



Collimator Studies

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RHUL

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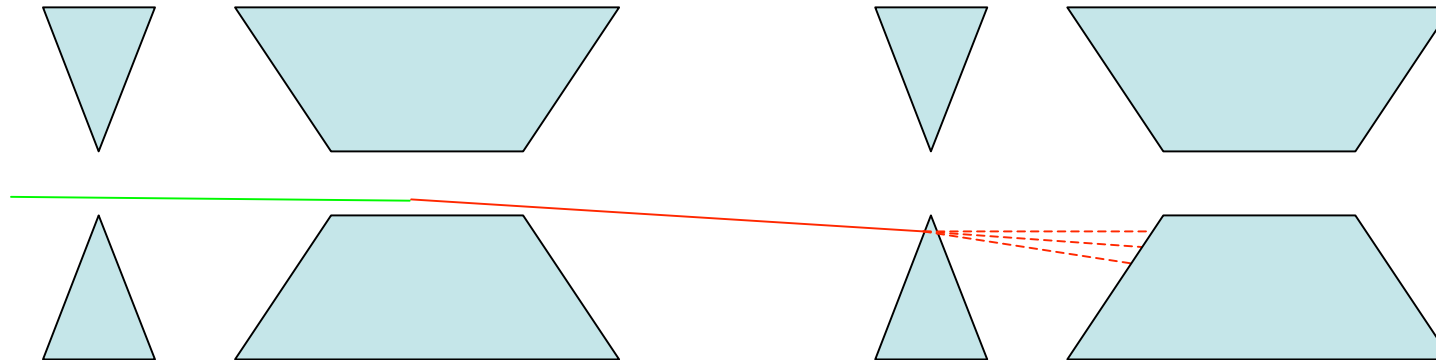
Intro



-
- Wakefield induced backgrounds
 - CLIC
 - Halo
 - Energy deposition
 - Particles at the IP
 - ILC
 - Energy deposition



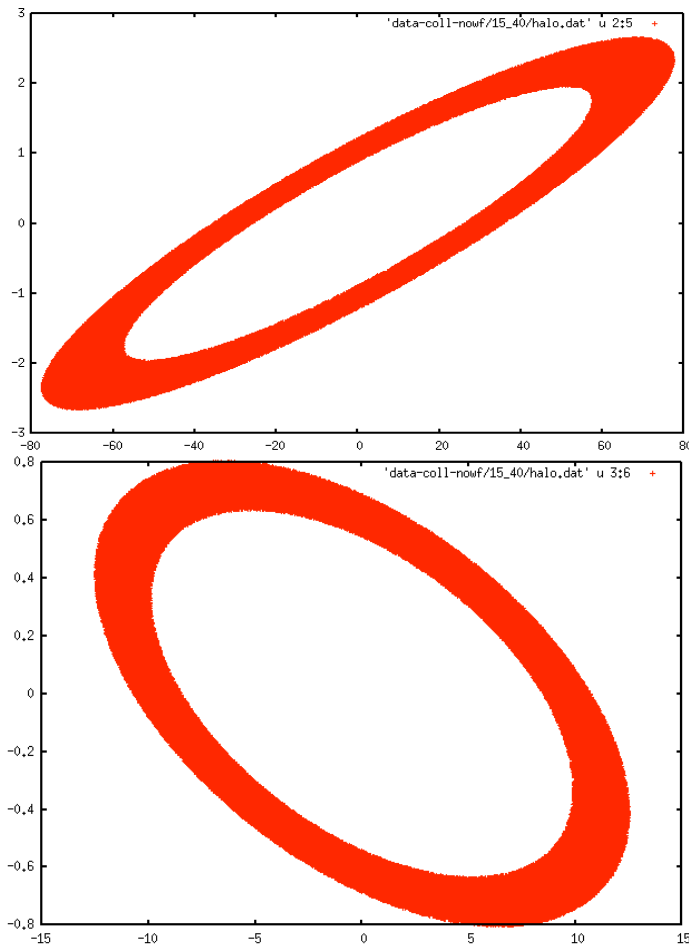
Wakefield-Induced Backgrounds



- Multi-particle effect
 - Particles at the head of the bunch cause a kick on trailing particles
- Transverse wakefield kick
 - Previously uncollimated particles can be kicked into beam elements
 - Direct hits to FD and VX
 - Secondary particles from beampipe scattering



