Y. Chao
05/22/02

Recent Results of Transport Automatch Test

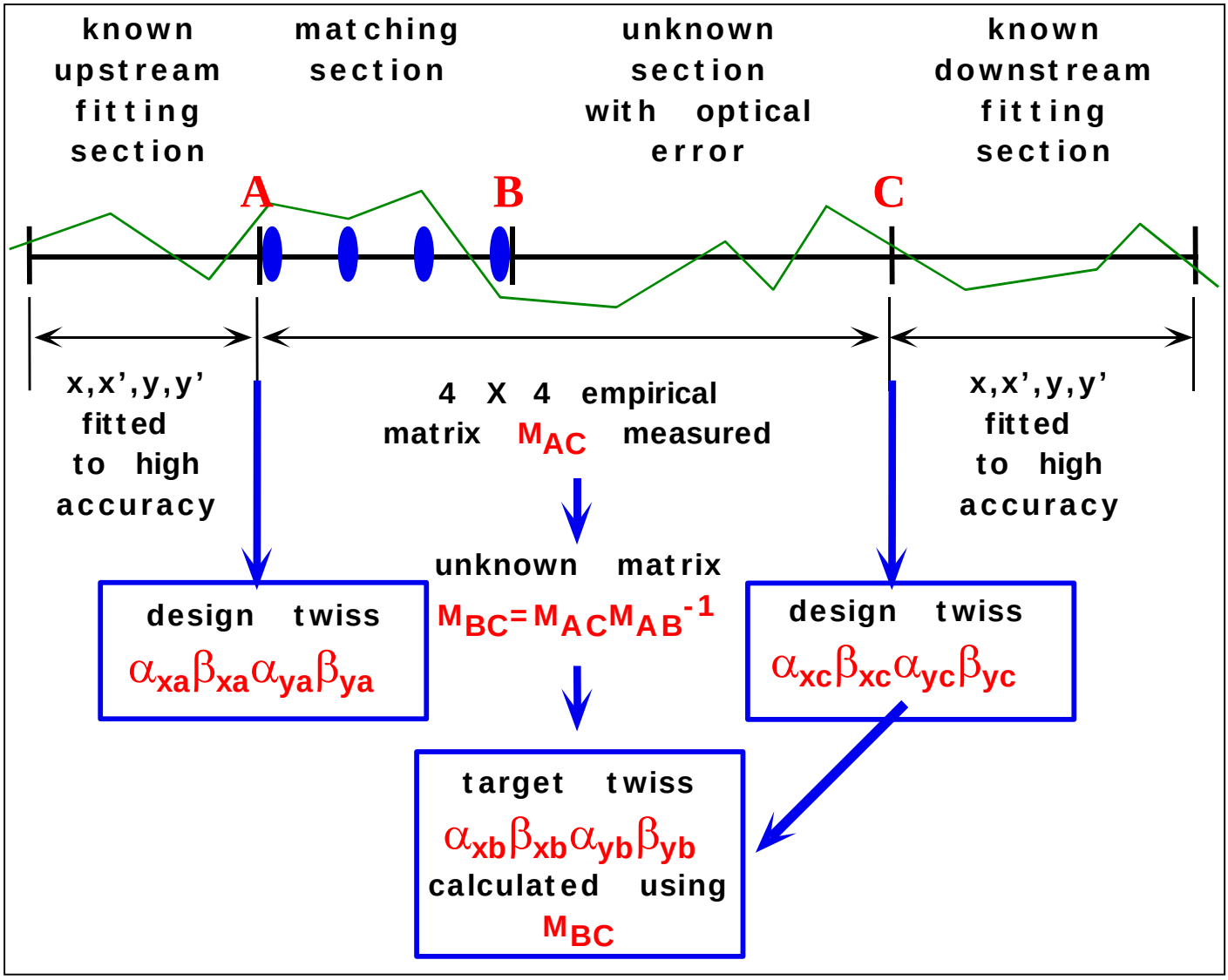
Why Do It?

