Numi Optics study

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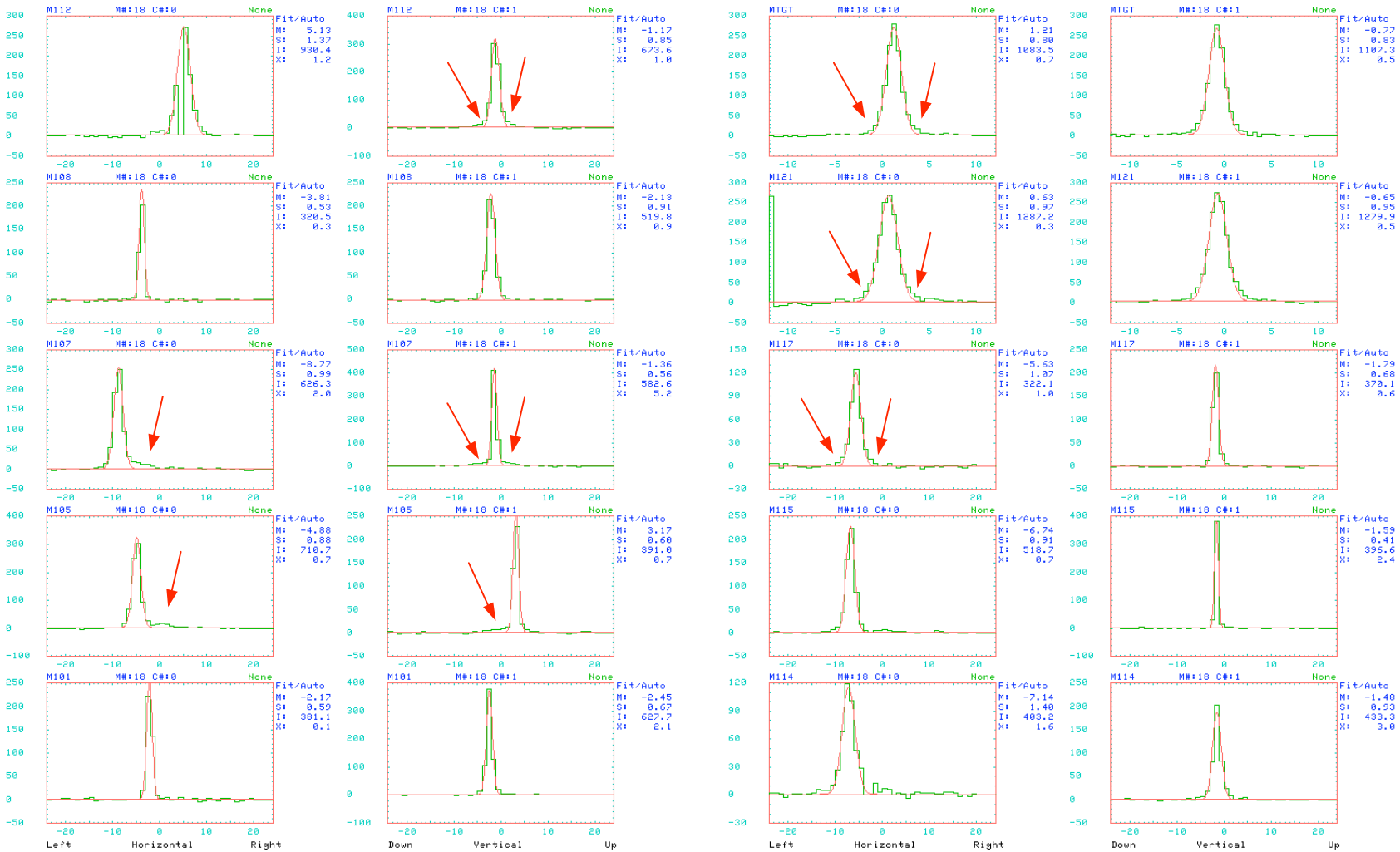
Main Injector Dept.