Halo distributions - CLIC



- 10000 particles per ring
- Rings of 5σ in $x:xp$
 - track distributions $0-5\sigma$ to $35-40\sigma$
- Rings of 10σ in $y:yp$
 - track distributions $0-10\sigma$ to $180-190\sigma$
- Tracking from the entrance to the BDS



Collimator Parameters

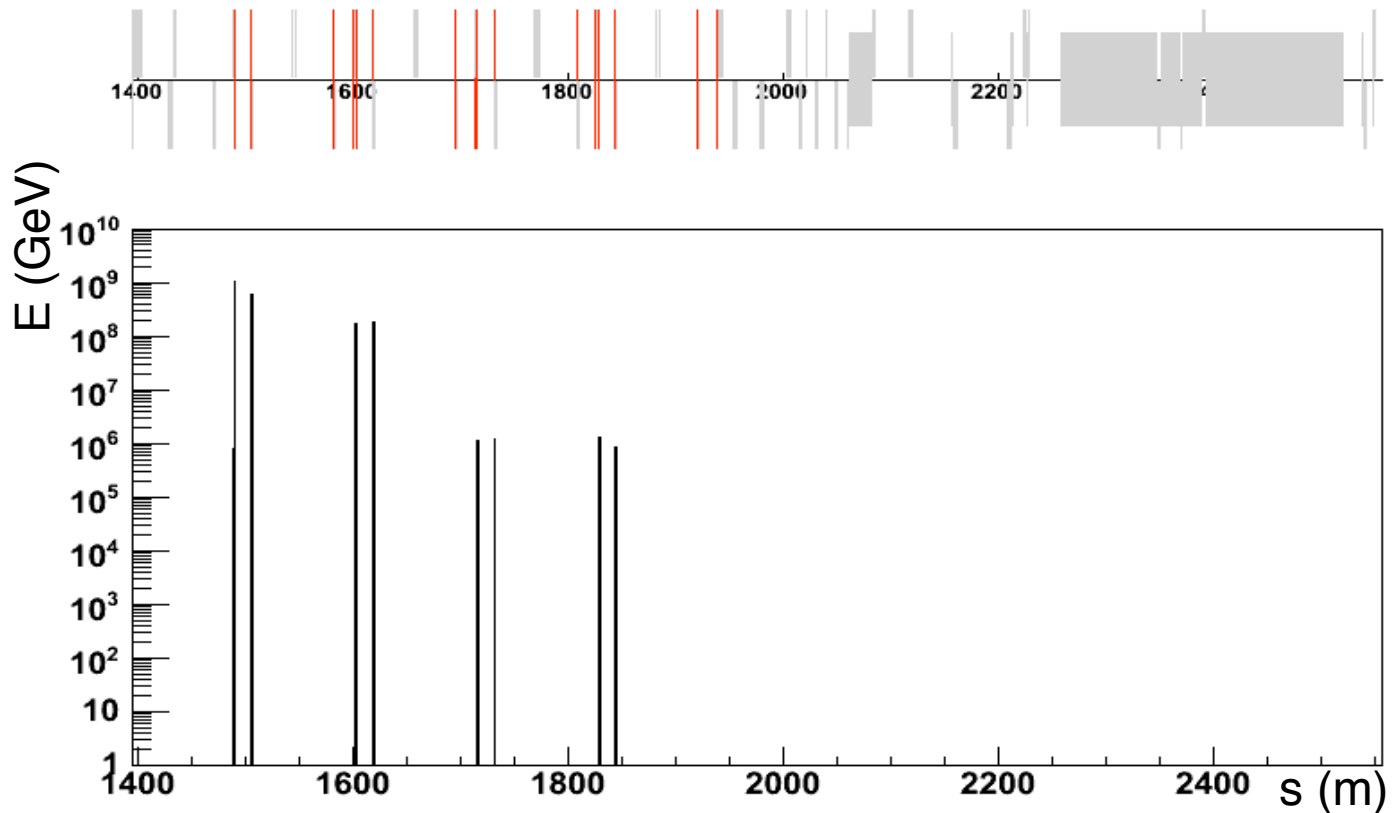


- $\text{ENGYSP}=\{A_x 3.51 \cdot 10^{-3}, A_y 25.4 \cdot 10^{-3}, L_f 0., L_t 9.0 \cdot 10^{-3}\}$
- $\text{ENGYAB}=\{A_x 5.4 \cdot 10^{-3}, A_y 25.4 \cdot 10^{-3}, L_f 0.646, L_t 0.027\}$
- $\text{YSP}=\{A_x 10.0 \cdot 10^{-3}, A_y 0.102 \cdot 10^{-3}, L_f 0., L_t 0.09\}$
- $\text{XSP}=\{A_x 0.08 \cdot 10^{-3}, A_y 10.0 \cdot 10^{-3}, L_f 0., L_t 0.09\}$
- $\text{XAB}=\{A_x 1.0 \cdot 10^{-3}, A_y 1.0 \cdot 10^{-3}, L_f 0.646, L_t 27.0 \cdot 10^{-3}\}$
- $\text{YAB}=\{A_x 1.0 \cdot 10^{-3}, A_y 1.0 \cdot 10^{-3}, L_f 0.646, L_t 27.0 \cdot 10^{-3}\}$

