



# **Methodical Accelerator Design Module Keepers Meeting**

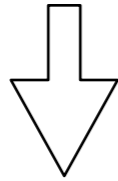
**Laurent Deniau  
CERN-BE/ABP**

**24<sup>th</sup> April 2012**

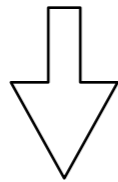
## Tasks

## Objectives

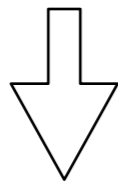
reorganize source code



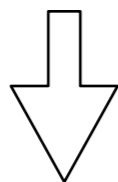
setup build system



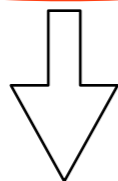
setup web site



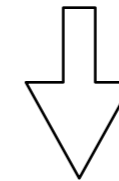
setup tracker



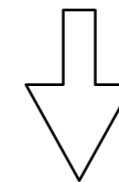
setup test system



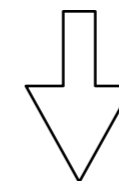
enforce the cohesion



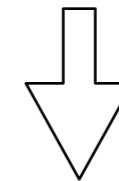
fast and portable builds



information and resources




bugs and requests



*pro release*

- ⦿ Check out the code (see “Bugs & requests” on website)
- ⦿ Make builds (see Makefile and make/README)
  - ➔ Do not modify the makefiles (svn!), use command line setup
    - ▶ `make -j5 ARCH=32 ONLINE=yes STATIC=yes Intel=yes`
    - ▶ `make -j5 ARCH=64 ONLINE=yes STATIC=yes GNU=yes`
  - ➔ For debugging, use `DEBUG` for debugging info and `NOPT` for optimization level
    - ▶ `make -j5 ARCH=32 ... DEBUG=yes NOPT=0`
  - ➔ List of options, see `Makefile`
  - ➔ Advanced config, see my `Makefile_post` on `lxplus:~mad/madx/madX`
- ⦿ Same build system and commands everywhere (Linux, MacOSX, Windows)
  - ➔ Requires only GNU make
    - ▶ For Windows, see `gnuwin32.sourceforge.net`
  - ➔ But different settings
    - ▶ `ONLINE` only for Linux
    - ▶ `STATIC` only for Linux and Windows



madx-dev  
on lxplus

Trace bugs and requests (see “Bugs & requests → tickets” on website)

- ➔ Tickets: user report, attached files, module belonging to, assigned to module keeper
  - ▶ 98 tickets created, 56% assigned with 35% to myself
  - ▶ 47 tickets open (48%), 43% assigned, 15% to myself
- ➔ Module keepers have been notified of their tickets by email
  - ▶ 6 tickets closed (excluding the 28 tickets closed by me)

many tickets are not assigned...

