

# *Backgrounds & Physics Simulations*



# Rationale

- The International Review Committee was concerned by the impact of backgrounds on SuperB detector performances / Physics reach
- Some of those concerns can be dissipated by back of the envelope evaluations
- Some others require a detailed simulation
  - a detailed detector model must be included



# What do we have right now?

- SuperB Geant4 based “monolithic” simulation (G.M.)
  - BBBrem (Rad Bhabha) generator plugged in (E.P.)
  - Geometry(G.M. + G.C.) hardwired @ compilation time
- From stand-alone generators
  - Touschek (Manuela Boscolo)
  - Electron-Positron pairs DIAG36 (E.P.)



# Considerations

- For detailed background studies, detector response simulation is needed
  - Detector experts have to implement the digitization procedure (from Geant hit to Electronic hit)
- Each evolution cycle of the Machine / Detector design requires a new Bkg simulation campaign
  - Fixed interface versus Machine designers (MAD) and Detector designers
  - Code should be “general-purpose”
- Detector description must be the same for these studies and the Pravda-like ones
- The home-made tool used so far does not fullfils any of these requirements

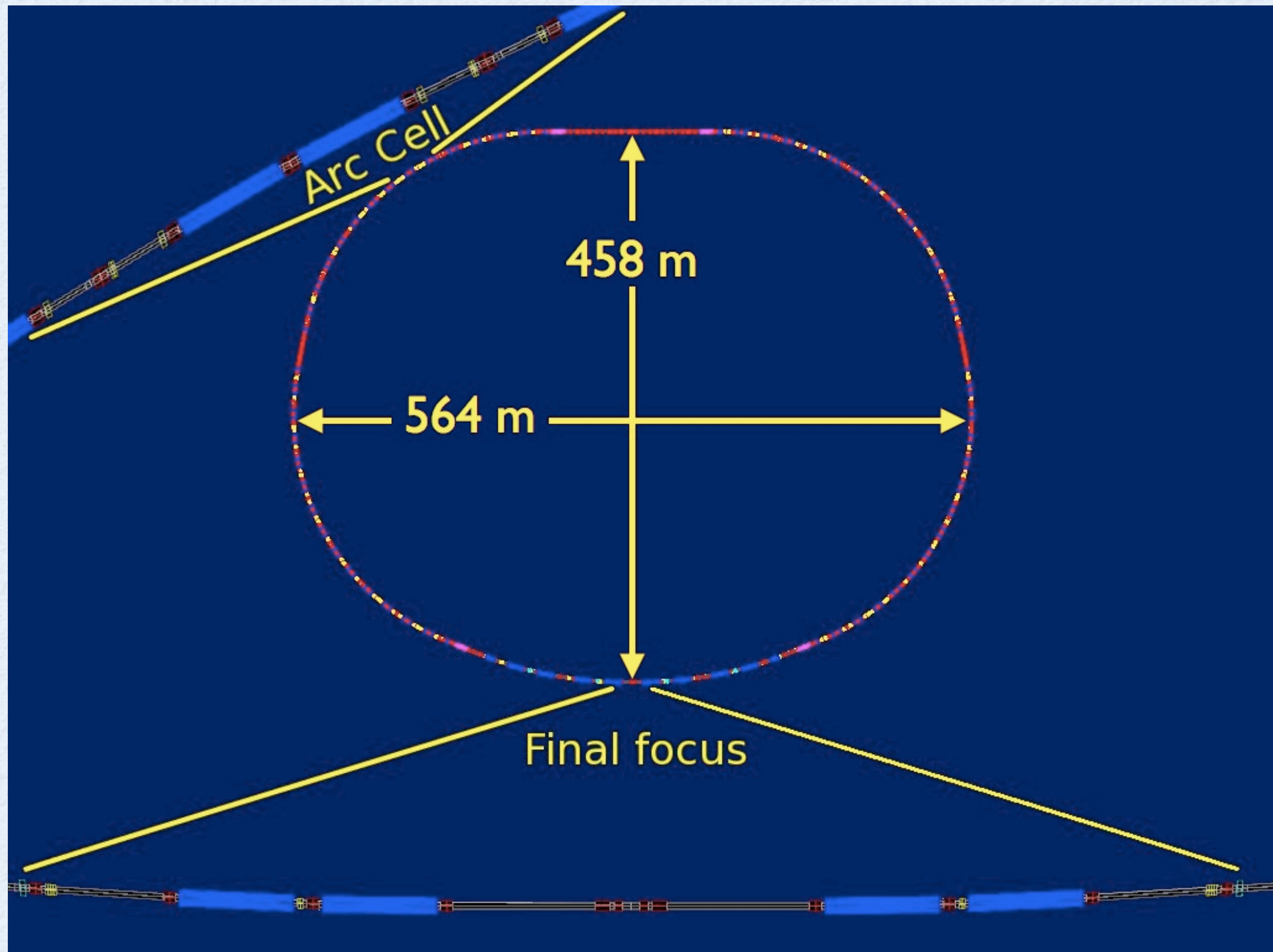


# Machine interface: BDSIM?

- A C++ Geant4 extension for beamline simulations
  - compatible with standard description format (MAD)
  - still in active development
  - still to be extensively validated
- BDSIM geometrical survey of SuperB HER ring (~1800m) identical to MAD one after some iterations with original developers



# BDSIM HER survey





# Detector issues

- Geometry description
  - Choice of a common language among sub-detectors
- Hit generation and signal processing
  - Software framework to interface bkg. gen/sim with detector response code
  - And the detector response code



# Geometry description options

- How / where should we store the volumes / materials / parameters?
  - GDML
  - ROOT database
  - mySQL database
- Need input / output Geant4 bindings (already existing for GDML)



# Hit generation/signal processing

- Reconstruction code depends strongly on the sub-system
  - should be provided by sub-detector experts
  - how much of the existing BaBar software can be reused?
- Parameters can be stored in the same way as geometrical ones



