

MAD9 Task Force Meeting 13/3/2000, Agenda

JMJ:

Bug reporting, MAD9 Documentation,
Arrays in MAD9,
LHC separation scheme, Matching problems
EPAC2000 paper

JP

Command for interpolation of optical functions

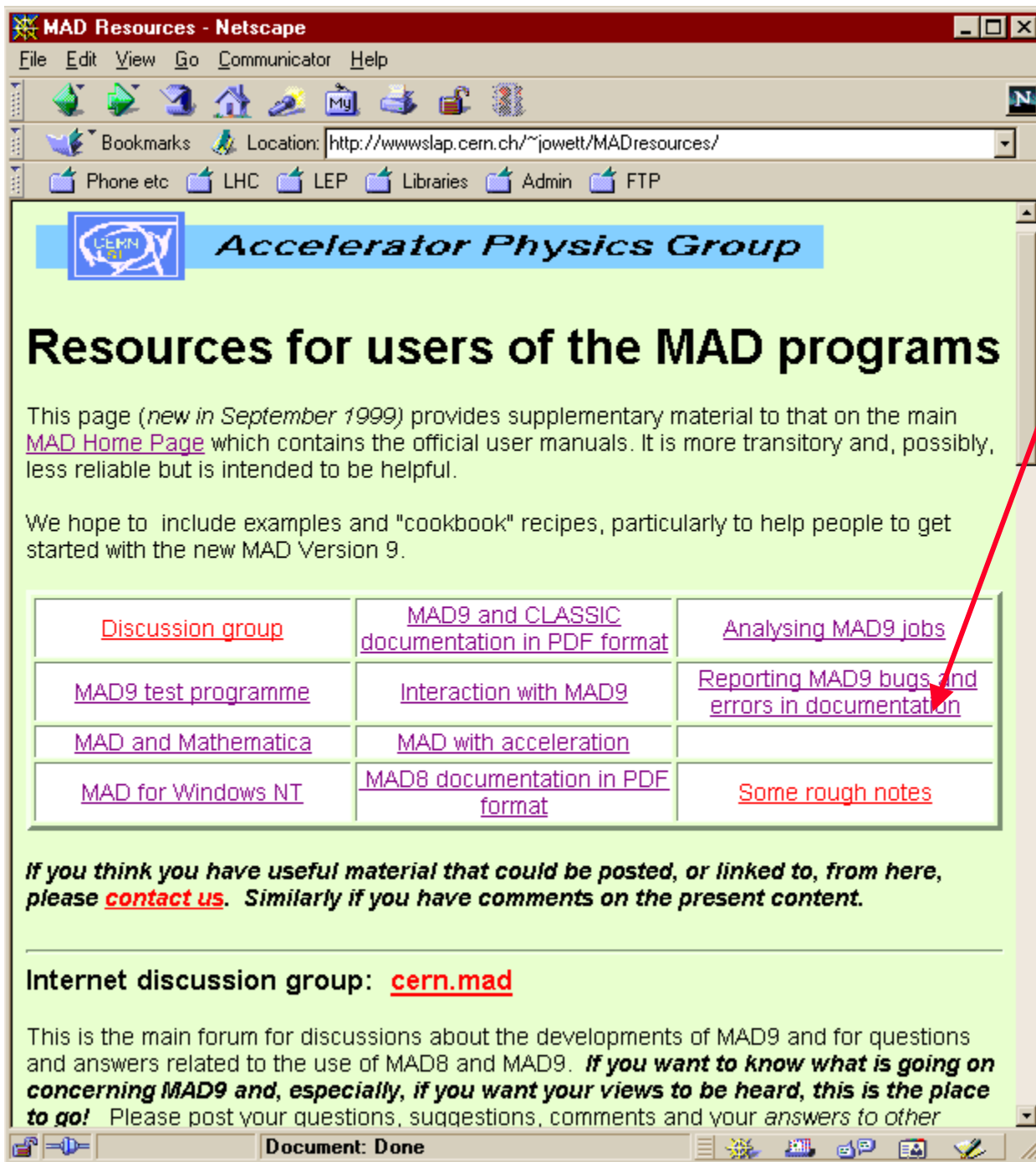
AA:

MAD9 in general

OB:

Two rings, Matching problems ...

