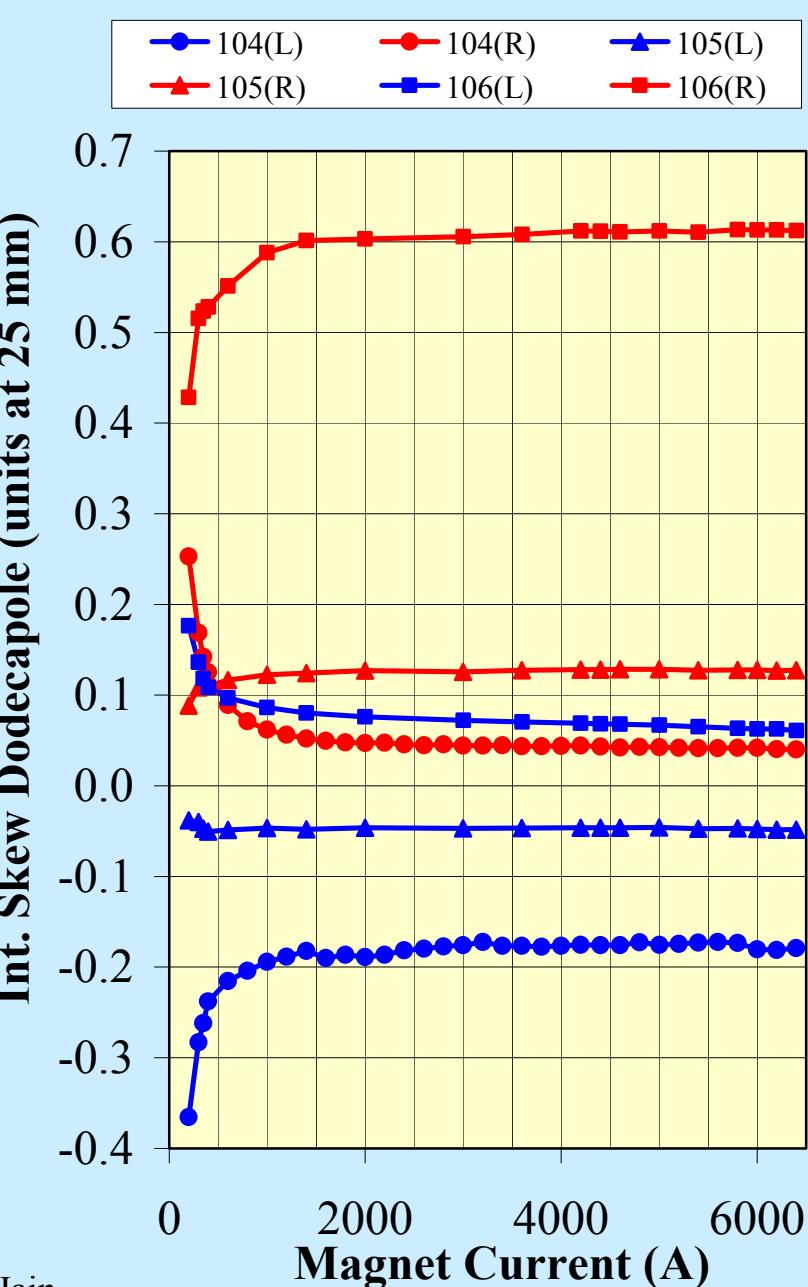
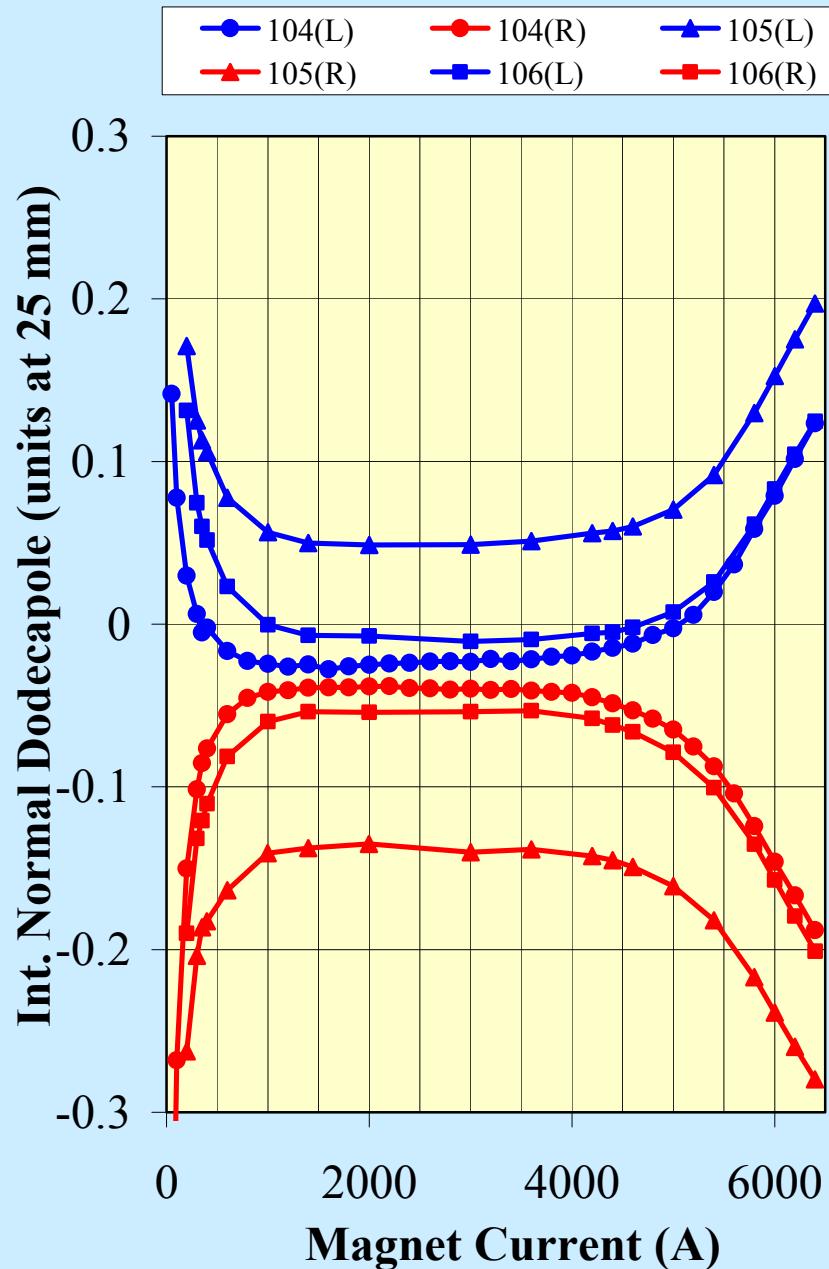