- A well matched machine can save a lot of trouble
- Adiabatic damping is important for parity experiments
- Existing matching method can be improved in many aspects
  - Information on mismatch / correction
  - Efficiency / Convergence
  - Quality of solution (if at all)
  - Insight

How Is It Done?

- Measure transport optics to the degree of precision needed for verifying matching results
- Match optics deterministically based on global solutions

Conceptual Transport Matching



- **Bottom line: Given that beam has design twiss parameters at A, we want it to be as design at C**

Deterministic Matching Algorithm

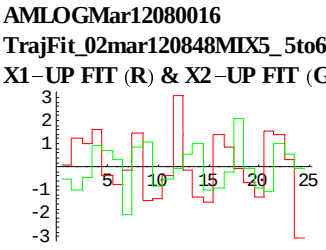
- **Global solutions obtained directly from input, often impossible with local methods.**

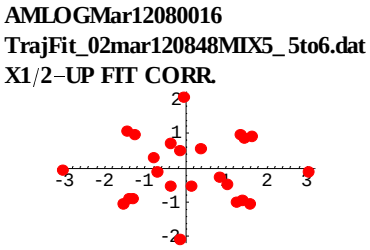
- **Can signal configuration problems.**

Test of March 12, 2002

- **Beam transport was deliberately changed by moving matching quads away from tuned values in 5R, 6R, 7R & 8R.**

- **One single set of special difference orbit data was used to match**
  - **5A-6A**
  - **6A-7A**
  - **7A-8A**
  - **8A-9A**





- **5A-6A achieved 100% match in both planes on first shot**
  → Demonstration of ability to "fine-tune"

- **Partial matching performed on the other arcs. All verified to be successful on first shot. 7A-8A partially successful due to gross initial error.**

- **Global algorithm prevented time wasted on impossible cases.**

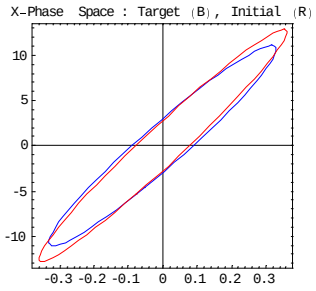
- **Solutions impossible to obtain by local methods**
  → (ΔGdl ~15,000 G –100,000 G)

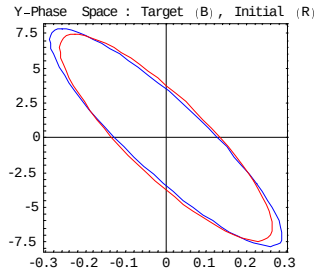
- **Observed orbit blowup disappeared after matching.**

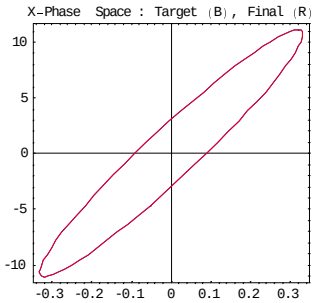
- **Machine reading / setting precision is up to the task, if we know how to extract the information.**

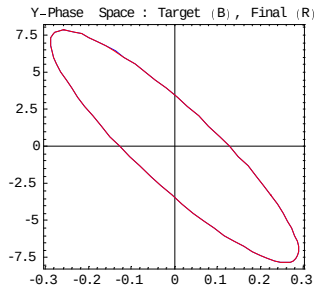
A definite proof that it works. Were we extremely lucky?