Javier Resta-López



Energy Deposition - Black Collimators



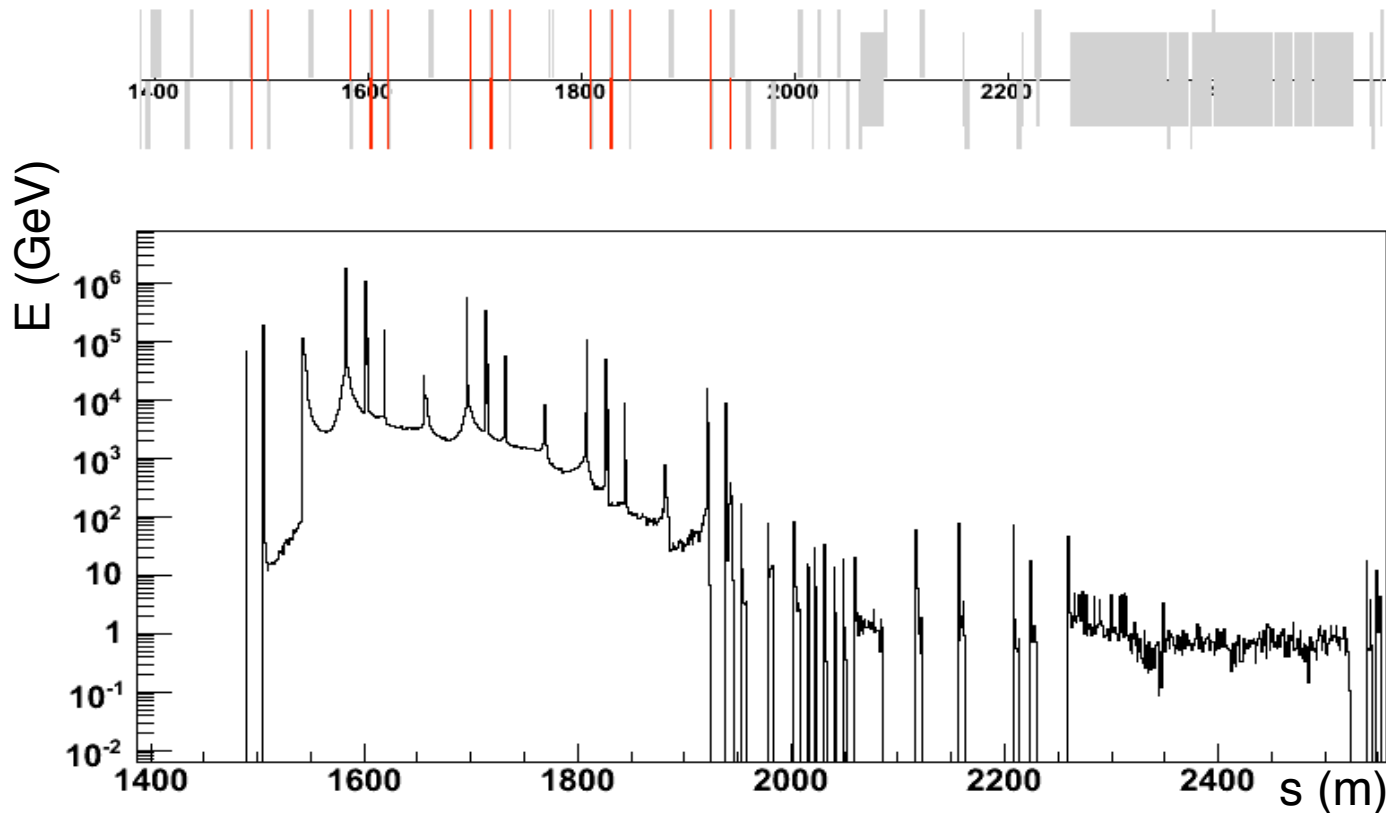
spm, Wed 16 Apr 2008 20:27:52 BST

BDSIM input file : CLICx.Coll.gmad





Energy Deposition - with secondaries