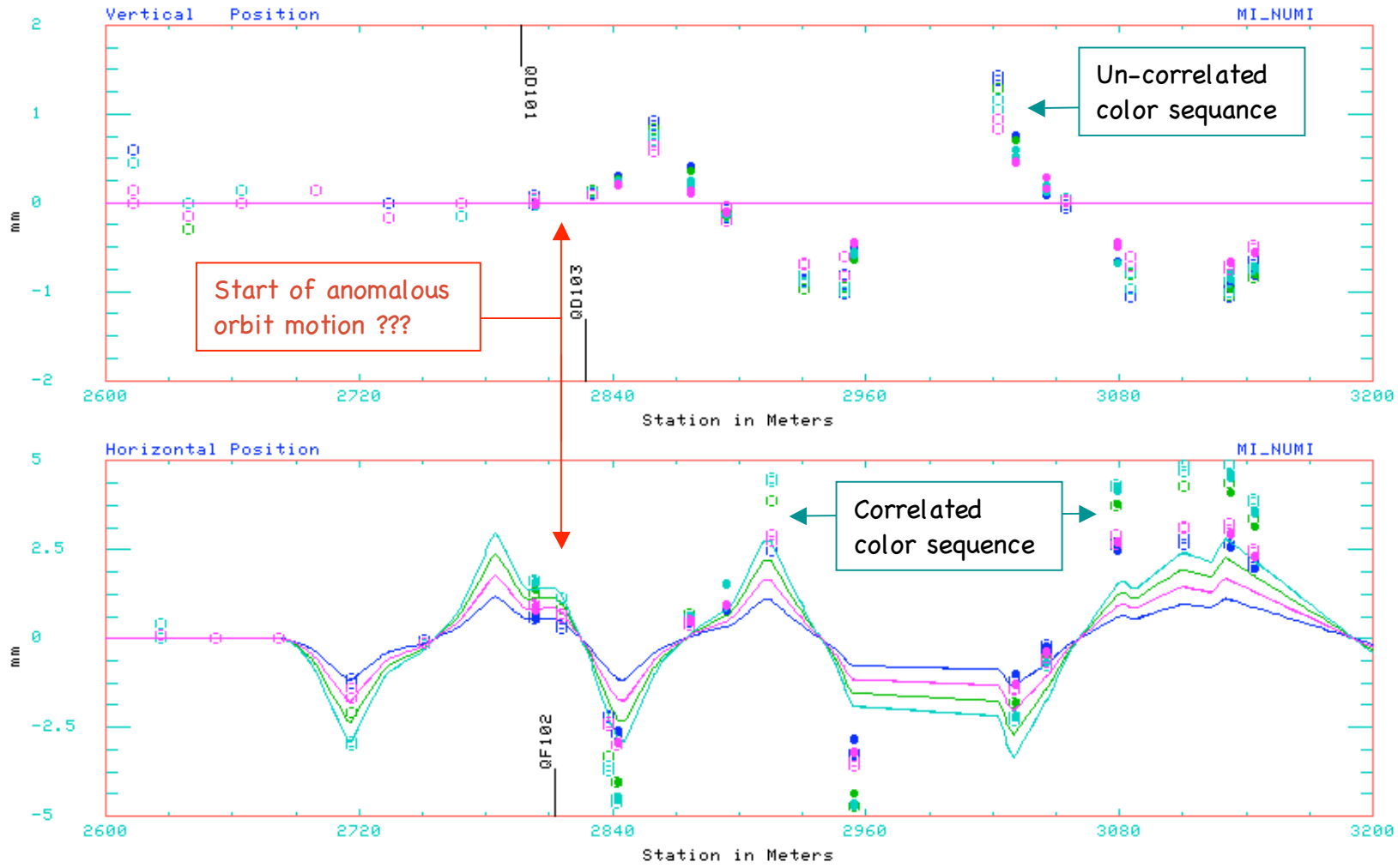
Study data

- One-bump orbits
  - Horizontal plane
    - ✓ Kicker at 602, 0 to -4 KV
    - ✓ H604, -6 to +6 amps
  - Vertical plane
    - ✓ V603, -8 to +8 amps
    - ✓ V605, -9 to +9 amps
  - V118
    - ✓ -12 to +12 ampl
- Dispersion data
  - Study was interrupted