Integral Field Quality in D2L Dipoles



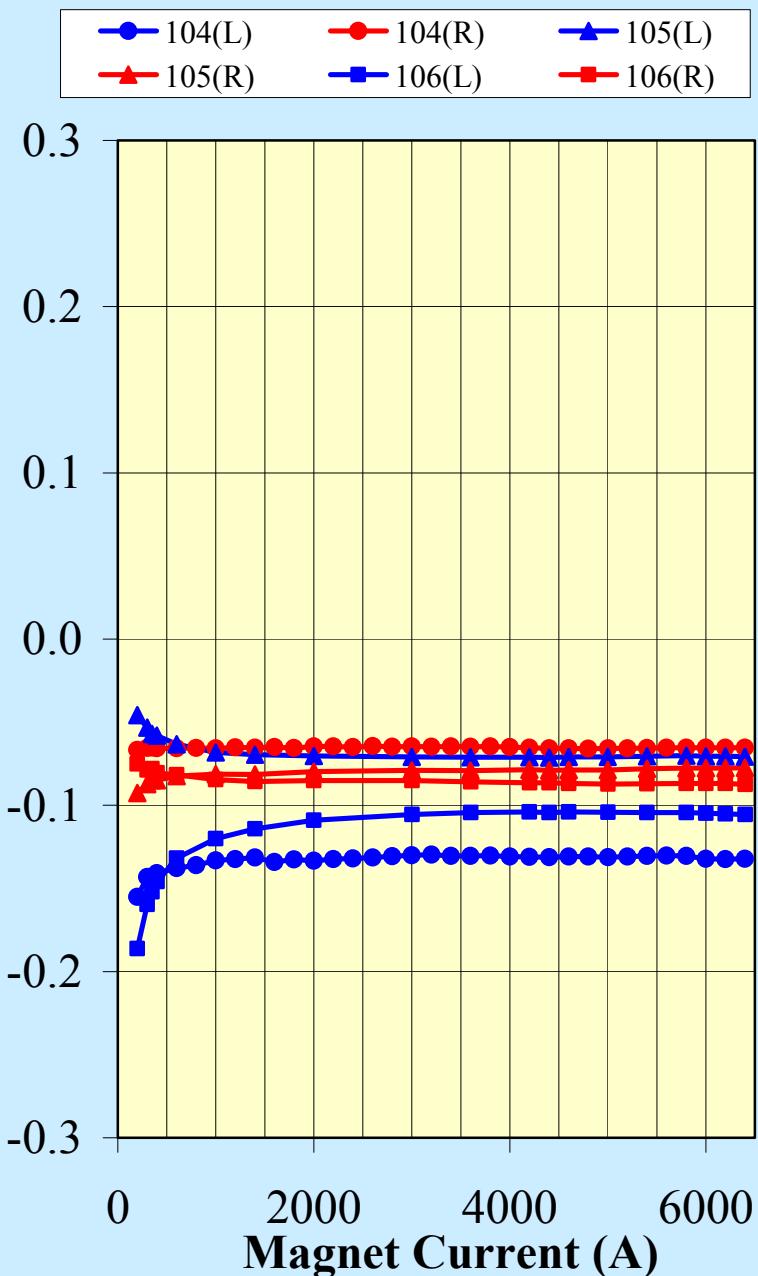