Ticket	Summary	Component	Status	Resolution	Version	Type	Priority	Owner	Reporter	Created
# 153	Memory overflow and input bug on windows	_windows	new		5.00	defect	major		gajendra.kumar.sahoo@...	18/04/12
# 152	PTC does not find the closed orbit	ptc_twiss	new		5.00	defect	major		sugahara.kengo@...	16/04/12
# 151	Significant memory leak in PTC	ptc_twiss	closed	fixed	5.00	defect	major	laurent.deniau	harry.renshall	05/04/12
# 150	memory management problem: plot with interpolate changes value of bending angle	mod_plot	new		5.00	defect	major		piotr.skowronski	03/04/12
# 149	Lost particles differ from previous version	mod_track	new		5.00	defect	major		simone.maria.liuzzo@...	01/04/12
# 148	Incorrect beam parameters retrieval	_doc	closed	worksforme	5.00	defect	minor	laurent.deniau	massimo.giovanozzi	29/03/12
# 147	Silent bug in the parser when ; is forgotten.	core_parser	closed	wontfix	5.00	defect	major		cedric.hernalsteens	27/03/12
# 146	Beam parameters are set to electron	core_variable	closed	worksforme	5.00	defect	major	laurent.deniau	andriyrusanov@...	27/03/12
# 145	Buserror in PTC twiss	ptc_twiss	new		5.00	defect	major		laurent.deniau	22/03/12
# 144	Invalid dispersion calculation with expression for e1, e2	mod_twiss	closed	fixed	5.00	defect	major	laurent.deniau	A.V.Bogomyagkov@...	21/03/12
# 143	How to increase the speed of MAD-X invocation	_perf	closed	fixed	5.00	info	major	laurent.deniau	frigyes.janos.nemes	20/03/12
# 142	Error with mvar1, mvar2	mod_match	closed	fixed	5.00	defect	major	laurent.deniau	heurich@...	20/03/12
# 141	Select does not work on twiss sectormap	core_select	new		5.00	defect	major		eliana@...	15/03/12
# 140	Survey table is not saved if table name is not survey	mod_survey	assigned		5.00	defect	major	frank.tecker	jose.abelleira	14/03/12
# 139	crash trying reading empty table files	core_table	new		5.00	defect	major		riccardo.de.maria	14/03/12
# 138	Unify aperture types in MAD-X and PTC	mod_aperture	new		5.00	task	major		laurent.deniau	14/03/12
# 137	Cavities voltages and frequencies are set to zero	core_element	closed	fixed	5.00	defect	major	laurent.deniau	miriam.fitterer	12/03/12
# 136	Space before arrow operator does not work	core_parser	closed	wontfix	5.00	defect	minor	laurent.deniau	stephane.fartoukh	06/03/12
# 135	PTC track craches with radiation	ptc_track	new		5.00	defect	major		frank.schmidt	22/02/12
# 134	ptc_normal produces empty fort.18	ptc_normal	new		5.00	defect	major		yngve.inntjore.levinsen	21/02/12
# 133	madx to use input arguments	core_main	new		5.00	request	minor		yngve.inntjore.levinsen	21/02/12
# 132	Seterr doesn't handle wrong input properly	mod_errors	new		5.00	defect	major		yngve.inntjore.levinsen	17/02/12
# 131	Reading and plotting data is crashing	mod_plot	new		5.00	defect	major		gabriel.johannes.mueller	14/02/12
# 130	Invalid behavior of Twiss command with a table name specified	mod_twiss	assigned		5.00	defect	major	laurent.deniau	gabriel.johannes.mueller	14/02/12
# 129	Nagfor 5.2 crashed in PTC	ptc_proper	closed	overcome	5.00	defect	major		frank.schmidt	08/02/12
# 128	Add chromatic components in PTC_twiss	ptc_twiss	new		5.00	task	major		miriam.fitterer	08/02/12
# 127	Match is crashing with a bus error	mod_match	assigned		5.00	defect	major	riccardo.de.maria	horst.schonauer	03/02/12
# 126	Negatif drift reported during matching	mod_match	closed	fixed	5.00	defect	major	laurent.deniau	piotr.skowronski	01/02/12
# 125	File not found	core_stream	closed	fixed	5.00	defect	major	laurent.deniau	horst.schonauer	01/02/12
# 124	Invalid parser message	core_command	closed	fixed	5.00	defect	minor	laurent.deniau	olav.ejner.berrig	01/02/12
# 123	Invalid values in the Twiss table	ptc_twiss	assigned		5.00	defect	major	laurent.deniau	eberhard.keil	31/01/12
# 122	Twiss table can hold many delta-p but save only one	core_table	assigned		5.00	defect	minor	laurent.deniau	eberhard.keil	31/01/12
# 121	Mistake in the doc of correct command	_doc	closed	fixed	5.00	defect	minor	laurent.deniau	ulrich.dorda	31/01/12
# 120	Use command reports incorrectly an undefined element	core_sequence	assigned		5.00	defect	major	laurent.deniau	eberhard.keil	31/01/12





# Trac Active Tickets



## {1} Active Tickets (47 matches)

- List all active tickets by priority.
- Color each row based on priority.