ARC 5 TO ARC 6 BEFORE









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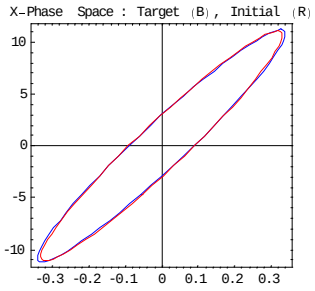

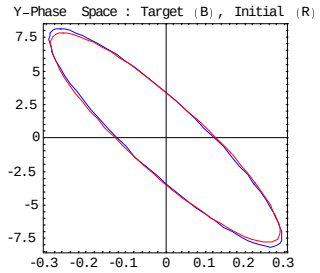

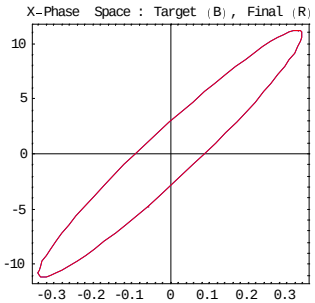

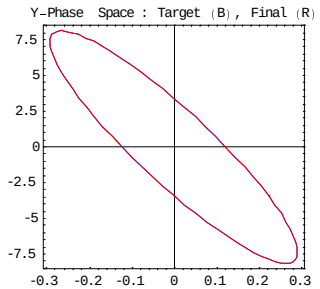

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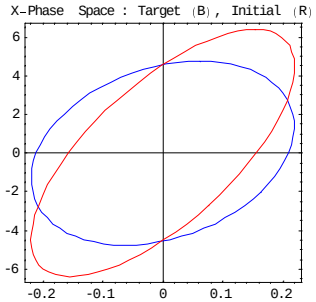

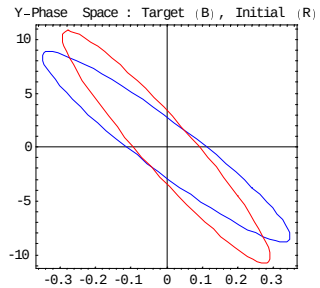

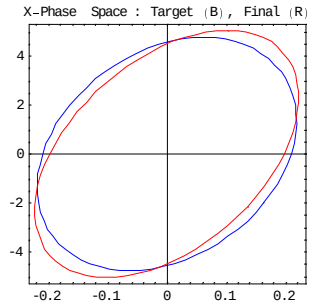

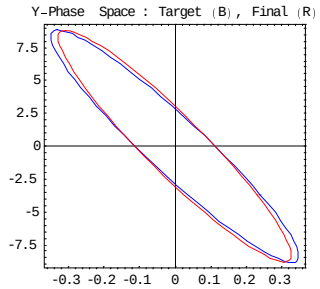

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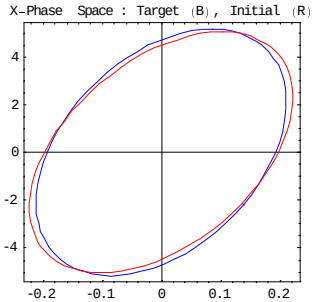