spm, Wed 16 Apr 2008 20:20:31 BST

BDSIM input file : CLICx.Coll.gmad

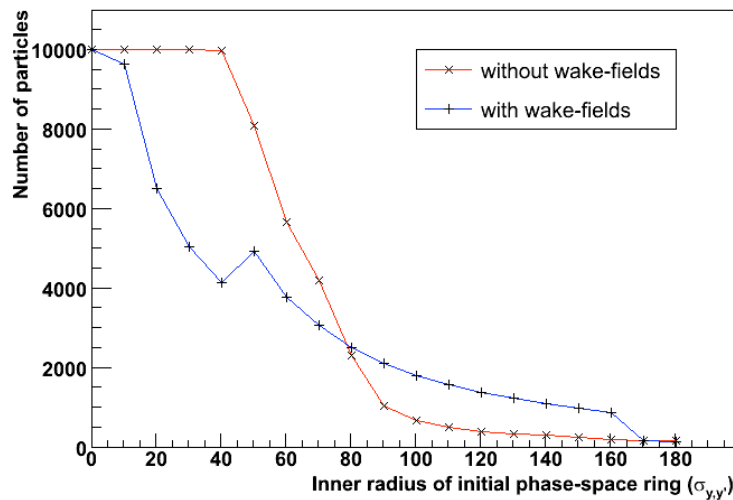
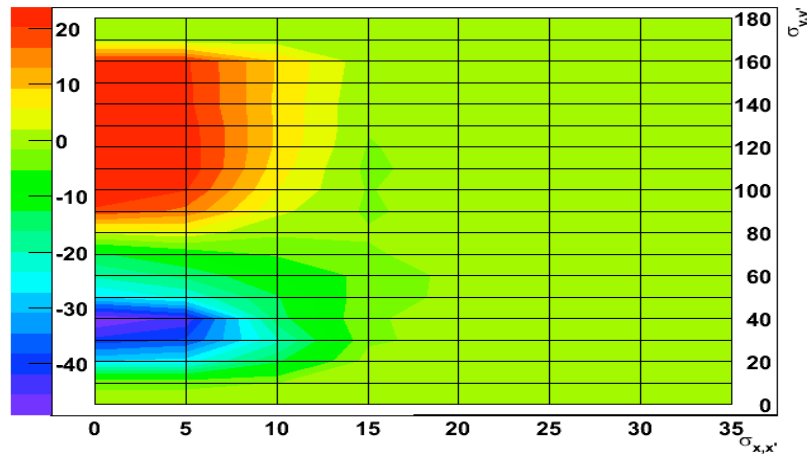
26/08/08

Using default collimator material (graphite)