### Check if you can/cannot takeover a ticket!!!

Ticket	Summary	Component	Status	Version	Type	Priority	Owner	Reporter	Created
#56	Problem with USE before aperture command	mod_aperture	new	5.00	defect	major		yngve.inntjore.levinsen	20/01/12
#60	ptc_twiss get DA got unstable	ptc_twiss	assigned	5.00	defect	major	piotr.skowronski	eberhard.keil	20/01/12
#61	Invalid deflection created by aperture	mod_aperture	assigned	5.00	defect	major	bernard.jeanneret	christoph.hessler	20/01/12
#67	Add a command similar to SETVARS that creates linear interpolating	core_command	new	5.00	request	major		riccardo.de.maria	26/01/12
#69	Plot survey table	mod_plot	new	5.00	defect	minor		eberhard.keil	26/01/12
#71	PLOT commands don't work on Windows	mod_plot	new	5.00	defect	major		eberhard.keil	26/01/12
#73	Invalid command BETA0 not detected	core_command	assigned	5.00	defect	major	laurent.deniau	eberhard.keil	27/01/12
#75	MAXAPER from PTC_TRACK does not work	ptc_track	assigned	5.00	defect	major	valery.kapin	chiang.markcc@...	27/01/12
#76	Oddity in madx graphics	mod_plot	new	5.00	defect	minor		eberhard.keil	27/01/12
#77	Aperture limit for RCOLLIMATOR does not work	mod_aperture	assigned	5.00	defect	major	laurent.deniau	i.strasik@...	27/01/12
#85	Table with 16 characters or more cannot be plotted	mod_plot	assigned	5.00	defect	minor	riccardo.de.maria	stephane.fartoukh	27/01/12
#86	Possible bug for plot, interpolate	mod_plot	new	5.00	defect	major		steffen.hillenbrand	27/01/12
#89	Deselect some magnets using slice=-1	mod_mkthin	assigned	5.00	task	major	helmut.burkhardt	thys.risselada	27/01/12
#99	Additional flag for the sectormap in twiss	mod_twiss	new	5.00	request	major		frank.schmidt	30/01/12
#100	Incorrect numerical results and crash in PTC	ptc_twiss	assigned	5.00	defect	major	piotr.skowronski	frank.schmidt	30/01/12
#102	Invalid interpolation in plot	mod_plot	new	5.00	defect	major		eberhard.keil	30/01/12
#104	Add crab cavity to Twiss calculations	mod_twiss	assigned	5.00	task	major	andrea.latina	frank.schmidt	30/01/12
#105	Integration of special nonlinear lens elements	mod_twiss	assigned	5.00	task	major	laurent.deniau	frank.schmidt	30/01/12
#106	Improve chromaticity calculation in Twiss	mod_twiss	new	5.00	task	major		frank.schmidt	30/01/12
#107	BeamBeam in PTC but not in convertor	ptc_proper	new	5.00	task	major		frank.schmidt	30/01/12
#108	AC-dipole in PTC but not in convertor	ptc_proper	new	5.00	task	major		frank.schmidt	30/01/12
#109	Facility to setup parameters	core_option	new	5.00	request	major		frank.schmidt	30/01/12
#113	Add thick quadrupoles in track	mod_track	assigned	5.00	task	major	andrea.latina	massimo.giovanozzi	30/01/12
#114	Add RF-multipoles in MAD-X	mod_twiss	assigned	5.00	task	major	andrea.latina	massimo.giovanozzi	30/01/12
#115	Bug in plot with interpolation	mod_plot	new	5.00	defect	major		eberhard.keil	30/01/12
#116	Bug in plot title and version	mod_plot	assigned	5.00	defect	minor	riccardo.de.maria	eberhard.keil	30/01/12
#118	ptc_track handles incorrectly observation points with ffile	ptc_track	assigned	5.00	defect	minor	valery.kapin	markus.ries@...	31/01/12
#120	Use command reports incorrectly an undefined element	core_sequence	assigned	5.00	defect	major	laurent.deniau	eberhard.keil	31/01/12
#122	Twiss table can hold many delta-p but save only one	core_table	assigned	5.00	defect	minor	laurent.deniau	eberhard.keil	31/01/12
#123	Invalid values in the Twiss table	ptc_twiss	assigned	5.00	defect	major	laurent.deniau	eberhard.keil	31/01/12
#127	Match is crashing with a bus error	mod_match	assigned	5.00	defect	major	riccardo.de.maria	horst.schonauer	03/02/12
#128	Add chromatic components in PTC_twiss	ptc_twiss	new	5.00	task	major		miriam.fitterer	08/02/12
#130	Invalid behavior of Twiss command with a table name specified	mod_twiss	assigned	5.00	defect	major	laurent.deniau	gabriel.johannes.mueller	14/02/12
#131	Reading and plotting data is crashing	mod_plot	new	5.00	defect	major		gabriel.johannes.mueller	14/02/12
#132	Seterr doesn't handle wrong input properly	mod_errors	new	5.00	defect	major		yngve.inntjore.levinsen	17/02/12
#133	madx to use input arguments	core_main	new	5.00	request	minor		yngve.inntjore.levinsen	21/02/12
#134	ptc_normal produces empty fort.18	ptc_normal	new	5.00	defect	major		yngve.inntjore.levinsen	21/02/12
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#138	Unify aperture types in MAD-X and PTC	mod_aperture	new	5.00	task	major		laurent.deniau	14/03/12
#139	crash trying reading empty table files	core_table	new	5.00	defect	major		riccardo.de.maria	14/03/12
#140	Survey table is not saved if table name is not survey	mod_survey	assigned	5.00	defect	major	frank.tecker	jose.abelleira	14/03/12
#141	Select does not work on twiss sectormap	core_select	new	5.00	defect	major		eliana@...	15/03/12
#145	Buserror in PTC twiss	ptc_twiss	new	5.00	defect	major		laurent.deniau	22/03/12
#149	Lost particles differ from previous version	mod_track	new	5.00	defect	major		simone.maria.liuzzo@...	01/04/12
#150	memory management problem: plot with interpolate changes value of bending angle	mod_plot	new	5.00	defect	major		piotr.skowronski	03/04/12
#152	PTC does not find the closed orbit	ptc_twiss	new	5.00	defect	major		sugahara.kengo@...	16/04/12
#153	Memory overflow and input bug on windows	_windows	new	5.00	defect	major		gajendra.kumar.sahoo@...	18/04/12