AOB



Resources Page

Documentation

WWW and PDF Versions, updates, ...

Bug reporting

Collects all together. Please follow this procedure.

Information sources

Discussion group

These meetings (transparencies etc.)

Technical advice, tips, ...

Related software

Madtomma

Job analysis

Utilities, etc.

MAD8 information

The MAD9 User's Guide

❑ Source is currently in LaTeX format

Updating is slow and tedious: need to run several programs to compile source into Web pages or a printable PDF file.

Need to move Web pages from **fci** to **mad** account (not quite trivial) and THEN set up automatic updating procedure when edits are made.

The “Known bugs” page can then start to show something.

❑ Alternatives

Move to another source format in long term?

❑ Reporting errors in documentation

–Use the same method as for bugs in the program (previous slide).

–Only report errors in the latest online version (not from paper versions!).

–*Please help* by diligently reporting bugs and suggesting improvements in the documentation.

❑ Other documents

–Class structures for CLASSIC and MAD9, physical methods, etc.

Constraints, arrays, MAD language limitations - Netscape Message

File Edit View Go Message Communicator Help

```
> 2) Why does this work
>
>   CONSTRAINT, VMAX(COLUMN(IR5, BETX, S.DS.L5/QF8.L5)) < 250.0, WGT = 1;
>   CONSTRAINT, VMAX(COLUMN(IR5, BETY, S.DS.L5/QF8.L5)) < 250.0, WGT = 1;
>   CONSTRAINT, VMAX(COLUMN(IR5, DX, S.DS.L5/QF8.L5)) < 3.0, WGT = 1;
>
These are three scalar constraints (the VMAX reduces the column of
values of a single optical function to a single value).

> but a more compact way:
>
> CONSTRAINT, ROW(IR5,S.DS.L5/QF8.L5 ,{BETX,BETY,DX})<
{250.,250.,3.0},wgt={1,1,1};
>
> doesn't work?
```

In MAD9, arrays are one-dimensional lists of Logical, Real, String, or Token list values, but NOT of arrays themselves. See

<http://wwwslap.cern.ch/mad/mad9/user/node15.html#sec:attribute>

<http://wwwslap.cern.ch/mad/mad9/user/node26.html#sec:realarray>

This implies that you can't have a two-dimensional array of Reals.

So your attempt to build a two-dimensional array (the values of BETX, BETY, DX at all the elements in the range S.DS.L5/QF8.L5) does not work. Even if it did, the comparison with the one-dimensional array of 3 values on the RHS of the constraint would not have an obvious meaning.

What you would clearly like to do is apply VMAX to each of the three columns of this object. I don't see how to do this in the MAD9 language except by writing out the details as in the 3-line method above.

Common experience with more complete list- or array-manipulation systems (e.g. Mathcad, Excel, Mathematica, ...) leads us to expect to be able to construct such expressions readily. However the MAD9 language does not have such functionality.

To solve your problem, we would have to introduce an analogue of Mathematica's Map function into the MAD9 language. I haven't really looked into how hard that would be but I suspect that it would not be

