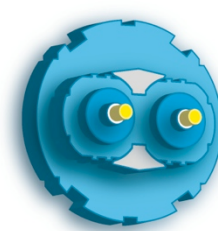
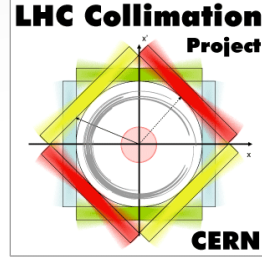




ROYAL  
HOLLOWAY  
UNIVERSITY  
OF LONDON



High  
Luminosity  
LHC

# BDSIM Update

L.Nevay, S.Boogert, S.Gibson, R.Kwee-Hinzmann

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# Recent Work

- Addressing previous ring closing issue
    - discussed here
  - Implementing ring turn control
  - Comparative cross-section plots
  - Comparative twiss function plots
- } underway, results soon



# Ring Closure

- BDSIM model generated from thick MadX optics
- Previously ring didn't close by  $\sim 100\mu\text{m}$  in X & Y
- Further investigation shows this is not BDSIM
  
- Working precision of MadX is 9sf
- 26500m  $\rightarrow$  resultant error  $O(10^{-4})$
- Increasing working precision does not improve
- Most component's length is defined to  $\sim 5\text{sf}$
  
- Is this inherent to the model?
- Unrealised / acceptable as no one works in Global coords?
  - apart from BDSIM...



# MadX Survey



- With high working precision “set, format=“15.20e”
- Use MadX survey command
- Similar to BDSIM and independent C++ calculation of length + angle.
- MadX survey output:

```
* NAME                               S                               L                               ANGLE                               X                               Y                               Z
$ %s                                %le                             %le                             %le                             %le                             %le                             %le
"LHCb1$START"                        0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00
"IP1"                                  0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00          0.00000000000000e+00
-:--- survey_lhcb1_00.tfs  Top L?? (Fundamental)
"DRIFT_416"                          2.66295481999989e+04          5.06999999997788e-01          0.00000000000000e+00          1.21703646286871e-04          0.00000000000000e+00          -2.93350796906494e+01
"MQXA.1L1"                          2.66359181999989e+04          6.37000000000000e+00          0.00000000000000e+00          1.21703646288640e-04          0.00000000000000e+00          -2.29650796906492e+01
"DRIFT_456"                          2.66374081999989e+04          1.490000000000160e+00          0.00000000000000e+00          1.21703646289054e-04          0.00000000000000e+00          -2.14750796906475e+01
"BPSW.1L1.B1"                       2.66374081999989e+04          0.00000000000000e+00          0.00000000000000e+00          1.21703646289054e-04          0.00000000000000e+00          -2.14750796906475e+01
"DRIFT_457"                          2.66379681999989e+04          5.59999999997672e-01          0.00000000000000e+00          1.21703646289210e-04          0.00000000000000e+00          -2.09150796906498e+01
"TAS.1L1"                            2.66397681999989e+04          1.80000000000000e+00          0.00000000000000e+00          1.21703646289710e-04          0.00000000000000e+00          -1.91150796906497e+01
"DRIFT_458"                          2.66558831999989e+04          1.6114999999980e+01          0.00000000000000e+00          1.21703646294187e-04          0.00000000000000e+00          -3.00007969065117e+00
"MBAS2.1L1"                         2.66588831999989e+04          3.00000000000000e+00          0.00000000000000e+00          1.21703646295021e-04          0.00000000000000e+00          -7.96906510549533e-05
"IP1.L1"                             2.66588831999989e+04          0.00000000000000e+00          0.00000000000000e+00          1.21703646295021e-04          0.00000000000000e+00          -7.96906510549533e-05
"LHCb1$END"                          2.66588831999989e+04          0.00000000000000e+00          0.00000000000000e+00          1.21703646295021e-04          0.00000000000000e+00          -7.96906510549533e-05
-:--- survey_lhcb1_00.tfs  Bot L?? (Fundamental)
Mark set
```

- Mismatch in MadX input to BDSIM
- Our use of optics? or inherent and acceptable?