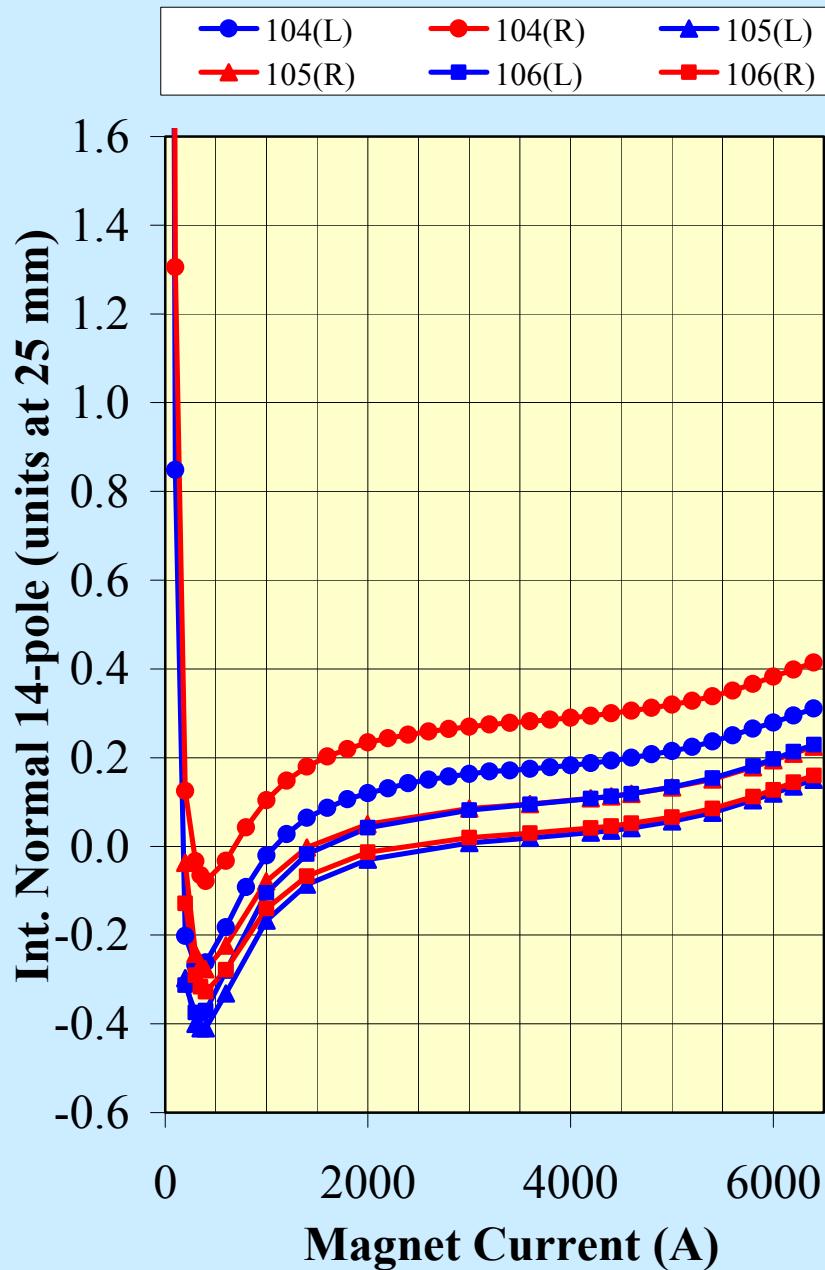
Integral Field Quality in D2L Dipoles



