FullSim Production Report

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Outline

- **Latest Full-Simulation Production:**
  - BRN code validation
  - New Fwd-EMC geometries
  - Background frames production for FastSim
  - Touschek simulation

BRN validation

- **Migration to a Packaged version of Bruno code ⇒ BRN**

- **BRN code validation:**
  - Motivation: to verify that the simulation output is equivalent to the legacy bruno code
  - The method: compare new code output with previous productions using old code (Elba production)
  - Generate Rad-BhaBha events with same configuration for Elba
    - Machine: SF10 V12
    - Geometry: Geometry_CIPE_V00-00-02
  - Production size is 10% of latest Elba Rad-BhaBha production: ~3000 bunch crossings

Fwd-EMC geometries

- **Request from Stefano Germani to test different options for Fwd-EMC device**
  - Nominal configuration uses LYSO (Geometry_CIPE_V00-00-02)
  - New geometries to be tested:
    - CSI: Csi with VPT readout (Geometry_CIPE_CSI)

      BGO: Bgo with PMT readout (Geometry_CIPE_BGO)
- **Production:**
  - Geometry_CIPE_CSI ~ 7.4k bunch crossings
  - Geometry_CIPE_BGO ~ 10k bunch crossings

Background Frames for FastSim

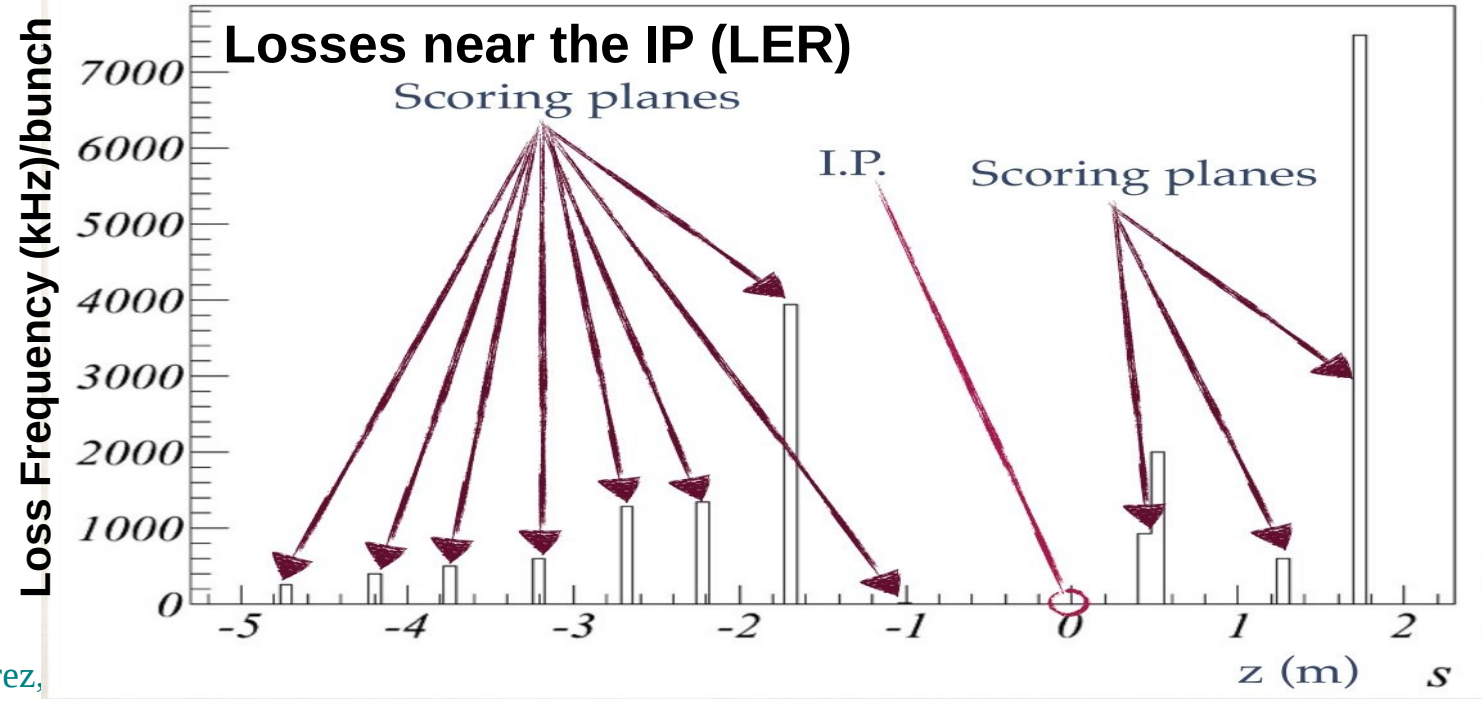
- **Request from Matteo Rama**
  - Wants to have the background frames for fastsim (bg-frames) as updated as possible
  - Every scheduled FullSim production of machine backgrounds should produce as well the bg-frames
- **Production (**Geometry_CIPE_V00-00-02**):**
  - Test and validation:
    - ~6k bunch crossings of Rad-BhaBha with