7



CLIC IP

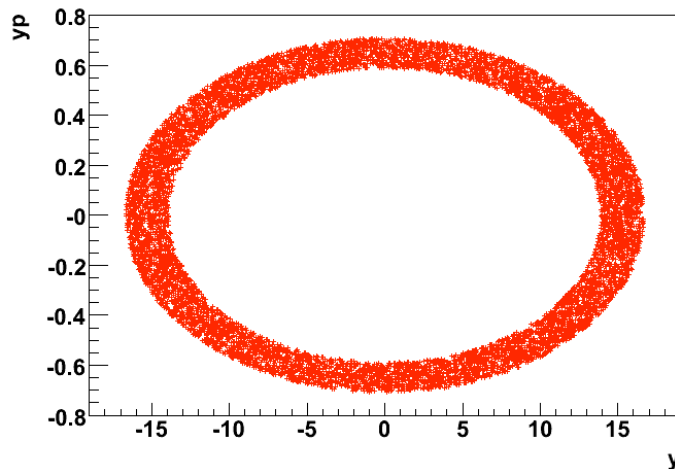
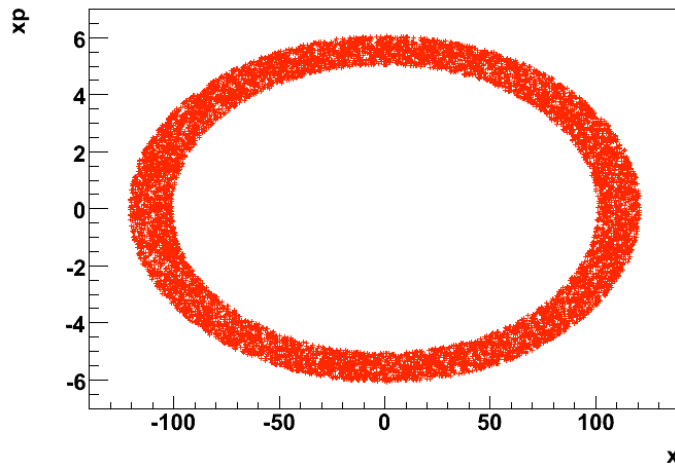


- $(N_1 - N_2) / \sqrt{(N_1 + N_2)}$
 - Major difference in particle numbers from low-x rings
 - Collimation depth in y is 80σ

- Fewer halo particles at IP with wakefields on
 - but these particles are the troublesome large-y particles...



Halo distributions - ILC



- 10000 particles per ring
- Rings of 1σ in $x:xp$
 - track distributions $0-1\sigma$ to $5-6\sigma$
- Rings of 2σ in $y:yp$
 - track distributions $0-2\sigma$ to $40-42\sigma$
- This time we track from the entrance to the final focus (after EBSY2), as that is where all the collimation happens



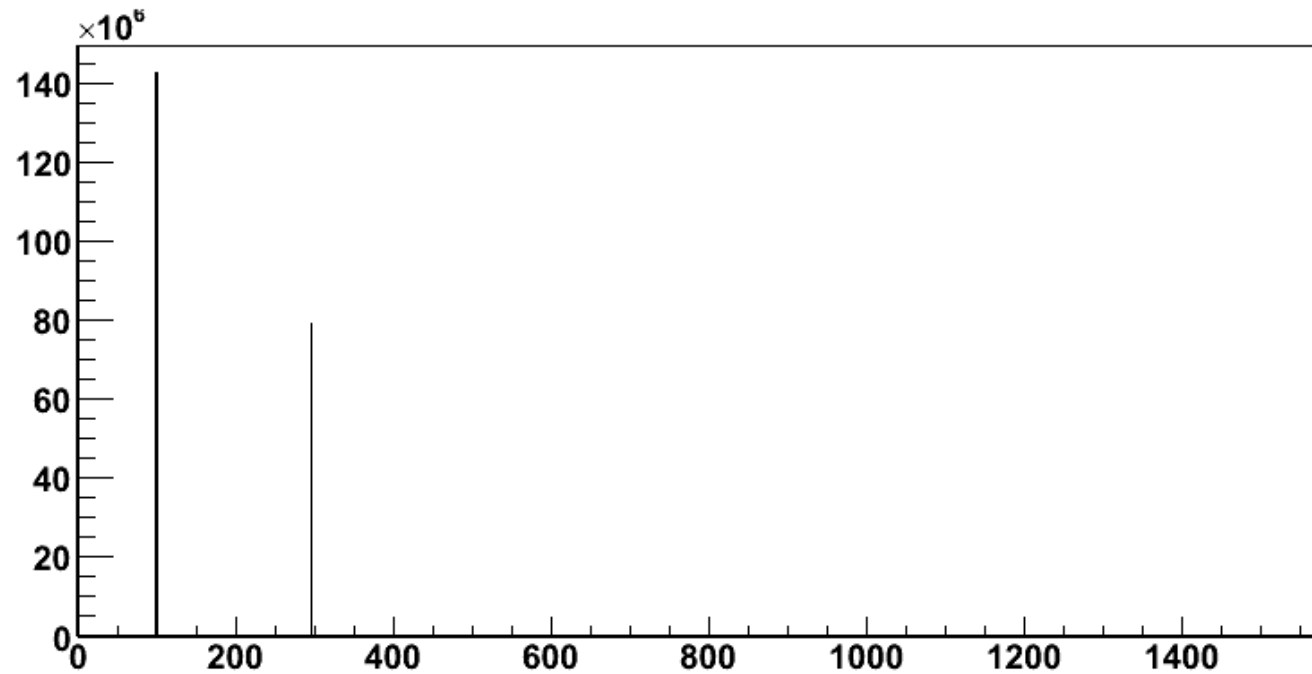
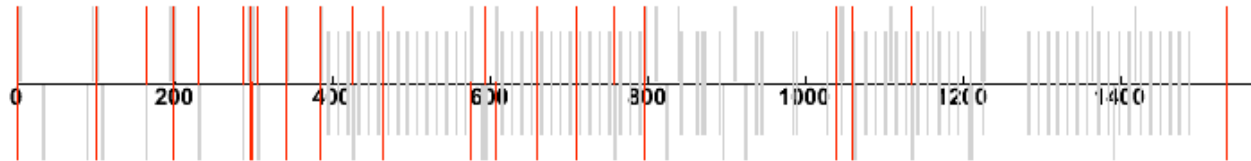
Collimator parameters - ILC