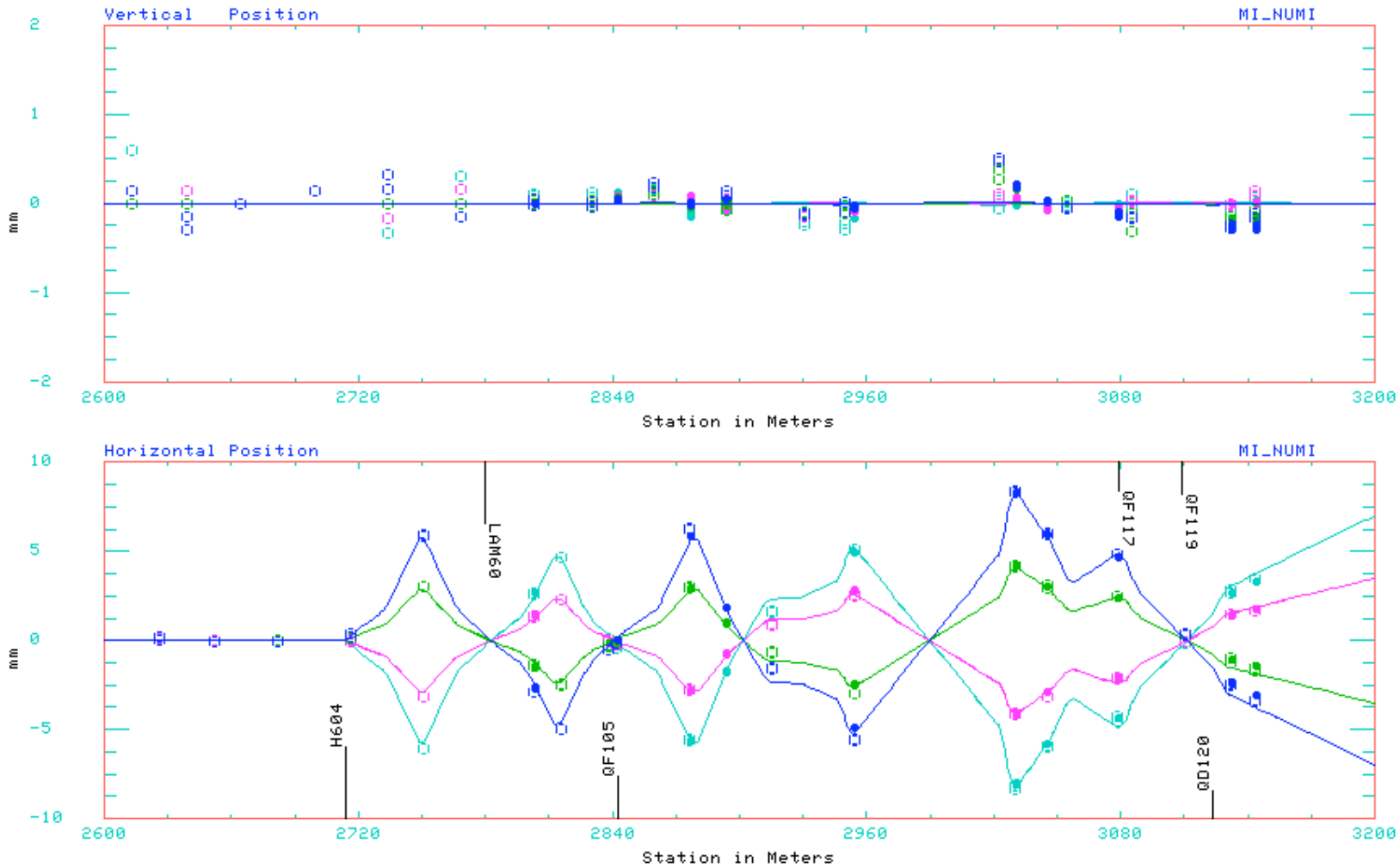
Beam profile, and the shoulders



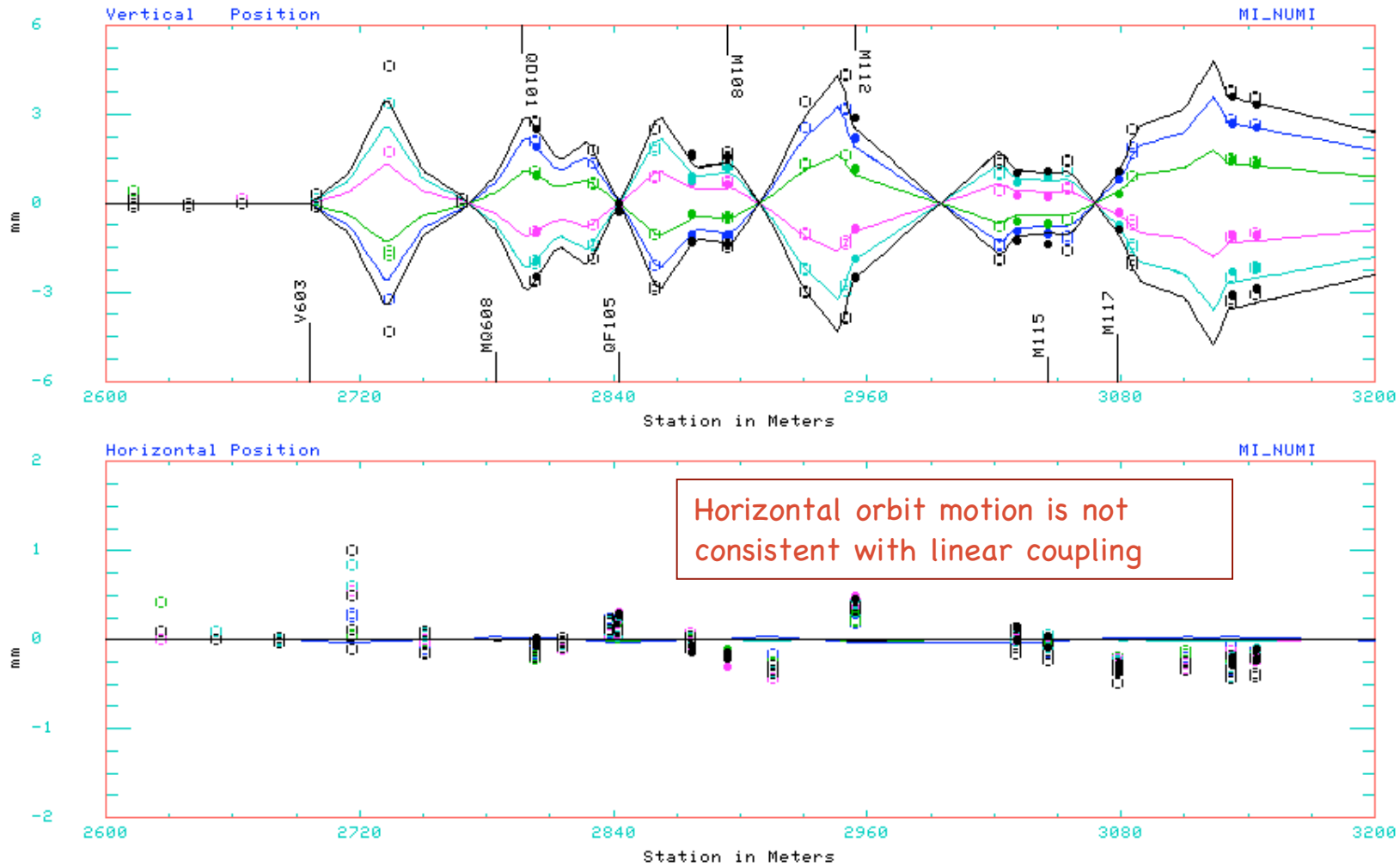
Orbit from MI60 kicker



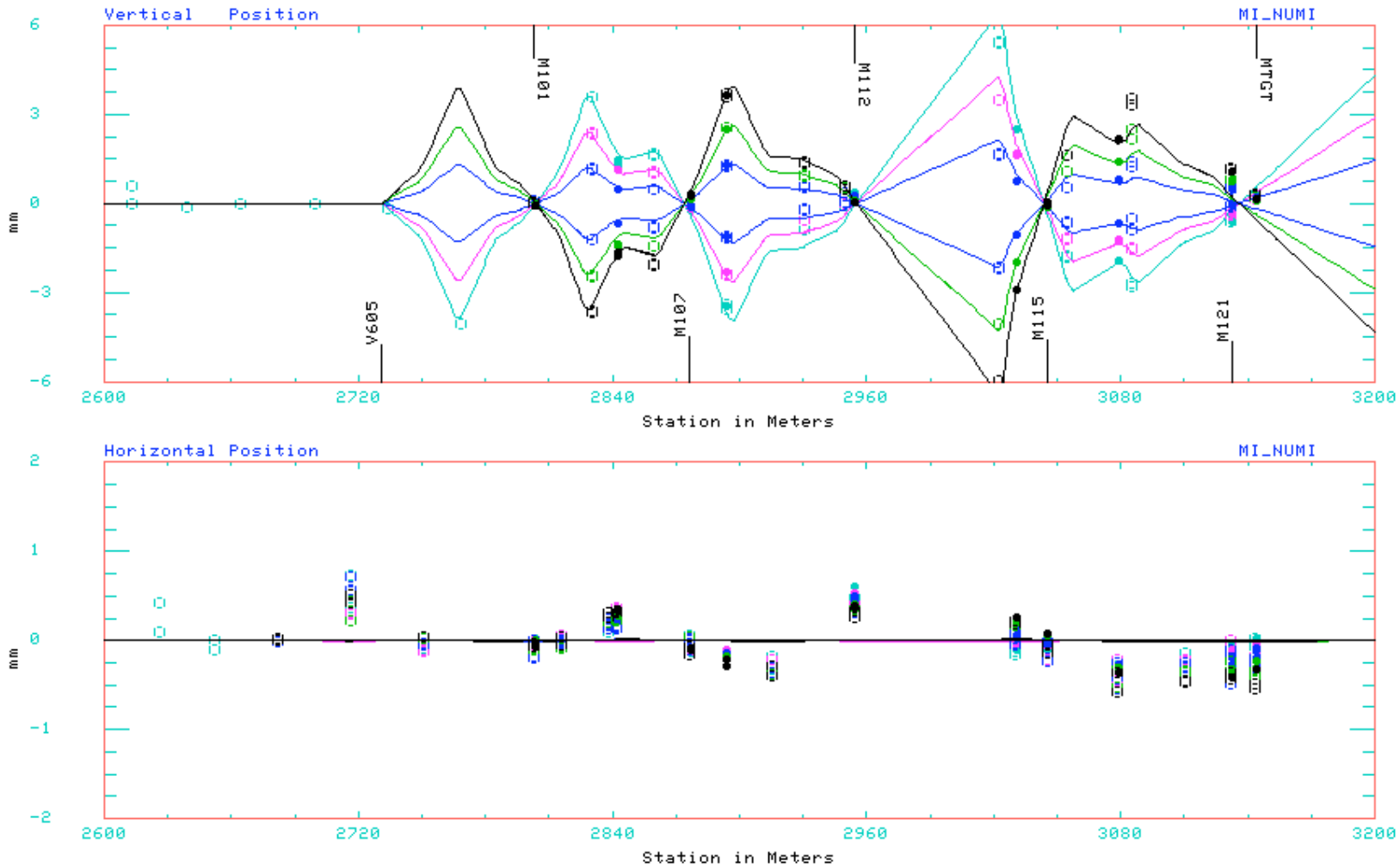
Orbit from MI H604



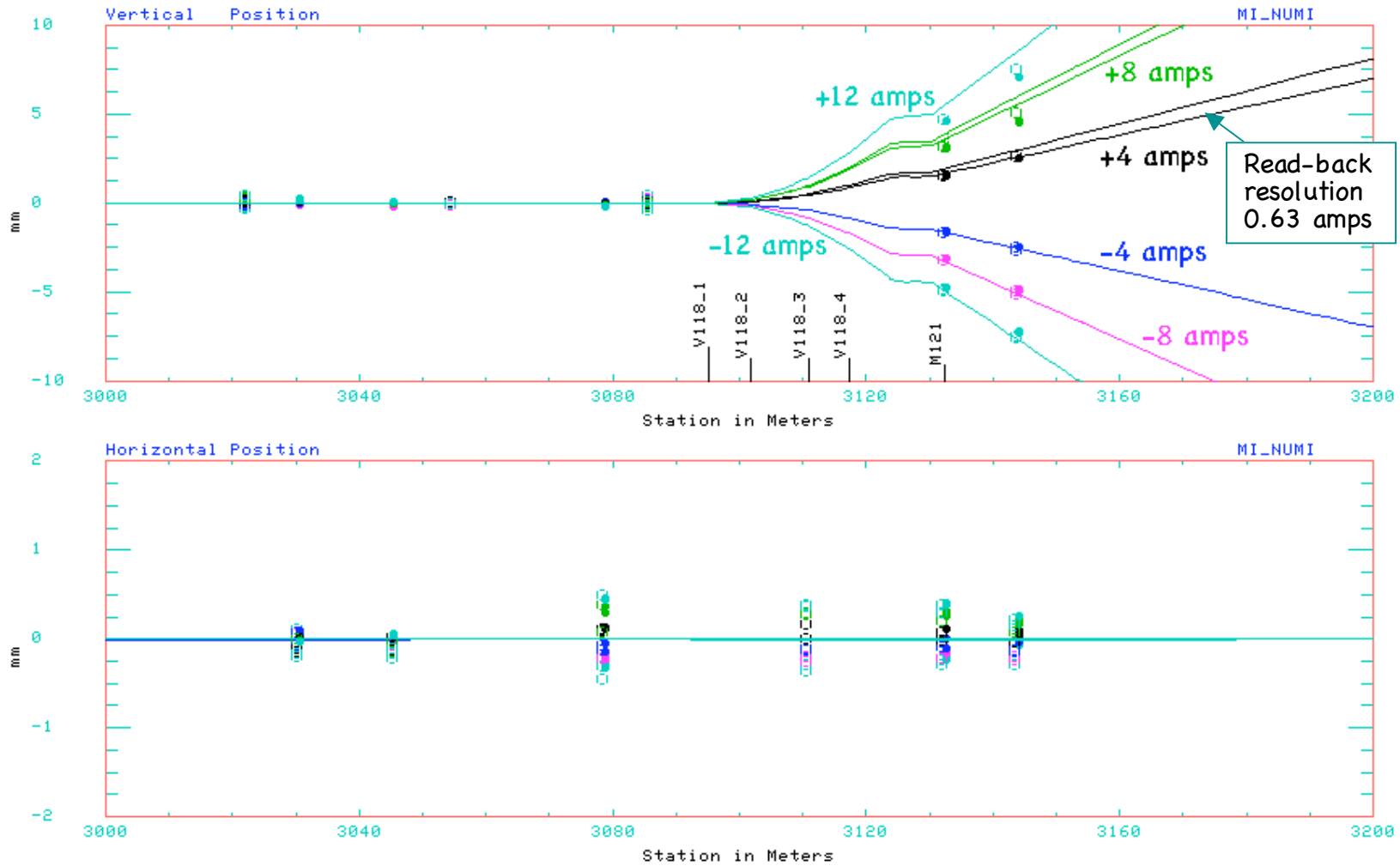
Orbit from MI V603



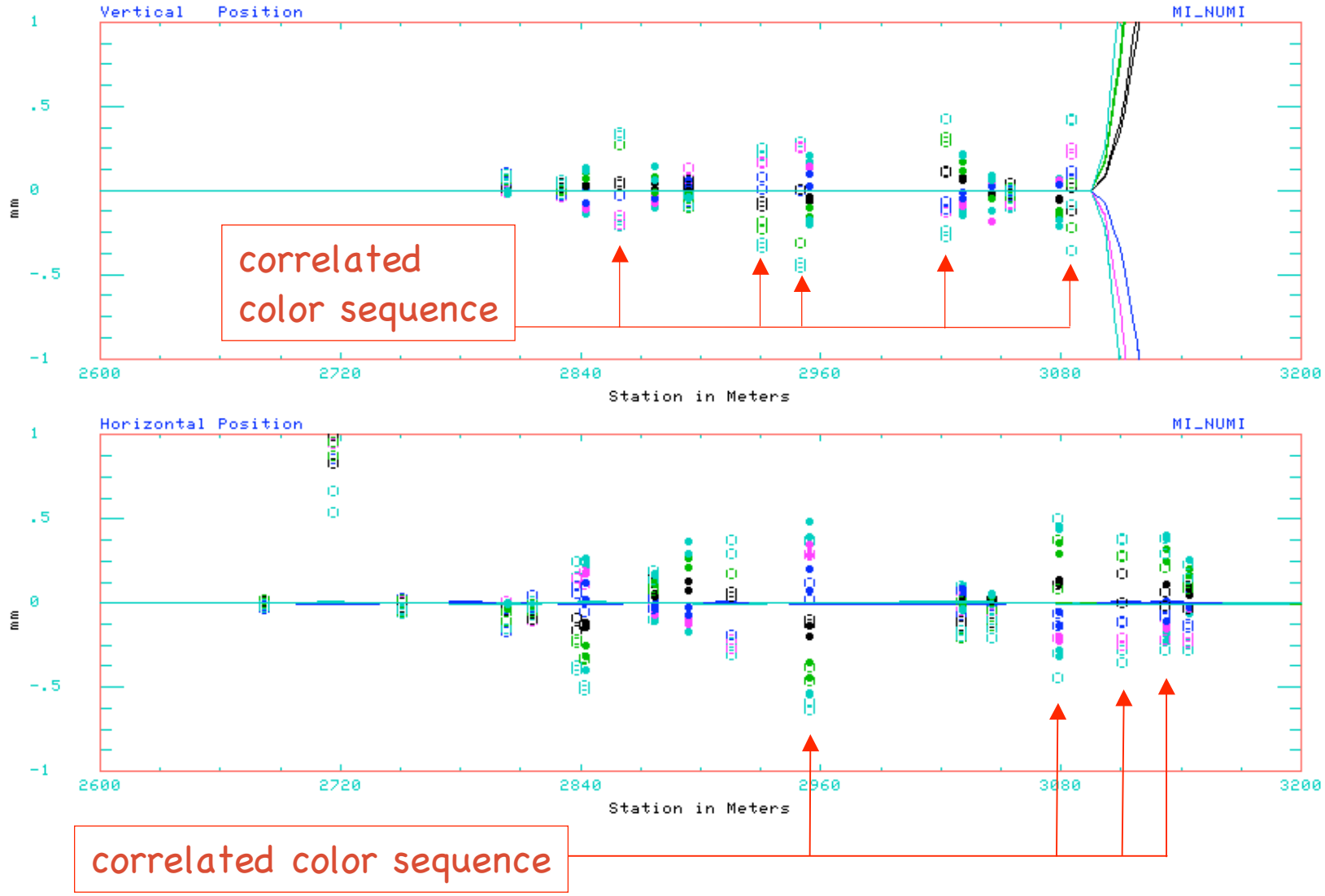
Orbit from MI V605



Orbit from V118 vertical bend