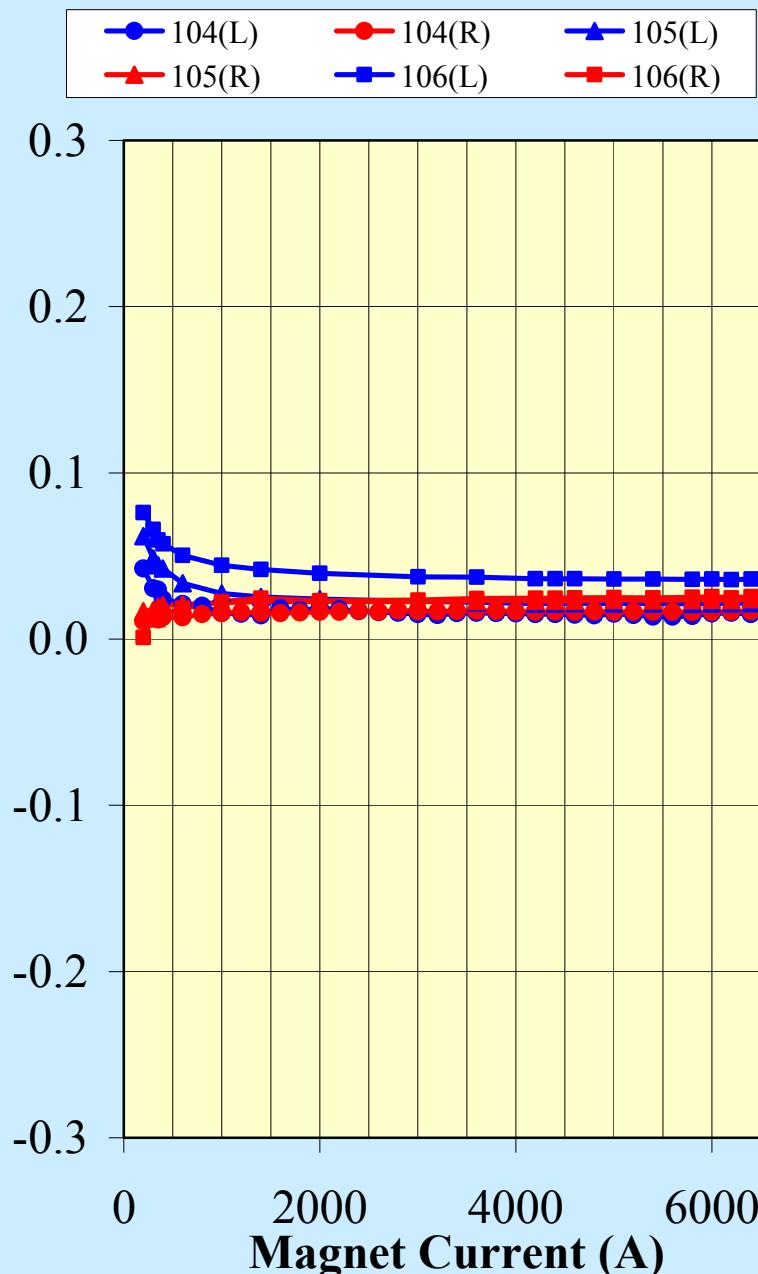
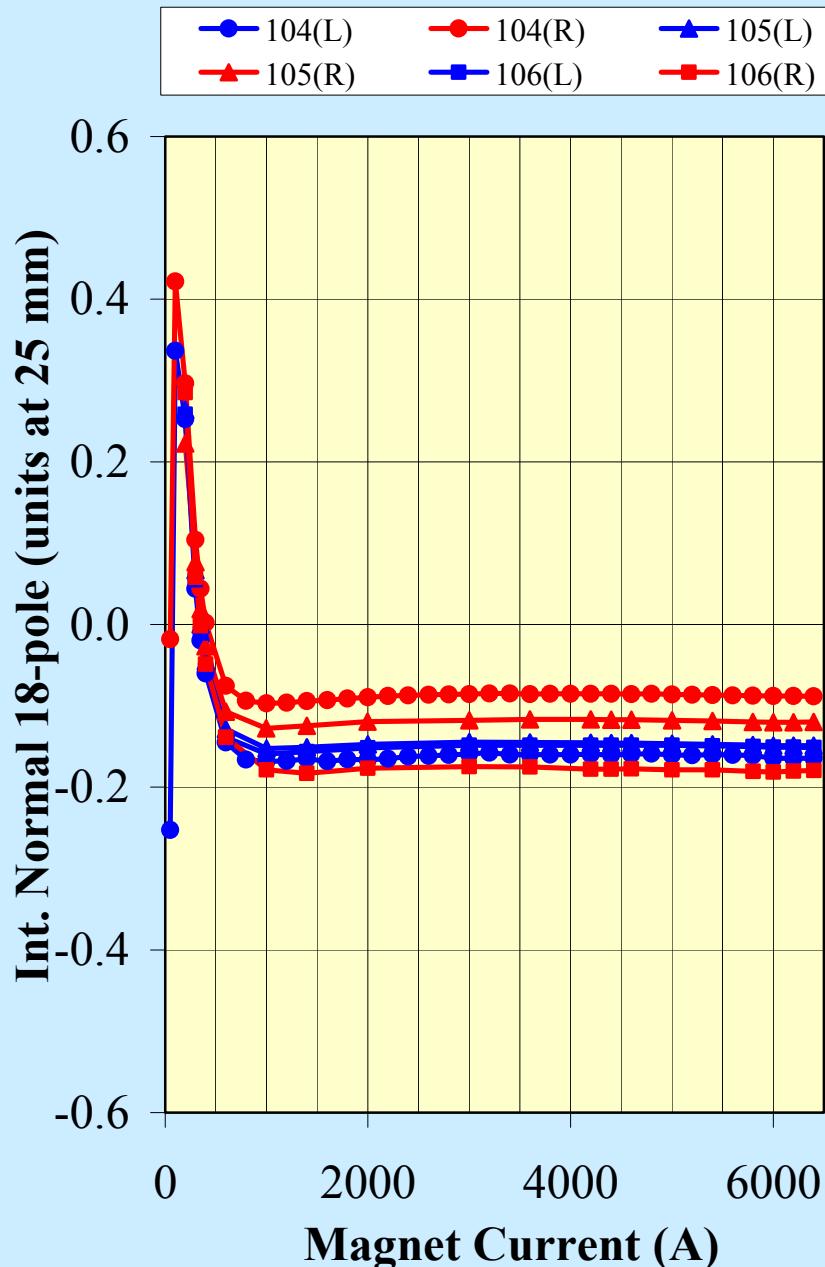
Integral Field Quality in D2L Dipoles



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