      $\Rightarrow$ equivalent to 30 micro secs
    - Status: being analysed
  - Actual request size: 1000 micro secs $\Rightarrow$ ~1M bunch crossings
- **Some issues:**
  - Jobs take too long (1.3 hours per event) due to detailed final focus model ($\pm$16m from IP)
  - Maybe it will be enough to produce bg-frames with a shorter final focus model

Touschek Background: Strategy

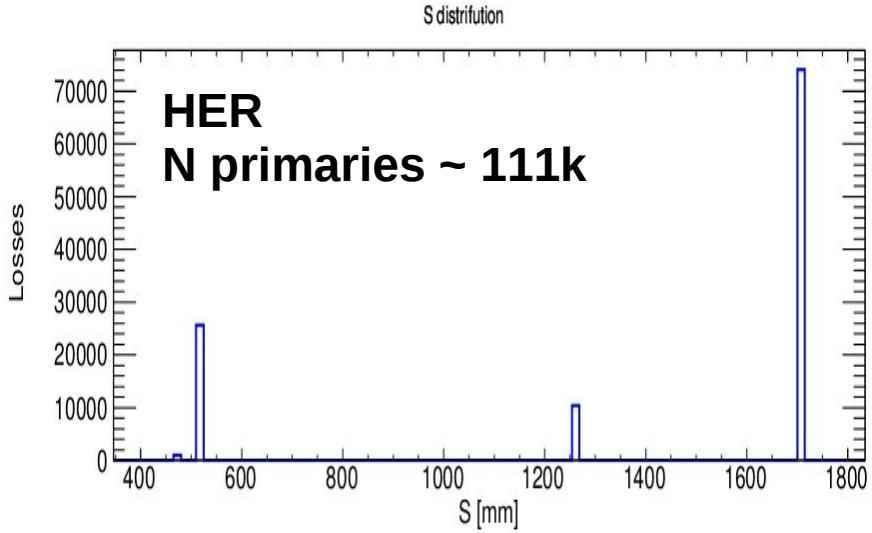
- **Primaries for BRN: STAR code (Manuela Boscolo)**
  - Simulate both Touschek and the beam gas scattering along the beam line
  - Transport the scattered particles along the lattice
  - Detect the collisions of these particles with the beam pipes (scoring planes)
- **Typical output:**