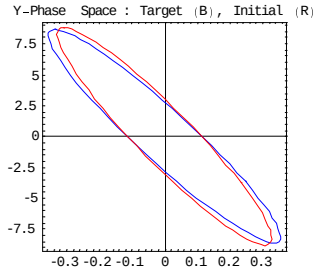

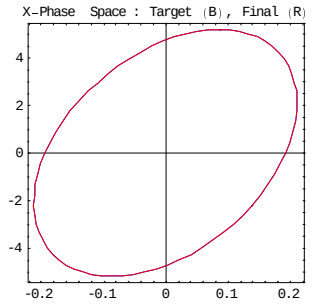

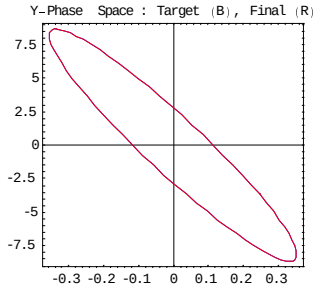

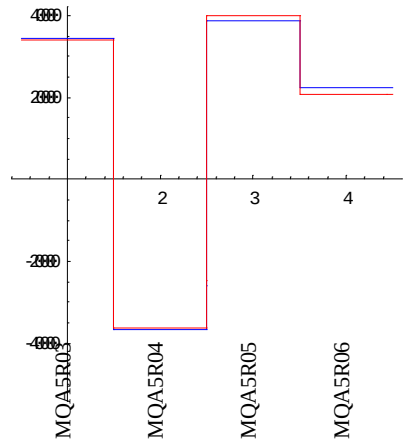

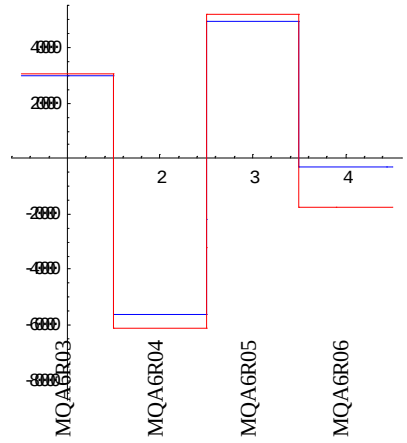

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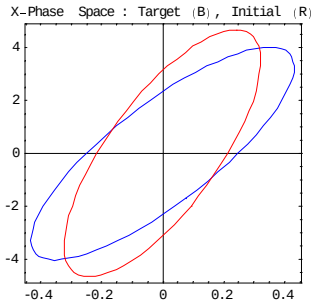

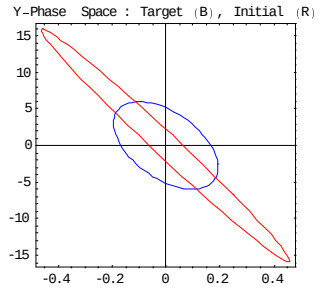

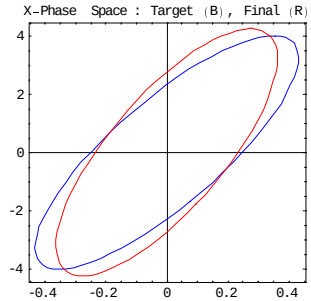

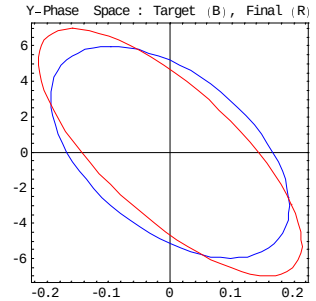

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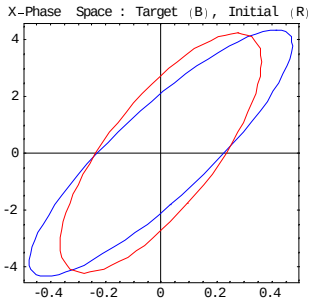

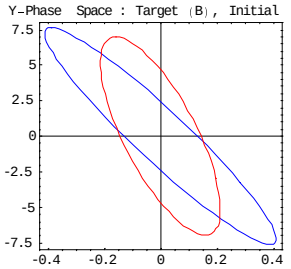

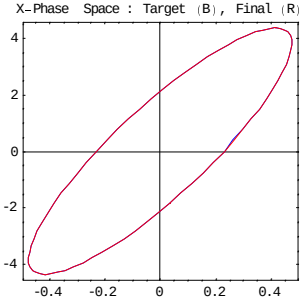

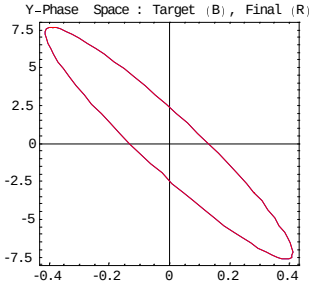

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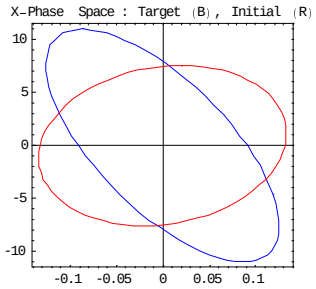