Laurent Deniau, CERN BE/ABP, 1211 Geneva 23, laurent.deniau@cern.ch

## Ticket #130 (assigned defect)

**Invalid behavior of Twiss command with a table name specified** Opened **2 months ago**  
Last modified **6 weeks ago**

Reported by:	<a href="#">gabriel.johannes.mueller</a>	Owned by:	<a href="#">laurent.deniau</a>
Priority:	major	Milestone:	
Component:	mod_twiss	Version:	5.00
Keywords:		Cc:	made@...

Description (last modified by [lideniau](#)) (diff)

date: 2012.02.14

The Twiss command with a table name specified does not respect the previous twiss definition! E.g. the following two snippets create different output!

Correct behaviour:

```
select, flag=twiss, clear;
select, flag=twiss, range=MQ.18R1.B1/MQ.24R1.B1, column=name,s,betx,bety,n1x_m,n1y_m;
twiss, sequence=lhcb1, file=values-ori.tfs;
```

Full table created:

```
select, flag=twiss, clear;
select, flag=twiss, range=MQ.18R1.B1/MQ.24R1.B1, column=name,s,betx,bety,n1x_m,n1y_m;
twiss, sequence=lhcb1, table=values;
write, table=values, file=values-ori.tfs;
```

owner

reporter

module

date of report  
≠ date of creation

user's  
comments

## Change History

Changed 2 months ago by [lideniau](#)

- **description** modified (diff)

Changed 2 months ago by [lideniau](#)

- **status** changed from *new* to *assigned*

Changed 6 weeks ago by [lideniau](#)

- **reporter** changed from *G. Mueller* to *muellerg*

Changed 6 weeks ago by [lideniau](#)

- **reporter** changed from *muellerg* to *gabriel.johannes.mueller*

Changed 6 weeks ago by [lideniau](#)

- **owner** changed from *lideniau* to *laurent.deniau*

ticket  
history

- ◎ Integrated into the build system
  - ➔ Use `test-xxx` rules and dependencies
  - ➔ Rely on `numdiff` tool to compare numeric files (soon on SVN)
  
- ◎ Unit tests
  - ➔ Very fast, should take <10 seconds
  - ➔ Run as often as possible
  - ➔ Requires a complete change of `madx` code (not foreseen in 2012)
  
- ◎ **Test cases**
  - ➔ Fast, should take <10 minutes
  - ➔ Light, should not depend on large lattice files
  - ➔ Run during development to validate **modules** after changes in the code
  
- ◎ **User cases**
  - ➔ Longer, should take <10 hours
  - ➔ Can depend on large lattice files shared across studies (e.g. LHC optics)
  - ➔ Run before releasing to validate **studies** and avoid backward incompatibilities



- Testing with `numdiff` (ongoing task, soon on SVN)
  - ➔ Compare numeric files with user defined constraints
  - ➔ Handle testsuite (multiple tests at once)
  - ➔ Passed/failed tests are reported on the console
  - ➔ Easy to use within makefile rules

```
pb-d-128-141-31-156:numdiff ldeniau$ ./numdiff -utest
[ Context ]
+ no constraint (0.00 s) - 27/ 27 : PASS
+ single constraint (0.00 s) - 27/ 27 : PASS
+ multiple row constraints (0.00 s) - 27/ 27 : PASS
+ multiple column constraints (0.00 s) - 27/ 27 : PASS
+ overlapping constraints (0.00 s) - 27/ 27 : PASS
+ overlapping strided constraints (0.00 s) - 27/ 27 : PASS
+ sparse mixed strided constraints (0.00 s) - 27/ 27 : PASS
+ many mixed strided constraints (0.00 s) - 27/ 27 : PASS
+ no constraint (after use) (0.00 s) - 27/ 27 : PASS
[ File diff ]
+ empty input (0.00 s) - 1/ 1 : PASS
= 244 total, 244 passed, 0 failed (0.00 s) PASS
```