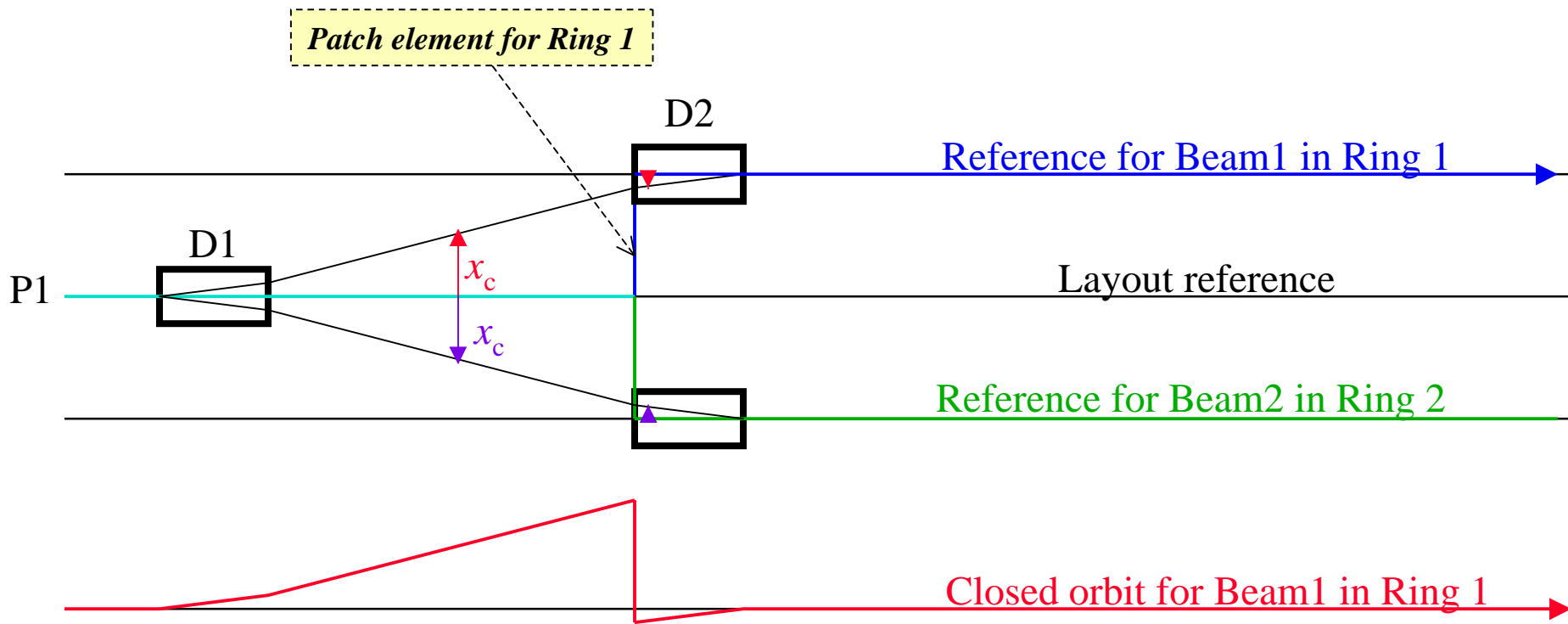
cern.mad Digest

□ Constraints and arrays

In MAD9, arrays are one-dimensional lists of Logical, Real, String, or Token list values, but NOT of arrays themselves.

A limitation on the MAD9 language: no two-dimensional arrays extracted from table objects.

LHC Separation in MAD9



- ❑ Both D1 and D2 have zero angle
But $K_0 = \pm\alpha/L$ to make closed orbit.
- ❑ Between D1 and D2 closed orbit gives beam separation

- ❑ Path must be before D2
Puts it in right position in space
- ❑ Small closed orbit inside D2
Opposite sign from that in D1 !

Matching

□ From Angeles Faus-Golfe:

- ... good news from the matching point of view (V6.0 sequence):
- ... made real matching for Totem Optics and with lmdif method it is efficient (in some sense more efficient than MAD8. I'm doing some comparisons but I don't have final assessment of this) and if you choose the good options not very slow.
- ... will give a matching example for the data base.

□ From Oliver:

Problems with V6.1 sequence, related to imbedding a sequence in another.

JMJ looking at files.

AA looking at prototype of problem

EPAC 2000 Paper

□ MAD Version 9

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A. ADELMANN (PSI)

The program MAD is widely used for accelerator design and beam dynamics studies. For many years, its input language has been the nearest thing to a world-wide standard for describing accelerator structures. The new Version 9 is a complete rewrite using a systematic object-oriented methodology based on the "Classic" classes for accelerator physics. It provides many improvements over the previous MAD Version 8. These include: (i) support for multiple beam-lines simultaneously, facilitating, for example, matching constraints that couple the two rings of a two-ring collider, (ii) much improved Lie-algebraic map calculations, (iii) a uniform method and format for exchanging many kinds of structured data with other programs, (iv) an improved and more consistent input language, (v) and finally we report on a parallel 3D poisson field solver for space charge calculations in high intense particle beams. The application to the PSI injector cyclotron will show's the general nature of this novel state of the art problem solving environment. We describe the current status of the program and how to get it, outline future plans and illustrate some of the new features.