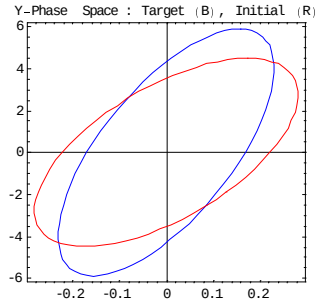

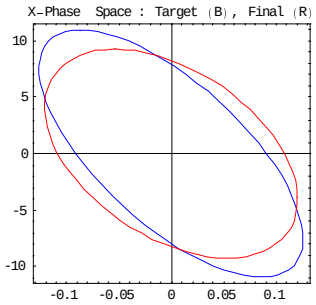

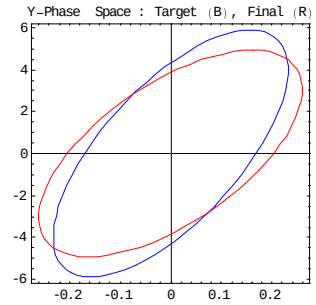

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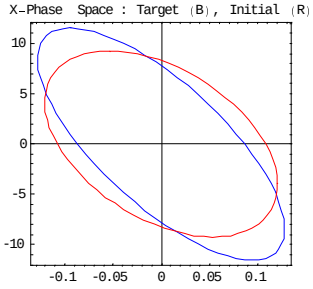
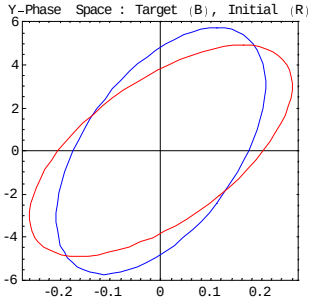
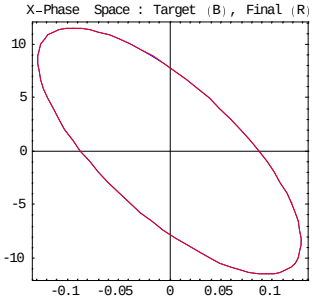
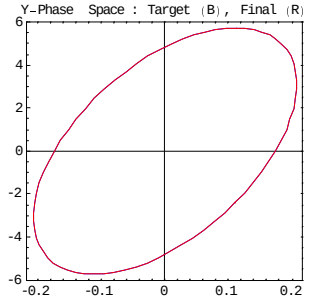
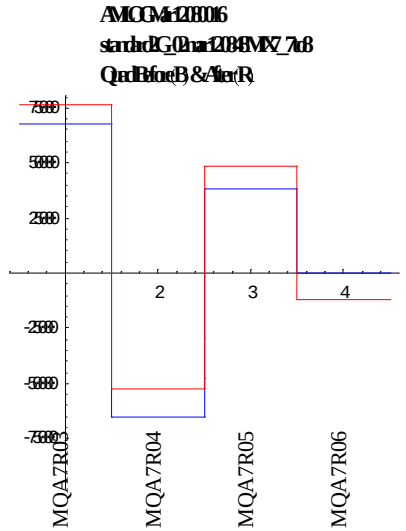
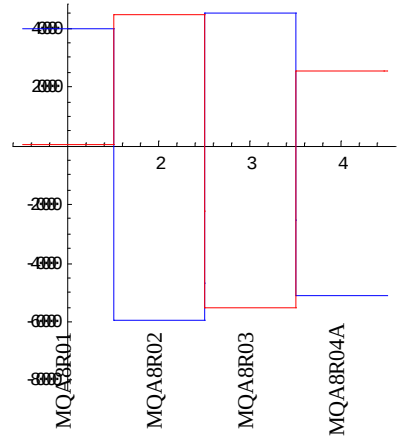