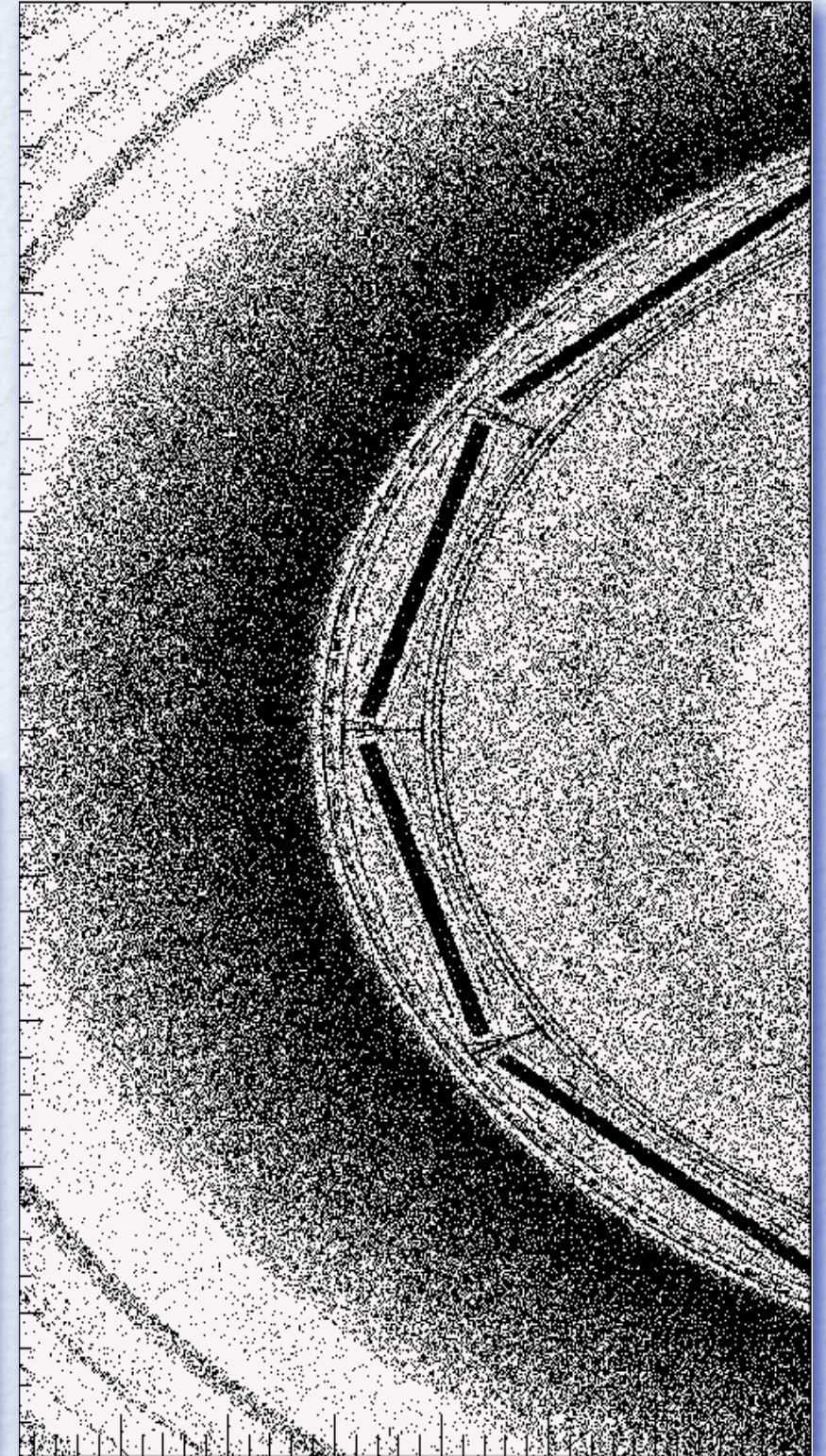
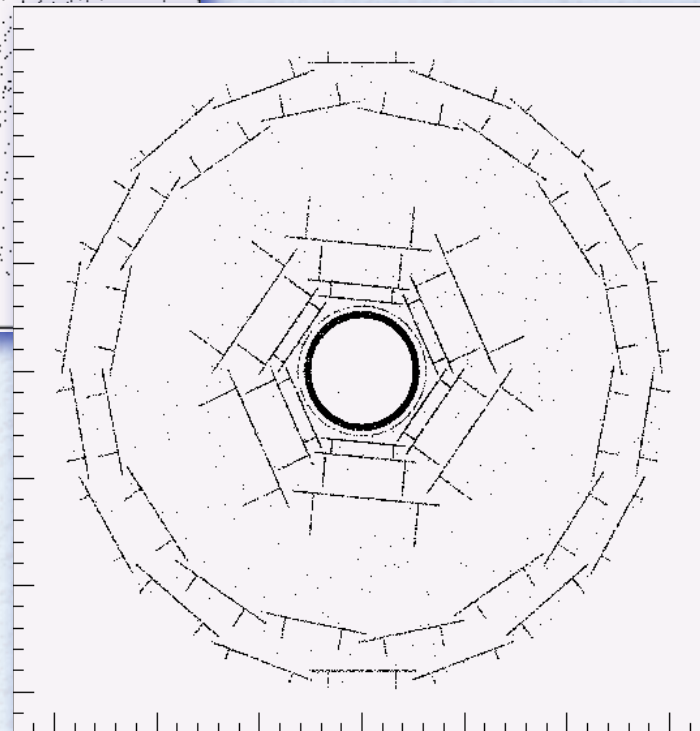
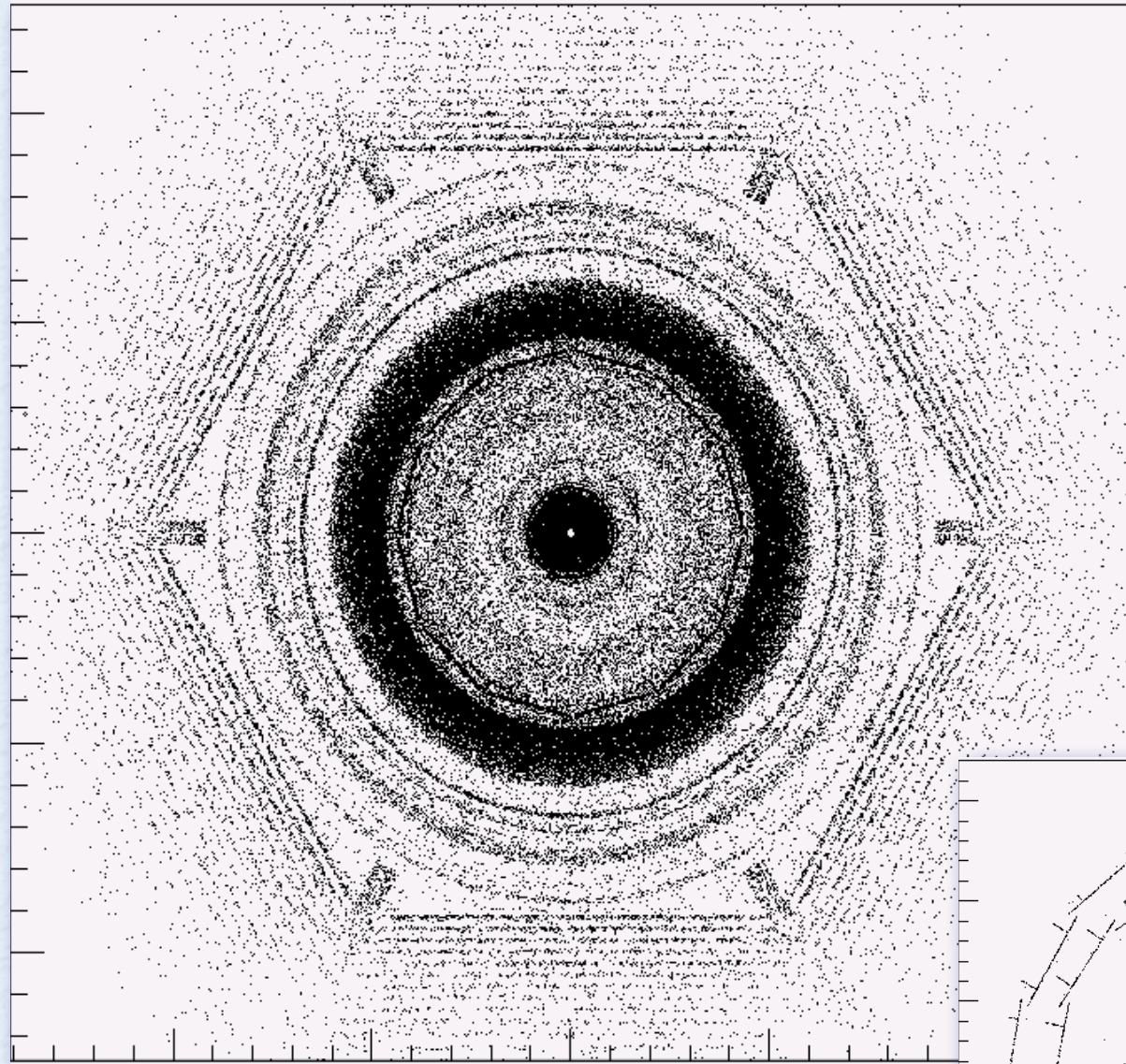
# BaBar Detector Code

	c++ lines	400 lines / day / man
SVT	143757	2.0 myrs
DCH	243035	3.4 myrs
DIRC	120984	1.7 myrs
EMC	267147	3.7 myrs
IFR	109482	1.5 myrs
total		12.3 myrs

We need to reuse as much as possible this framework  
Not conceivable to rewrite it from scratch in 1 year.



# BaBar MC Geometry



Geometry need a bold simplification for both background & fast sim.



# Conclusions

- Possible Options for the Geometry description language identified
- Work needed:
  - Development & Validation of the machine simulator
  - Adapting / stripping BaBar code (common to Fast / Detailed simulation)
  - Digitization code (from Detector experts)