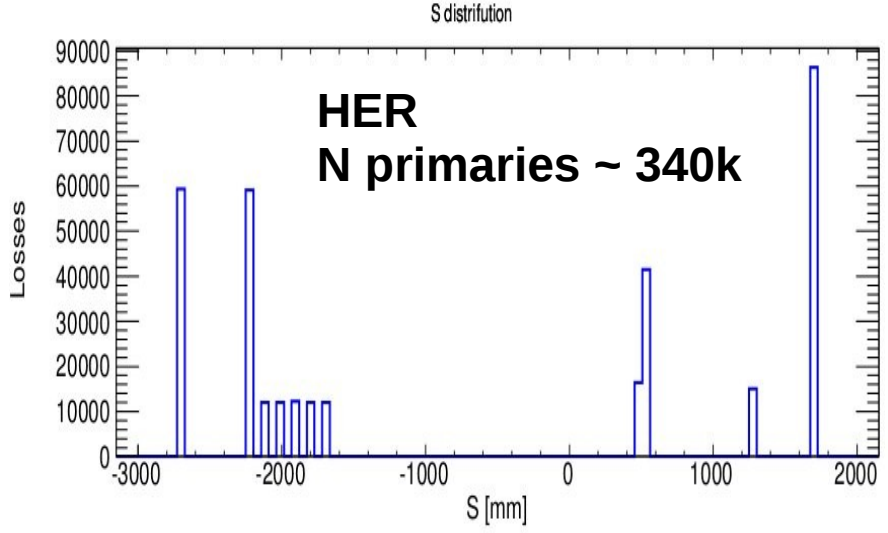
0.445558E-01	-0.550303E-02	-0.126830E-05	0.376408E-06	1.71000	-0.239831E-01	0.818628	1
0.456014E-01	-0.570537E-02	-0.280276E-04	0.113856E-04	1.71000	-0.252154E-01	0.755761	1
0.474620E-01	-0.592261E-02	-0.210435E-04	0.873927E-05	1.71000	-0.249482E-01	0.778852	1
0.432248E-01	-0.531700E-02	-0.179759E-04	0.663319E-05	1.71000	-0.236050E-01	0.997186	1
x (m)	$\frac{dx}{ds}$ (rad)	y (m)	$\frac{dy}{ds}$ (rad)	s (m)	$\frac{\Delta E}{E}$	f (KHz)	#turn

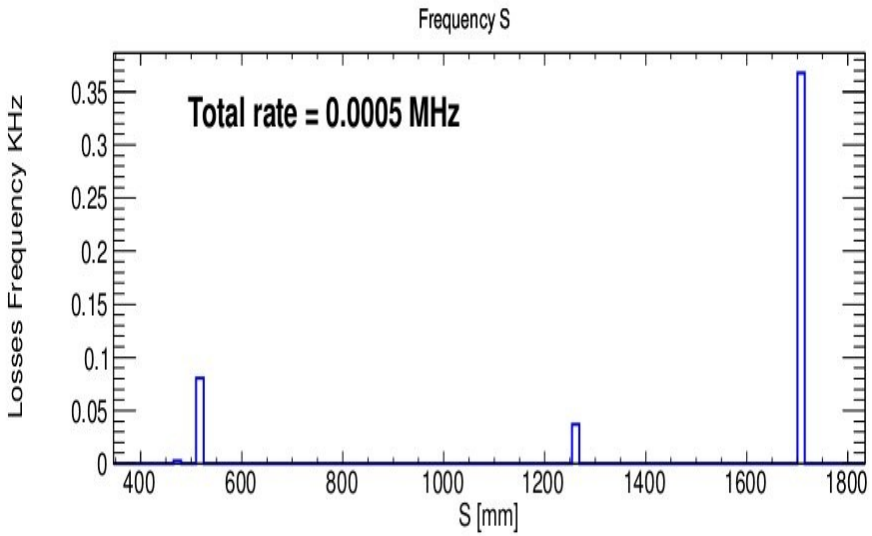


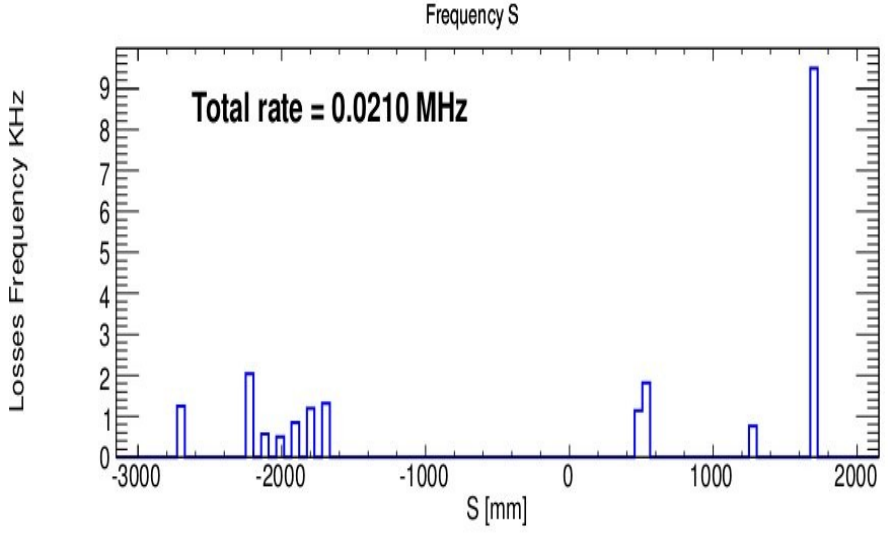
Touschek Background: Samples (I)