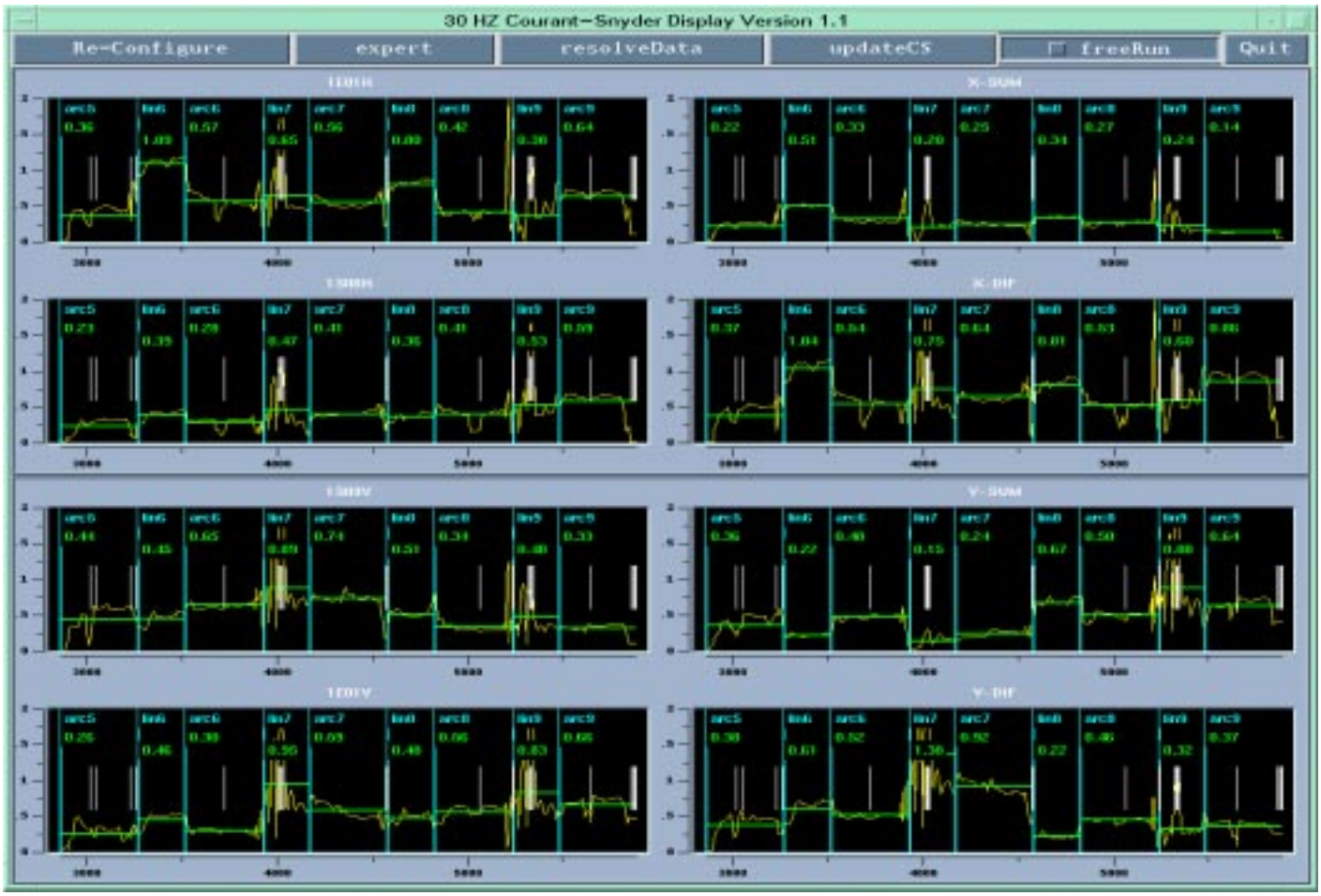






03/12/02 Test

Before



After