qsUtility/eDT Update

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OPS StayTreat Presentation

Outline

qsUtility Overview

qsUtility consists of a set of tools for performing emittance measurements and analyzing the results:

- ▶ zigzag_dataCollector: Runs automated emittance measurements and formats the data for input to analyzer.
- ▶ analyzer: Computes emittance and Twiss parameters from data collected by zigzag_dataCollector.
- ▶ matchingTool: Automates matching to design Twiss parameters based upon measured parameters computed by analyzer.

qsUtility Overview (cont.)

- ▶ The overall goal of `qsUtility` is to provide tools for operators to perform emittance measurements and optics matching without expert intervention.
- ▶ Transparency and flexibility are important. If there is a problem with a measurement, it should be clear what the problem is and there should be a clear path to fix the problem.
- ▶ We would like to get the time to do ORFP down to < 1 hour per arc.

zigzag_dataColllector Screenshot

analyzer Screenshot

`matchingTool` Screenshot

Selected Configuration: /a/devdata/dvlfileio/fileio/q/qsUtility/match_config/F3-0/INJ_NL_match_example.xml [Help] [Quit]

| 1: Select a Configuration File |
| 2: Enter Input Twiss Parameters ----------> |
| 3: Create Lattice & Command File |
| 3a: Edit Command File (optional) |
| 4: Go |

Input Twiss at MQD0L06

betax (m)	12.782
alphax	1.4903
betay (m)	10.83
alphay	1.213

Design Twiss at MQD0R09

betax (m)	1.941303
alphax	-.6854467
betay (m)	20.49233
alphay	2.28783

Expert Options (Be Careful)

☐ Allow optimizer to change quad signs? (Default is NO)

☐ Start with present machine settings instead of design? (Default is NO)

Progress (most recent action at the top)

Click 'Create Lattice & Command File' to build the lattice with the input twiss parameters
Config file /a/devdata/dvlfileio/fileio/q/qsUtility/match_config/F3-0/INJ_NL_match_example.xml loaded
Getting design Twiss parameters at MQD0R09 from CED
Reading config file /a/devdata/dvlfileio/fileio/q/qsUtility/match_config/F3-0/INJ_NL_match_example.xml
Select a configuration file to begin

zigzag_dataCollector Updates

The "ZigZag" harp data collection protocol has finally been implemented. We used it succesfully during the last run. An emittance measurement now takes a few minutes rather than an 45 minutes to an hour. Upcoming improvements include:

- One SA data file per wire scan vs. One Big File for entire measurement
    - Simplifies harp data processing by eliminating troublesome peak finding
    - Allows better monitoring of measurement progress. Plots of beam size, etc. for each measurement step can now be provided.
    - Eliminates danger of harp buffer overflow in normal use cases.
- Provide selection for "beam off" method (FC1, FC2, Laser mode, etc)
    - Provides flexibilty in taking measurements with multiple beams in play, e.g. allows one to take measurements for one hall while not interrupting beam to another.

- Provide an option to compute wire position from DAC rate and wire speed rather than pot signal.
  - Allows reasonable measurements to be taken by harps with ratty potentiometer readbacks.

analyzer Updates

- Provide additional data on the GUI (e.g. R matrix elements).
  - More useful to optics experts than operators.
- Provide a method to backpropagate Twiss parameters directly on the GUI.
  - Simplifies backpropagation for matching.

matchingTool Updates

- Option to start from present machine settings vs design.
  - Allows for iterative matching.
- Provide ability to match to parameters other than β and α.
  - Match to beam size σ or any other parameter generically.

eDT Overview

eDT (`elegant` Download Tool) computes design BDL setpoints for all quadrupole and dipole magnets in CEBAF.

- ▶ Provides operators with a visual tool for comparing design BDLs to those presently in the machine.
- ▶ Creates BURT snapfiles for downloading design setpoints
- ▶ Allows "overlays" to be loaded on top of the design setpoints to allow for off-design configurations (e.g. Injector Chicane M_{56}, Hall Compton Chicane vs Straight-Ahead).
- ▶ Provide other functions such as corrector zeroing, dogleg "design" setpoints, etc.

eDT Screenshot

eDT Updates

- eDT is mostly static at this point.
- Expect speed improvements with upcoming changes to `elegant` decks to CED import.
- Possibility of incorporating design setpoints into the alarm handler or other methods to warn of or prevent inadvertently blowing away a good setup.

End.