example of (incomplete) unit tests output for `numdiff` itself



● Single test, **explicit** sequence (Makefile\_test rules)

```
test-mytest: madx-test
  cd tests/mytest ; $(RM) out*.txt
  $(MADX) < mytest.madx > out.txt
  $(DIFF) out.txt ref.txt cfg.txt
  $(DIFF) out1.txt ref1.txt cfg1.txt
  ...
```

bold files are provided by modules keepers

the two files to compare

the diff constraints

names and numbering convention matter

● Series test, **implicit** sequence (Makefile\_test rules)

➔ Look for version 1,2,... of output, reference and config files using convention as above

```
test-mytest: madx-test
  cd tests/mytest ; $(RM) out*.txt
  $(MADX) < mytest.madx > out.txt
  $(DIFF) -serie out.txt ref.txt cfg.txt
```

assumes same convention as above

● Many options available

- ➔ mytest.madx should be portable (i.e. Windows path should use / not \)
- ➔ no symbolic link to other file, no system call, use relative paths, etc...

⦿ Constraint File (list of constraints)

```
#row      col      constraints
*         *         dig=1e2  rel=1e-7  # '*' means all
30:$     *         rel=1e-6  # '$' means end
5:10     *         abs=1e-3  # row slice 5,6,7,...,14
5-10/2   *         rel=1e-5  # row range with stride 5,7,9
31       4-5     dig=1e3   # line 31 column 4,5
5-10/2   *         rel=1e-5  # row range with stride 5,7,9
```

⦿ Constraint format

- ➔ range        *start - end / stride*
- ➔ slice        *start : size / stride*
- ➔ shortcuts    \$ = end, \* = all (equivalent to 1:\$)
- ➔ col refers to **number column** (character column may varies)
- ➔ dig, rel, abs mean *digits* (from input), *relative* and *absolute* errors
- ➔ skip, ign mean *skip* the entire line (whatever column is specified) and *ignore*
- ➔ # or ! start line comments

- ◎ What is a number? (*column count*)
  - ➔ Definition needed to unambiguously count the ***number column*** used in constraints
  - ➔ Integer or floating point number
    - ▶ signs are optional for mantissa and exponent
    - ▶ decimal point is optional, digits must appear at least before and/or after the decimal point
    - ▶ exponent is optional, character e,E,d,D are valid for exponent
    - ▶ blank (space, \t, \n, \r) or punctuation other than **dot** and **underscore** are suffix separators
  
- ◎ Examples of number
 

**3, 3., 2.3, .2, 2., 1.5e5, 3.4d3, 1.e5**

**-15, +12, +-10, %05f, ?5, <5, =5, 0.15.6, .15.6, .15 .6**

**15MB, MB 15, MB 15., MB .15**
  
- ◎ Examples of not-a-number
 

**MB15, MB15., MB.15, MQ.A2.3, \_15,**

- ⊙ How numbers are compared?
  - ➔ Absolute:  $|a - b| \leq \text{abs}$
  - ➔ Relative:  $|a - b| \leq \text{rel} \cdot \min(|a|, |b|)$
  - ➔ Digits:  $|a - b| \leq \text{dig} \cdot \min(|a|, |b|) \cdot 10^{-\text{ndig}}$ 
    - `ndig` is the max number of significant digits read from input
  - ➔  $a = 0$  or  $b = 0 \Rightarrow \text{min} = 1$ 
    - Relative  $\Rightarrow$  Absolute
  
- ⊙ What is a line? (*row count*)
  - ➔ Everything up to `\n` (Unixes), `\r\n` (Windows) or `\r` (Old Mac)
  - ➔ Portable across operating system
  
- ⊙ Constraints can overlap
  - ➔ Last constraints in the constraints file prevail
  - ➔ Define weak constraints first, then refine tolerances



- Objectives for next pro-release
  - 1) Finish the `numdiff` tool (LD)
  - 2) Prepare valid test cases (Module Keepers)
  - 3) Prepare valid user cases (Module Keepers)
  - 4) Integrate test/user cases into the test system (Module Keepers with LD)
  - 5) Cleanup examples versus test/user cases (shared files, redundancy)
  
- In parallel
  - ➔ Solve as much bugs as possible (LD, Module Keepers)

## Objective

deliver MAD-X pro release 5.01.00 as soon as possible