Some upcoming changes in MAD-X v 5.02.05

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for the MAD-X team

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ECOLLIMATOR, RCOLLIMATOR

Label: ECOLLIMATOR, XSIZE=real, YSIZE=real;
Label: RCOLLIMATOR, XSIZE=real, YSIZE=real;

Have been removed from MAD-X:

- XSIZE and YSIZE were never used…
- **…, APERTYPE=string, APERTURE={array},APER_TOL={array};**
  should be used instead.
- COLLIMATOR has been added; behaves like a drift but with additional aperture data.

REJECTED during meeting

Impact:

- Any occurrence of ECOLLIMATOR or RCOLLIMATOR elements, XSIZE or YSIZE attributes will crash MAD-X version 5.02.05 (next dev)
- Any occurrence of COLLIMATOR element will crash MAD-X versions 5.02.04 and before.

ECOLLIMATOR, RCOLLIMATOR (rev)

- **COLLIMATOR element has been added to MAD-X**;
  it behaves like a drift but takes additional aperture data:
  APERTYPE=string, APERTURE={array},APER_TOL={array};

- All elements having **APERTYPE=string, APERTURE={array}** attributes are treated accordingly in APERTURE and TRACKING.

- **ECOLLIMATOR and RCOLLIMATOR are deprecated**
  but are still parsed for now, with important caveat that
  XSIZE and YSIZE are never used.

  E and RCOLLIMATOR trigger warnings in APERTURE and TRACK.

RACETRACK aperture

- Generalized the racetrack aperture to accept elliptical corners instead of simply circular.

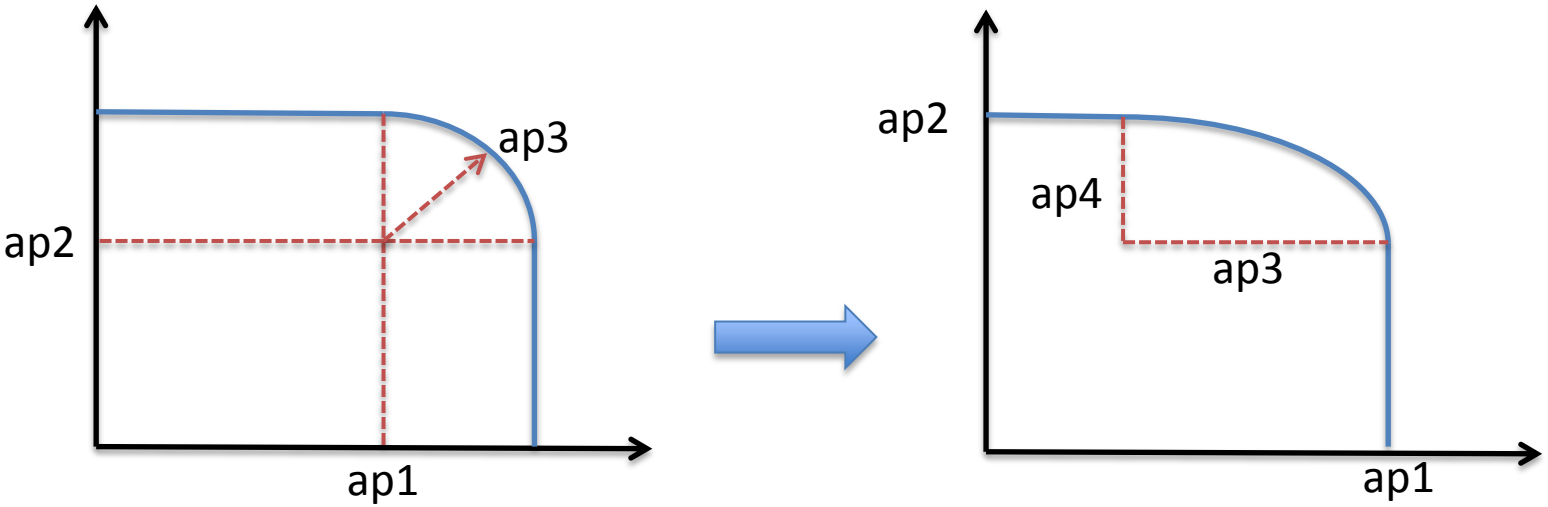
  …, APERTYPE=racetrack, APERTURE={ap1,ap2,ap3,ap4};

- Aligned the meaning of attributes to match other shapes:
  - 1st aperture array element = max. horizontal extent
  - 2nd aperture array element = max. vertical extent

  which is convenient for plots.

Impact : need to modify all racetrack apertures to include fourth parameter and redefine first and second parameters.

RACETRACK aperture



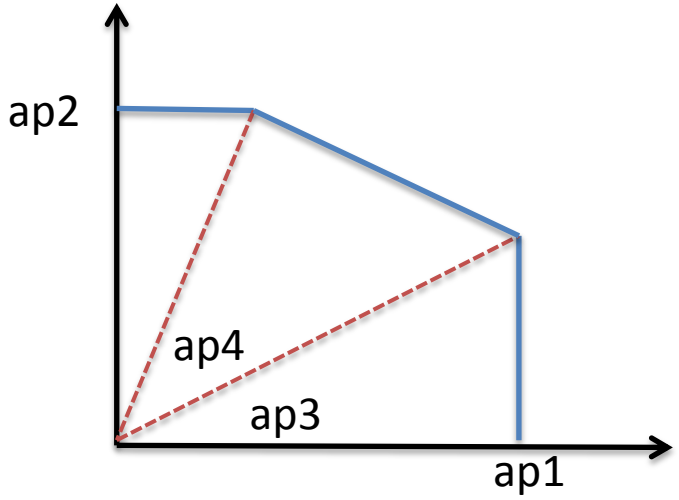
Transformation:
{ap1, ap2, ap3} ->
{ap1+ap3, ap2+ap3, ap3, ap3}

OCTAGON aperture

OCTAGON aperture defined

with parameters:

- ap1, ap2: max horizontal and vertical extent,
- ap3, ap4: two angles sustaining the cutout part.



Consolidation of apertures

- MARGUERITE removed from MAD-X
  still within PTC library

- Apertures now known in both MAD-X and PTC:

  circle, ellipse, rectangle, rectellipse, rectcircle, lhcscreen, racetrack, octagon

- Now waiting for specification for Sixtrack translation

Beam emittances

- Two definitions within MAD-X

  $\varepsilon_n = 4\ \beta\gamma\ \varepsilon$ in BEAM, EMIT

  $\varepsilon_n = \beta\gamma\ \varepsilon$ in APERTURE, SIXTRACK

- MAD-X is now standardised on the “1σ definition” and uses $\varepsilon_n = \beta\gamma\ \varepsilon$ everywhere.

- Normalised emittances are only used for input and never used directly in calculations

- **Consequence:** the EXN and EYN attributes of the APERTURE command have been removed. APERTURE gets geometric emittances from BEAM command. Hence, defaults have also changed!

- **Impact:** check and modify accordingly all scripts and input files

Makethin

- Redefinition of SLICE attribute in SELECT statements from number of slicing operations to actual number of slices.
- **STYLE = TEAPOT** becomes default, irrespective of number of slices, except for collimators.
- Provision for iterative MAKETHIN operations on same sequence.
- **MAKEDIPEDGE=true** becomes default value

These changes will appear in the next development release v 5.02.05 scheduled at the end of the month.

Please check these new features against your scripts and input files.