- $x_{\text{gapsp1}} := 0.300\text{e-}3$; $y_{\text{gapsp1}} := 0.250\text{e-}3$;
- $x_{\text{gapab2}} := 4.000\text{e-}3$; $y_{\text{gapab2}} := 4.000\text{e-}3$;
- $x_{\text{gapsp2}} := 0.300\text{e-}3$; $y_{\text{gapsp2}} := 0.200\text{e-}3$;
- $\text{rpc1} := 5.000\text{e-}3$;
- $x_{\text{gapab3}} := 4.000\text{e-}3$; $y_{\text{gapab3}} := 4.000\text{e-}3$;
- $x_{\text{gapsp3}} := 0.300\text{e-}3$; $y_{\text{gapsp3}} := 0.250\text{e-}3$;
- $\text{rpc2} := 5.000\text{e-}3$;
- $\text{rpc3} := 5.000\text{e-}3$;
- $x_{\text{gapab4}} := 4.000\text{e-}3$; $y_{\text{gapab4}} := 4.000\text{e-}3$;
- $x_{\text{gapsp4}} := 0.300\text{e-}3$; $y_{\text{gapsp4}} := 0.200\text{e-}3$;
- $\text{rpc4} := 5.000\text{e-}3$;
- $\text{rpc5} := 5.000\text{e-}3$;
- $x_{\text{gapab5}} := 4.000\text{e-}3$; $y_{\text{gapab5}} := 4.000\text{e-}3$;
- $x_{\text{gapsp5}} := 0.420\text{e-}3$; $y_{\text{gapsp5}} := 0.250\text{e-}3$;
- $\text{rpc6} := 5.000\text{e-}3$;
- $\text{rpdump} := 10.000\text{e-}3$;
- $\text{rpc7} := 5.000\text{e-}3$;
- $x_{\text{gapspex}} := 3.200\text{e-}3$;
- $\text{rpc8} := 5.000\text{e-}3$;
- $\text{rpc9} := 5.000\text{e-}3$;
- $\text{rpc10} := 5.000\text{e-}3$;
- $x_{\text{gapabe}} := 1.000\text{e-}3$; $y_{\text{gapabe}} := 1.000\text{e-}3$;
- $\text{rpc11} := 5.000\text{e-}3$;
- $x_{\text{gapab10}} := 4.400\text{e-}3$; $y_{\text{gapab10}} := 4.400\text{e-}3$;
- $x_{\text{gapab9}} := 6.600\text{e-}3$; $y_{\text{gapab9}} := 3.000\text{e-}3$;
- $x_{\text{gapab7}} := 4.500\text{e-}3$; $y_{\text{gapab7}} := 3.000\text{e-}3$;
- $x_{\text{gapmsk1}} := 8.300\text{e-}3$;
- $\text{rmskcrab} := 10.500\text{e-}3$;
- $x_{\text{gapmsk2}} := 8.500\text{e-}3$;

