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# **BDSIM Documentation**

***Release 0.64***

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March 04, 2015



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## INTRODUCTION

### 1.1 Purpose of BDSIM

### 1.2 General Simulation Steps





## INSTALLATION

### 2.1 Downloading BDSIM

### 2.2 Compiling - SL6



## GETTING STARTED



**LATTICE ELEMENTS**



**LATTICE SEQUENCE**





**SAMPLERS - OUTPUT**



**PHYSICS LISTS**



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CHAPTER  
**EIGHT**

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**OPTIONS**



## **BEAM PARAMETERS**





## DISTRIBUTIONS

- gauss
- gaussTwiss
- reference

Aperture Model	# of parameters	aper1	aper2	aper3	aper4
circular	1	radius	NA	NA	NA
rectangular	2	x half width	y half width	NA	NA
elliptical	2	x semi-axis	y semi-axis	NA	NA
lhcscreen-simple	3	x half width of rectangle	y half width of rectangle	radius of circle	NA
lhcscreen	3	x half width of rectangle	y half width of rectangle	radius of circle	NA
rectellipse	4	x half width of rectangle	y half width of rectangle	x semi-axis of ellipse	y semi-axis of ellipse
racetrack	3	horizontal offset of circle	vertical offset of circle	radius of circular part	NA
octagon	4	x half width	y half width	angle 1 [rad]	angle 2 [rad]

after reading this, go back to the top in [Distributions](#)

You can also have a look in another document at [Output Analysis](#)

These parameters can be set with the *option* command as the default parameters and also on a per element basis, that overrides the defaults for that specific element. Up to four parameters can be used to specify the aperture shape (*aper1*, *aper2*, *aper3*, *aper4*). These are used differently for each aperture model and match the MADX aperture definitions. The required parameters and their meaning are given in the following table.

Currently, only circular and rectangular are implemented. More models will be completed shortly.

The outer volume is represented (with the exception of the *drift* element) by a cylinder with inner radius equal to the beampipe outer radius and with outer radius given by default by the global *boxSize* option, which can usually be overridden with the *outR* option.

In Geant4 it is possible to drive different *regions* each with their own production cuts and user limits. In BDSIM three different regions exist, each with their own user defined production cuts (see *Physics*). These are the default region, the precision region and the approximation region. Beamline elements can be set to the precision region by setting the attribute *precisionRegion* equal to 1. For example:



## **MODEL PREPARATION**

### **11.1 Manual Preparation**

### **11.2 MADX Conversion**

### **11.3 MAD8 Conversion**

### **11.4 Python Builder**



## OUTPUT ANALYSIS

### 12.1 ROOT Output

### 12.2 ASCII Output



## **APPENDIX 1 - TRACKING ROUTINES**

### **13.1 Quadrupole**





## **APPENDIX 2 - GEOMETRY INPUT**

### **14.1 Mokka**



## INDICES AND TABLES

- *genindex*
- *modindex*
- *search*