Losses near the IP

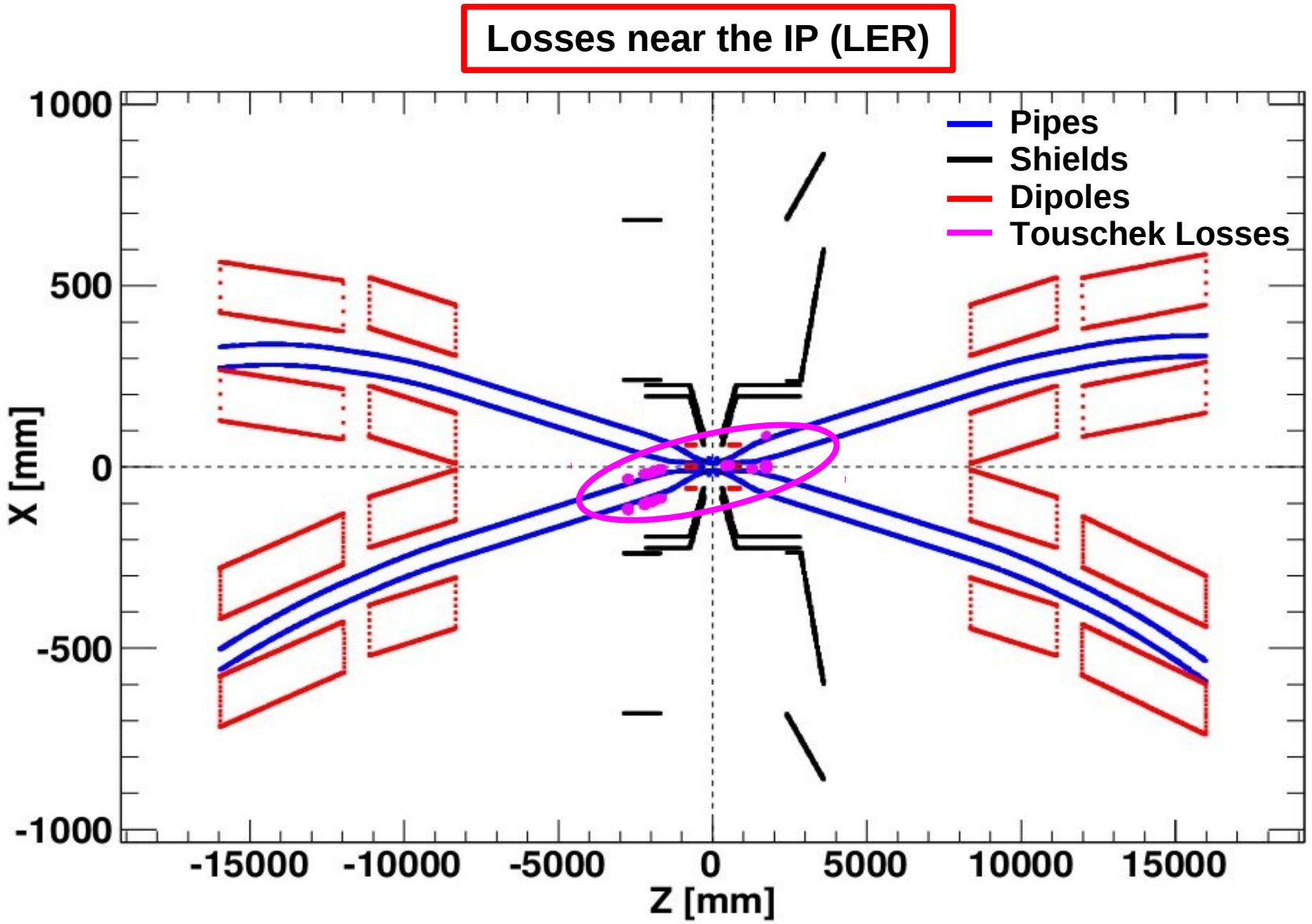








Touschek Background: Samples (II)