Strange effect from changing V118 setting



Quad currents used to match orbit data

DB_name		Used	Was	Δamps
I:KPS6N	kV	50.34		
I:LAM60	Amps	915.22		
I:LAM61	Amps	1967.11		
E:V100	Amps	2741.55		
E:HV101	Amps	1598.69		
E:V108	Amps	4393.75		
E:V118	Amps	4112.50		
E:QD101	Amps	56.21		
E:QF102	Amps	64.80		
E:QD103	Amps	63.77		
E:QF104	Amps	21.72		
E:QF105	Amps	60.22		
E:QD106	Amps	60.23		
E:QF107	Amps	60.25		
E:QD108	Amps	57.05	60.05	-3
E:QF109	Amps	55.06	60.06	-5
E:QD110	Amps	25.64		
E:QD111	Amps	75.21	78.21	-3
E:QF112	Amps	77.01	82.01	-5
E:QD113	Amps	81.50		
E:QF114	Amps	78.36		
E:QF115	Amps	18.61	25.61	-7
E:QD116	Amps	64.07		
E:QF117	Amps	55.08		
E:QD118	Amps	46.60	51.60	-5
E:QF119	Amps	35.35		
E:QD120	Amps	68.25		
E:QF121	Amps	62.16	60.16	2

58.06 amp used

58.09 amp used

17.1 amp used

Summary

- Profile data
  - Shoulder on beam profiles (not a new issue).
- Orbit with MI60 kicker
  - Anomalous orbit motion in both plane.
- Vertical orbits
  - Anomalous horizontal orbit motion.
- V118 bend
  - Orbit response not symmetric.
  - Anomalous orbit motion up-stream, in both planes
    - ✓ Both planes and correlated with V118 setting.
- QD101
  - Current reading is consistent with orbit data.

Plan for next study

- Beam requirement
  - Single batch, 4E12.
- Dispersion function data
  - Verify the dispersion function after V118.
- Clean beam, i.e. no shoulders.
  - Play with batch number.
- Use MI H602 corrector instead of 60 kicker.
  - Build long 602 bump across 608 Lambertsons.
- Vary LAM61 current
  - Study transfer constant at high field.