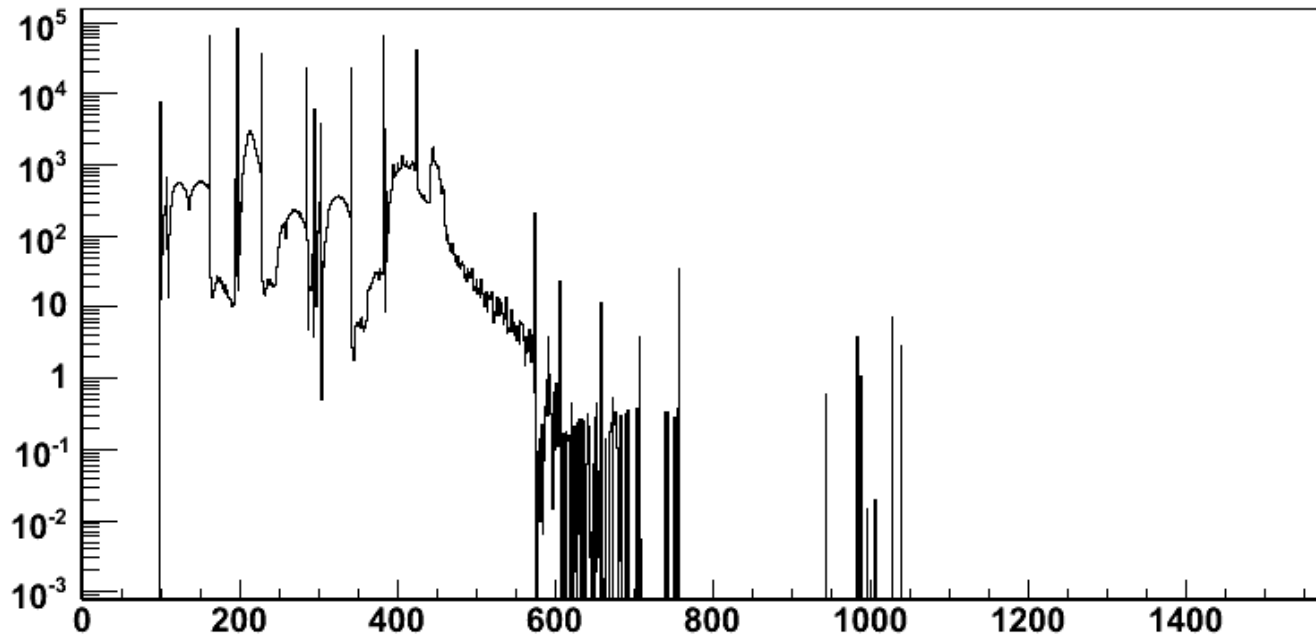
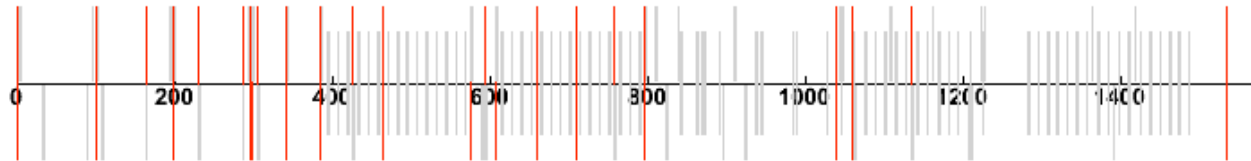


ILC Energy Deposition - Black Collimators





ILC Energy Deposition - with Secondaries





Summary



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- Last losses in ILC are at $> 400\text{m}$ from the IP
 - cf CLIC: losses all the way to the IP
 - Of course, CLIC is 6 times higher energy...
 - Full wakefield simulations for ILC now underway