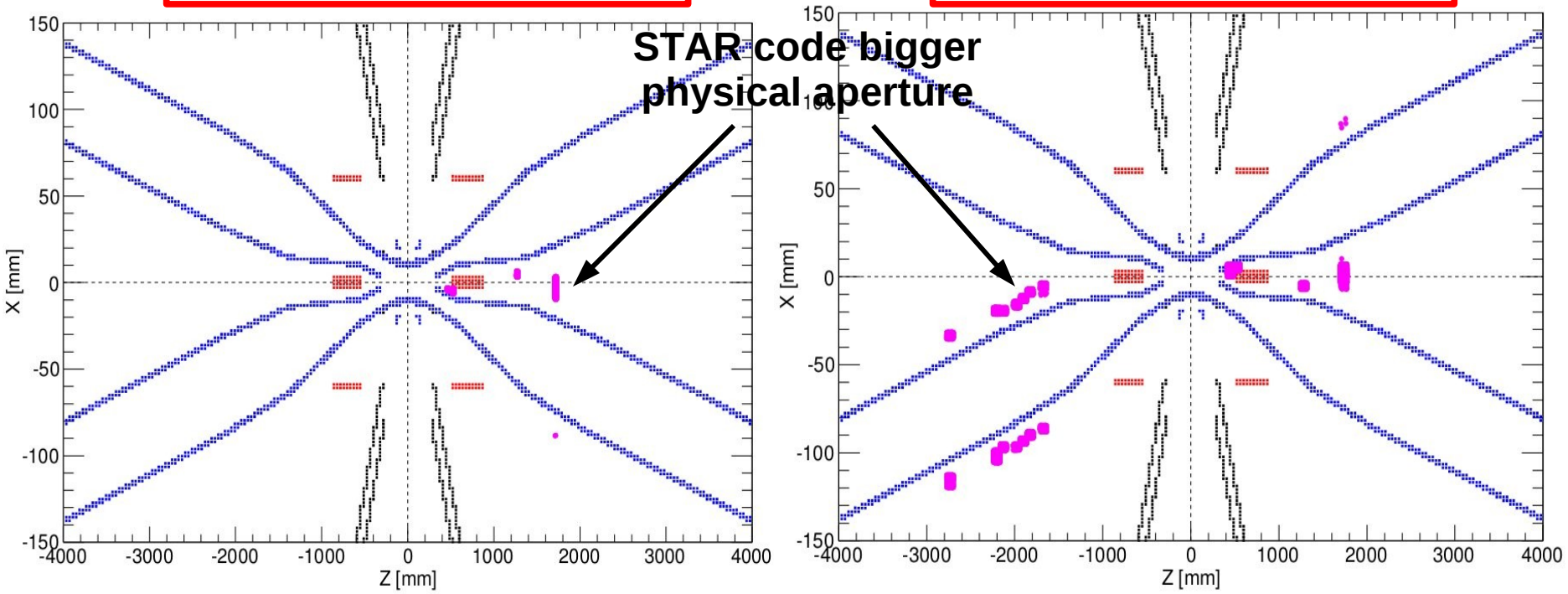
Touschek Background: Samples (III)

- **Touschek Losses are mainly located in the downstream direction of the beam pipe**
- **One issue:**
  - STAR code uses a physical aperture bigger than BRN: pipe radius 4cm (STAR) instead of 2.5cm (BRN)
  - Touschek background rates are expected to be underestimated with the current samples

Pipes
Shields
Dipoles
Touschek Losses

Losses near the IP (HER)

Losses near the IP (LER)




Backup