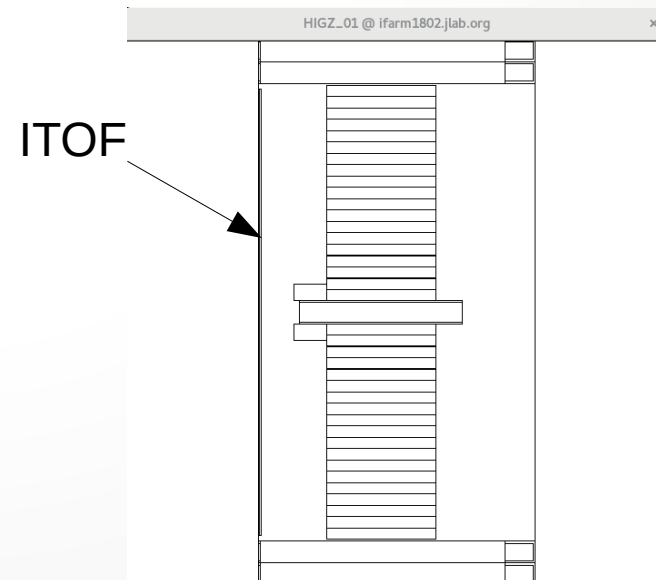


EM background rate simulations

Simon Taylor / JLab

- Used Richard's coherent bremsstrahlung beam generator built into HDGeant4
- Simulated FCAL-2 geometry with DIRC+additional TOF-veto volume (ITOF) but no GE
- Used measured scaler rates for $I=900$ nA to calibrate rates in ITOF and FCAL-2



Bremsstrahlung rate and spectrum

Hall D Coherent Bremsstrahlung Rate Calculator

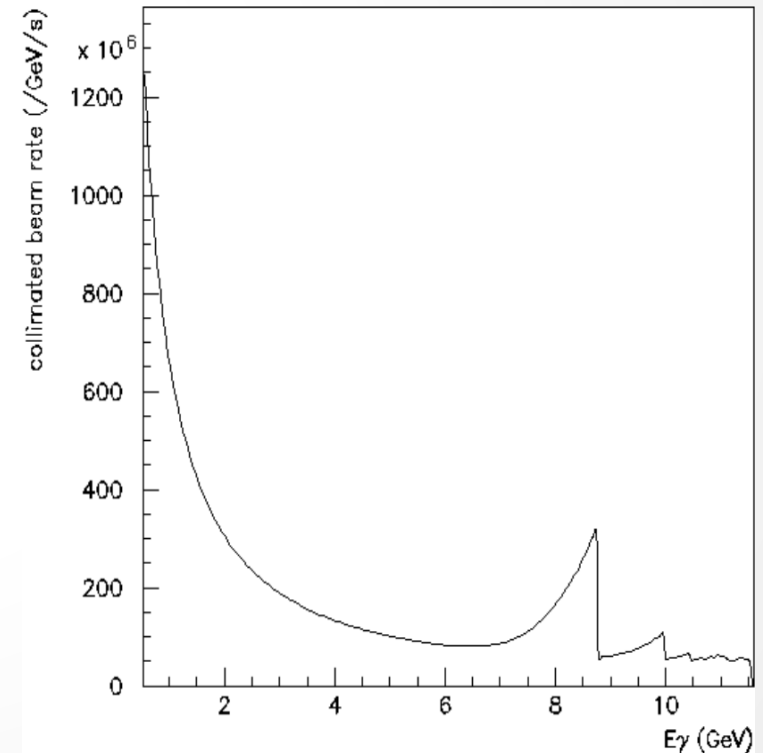
Richard Jones, University of Connecticut
August 12, 2012

update

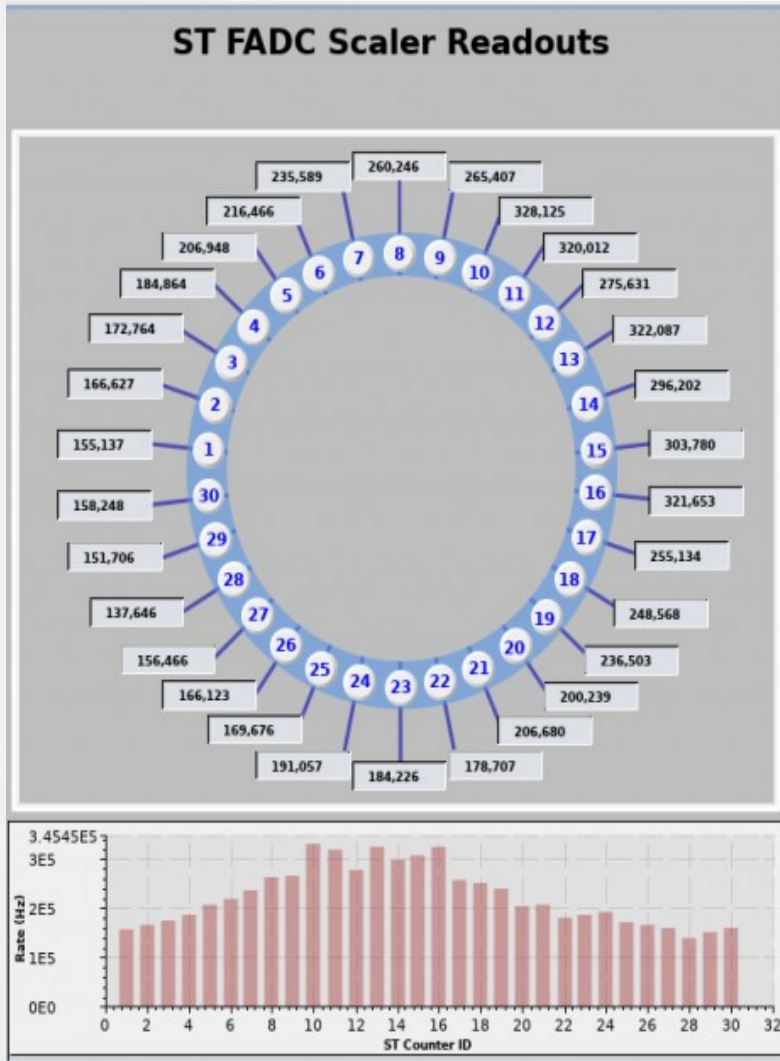
Electron beam energy	<input type="text" value="11.55"/> GeV	<input type="button" value="default"/>	Low edge of primary peak window	<input type="text" value="8.4"/>
Electron beam current	<input type="text" value="0.9"/> μA	<input type="button" value="default"/>	GeV	<input type="button" value="default"/>
Electron beam emittance	<input type="text" value="2.5e-09"/> m	<input type="button" value="default"/>	High edge of primary peak window	<input type="text" value="9"/> GeV
Electron beam circular polarization	<input type="text" value="0"/>	<input type="button" value="default"/>	Low edge of background window	<input type="text" value="0.1"/>
Radiator thickness	<input type="text" value="5.5e-05"/> m	<input type="button" value="default"/>	GeV	<input type="button" value="default"/>
Radiator secondary tilt	<input type="text" value="0.25"/> rad	<input type="button" value="default"/>	High edge of background window	<input type="text" value="3"/>
Photon spectrum peak energy	<input type="text" value="8.8"/>	<input type="button" value="default"/>	GeV	<input type="button" value="default"/>
Number of bins in photon spectrum	<input type="text" value="200"/>	<input type="button" value="default"/>	Low edge of endpoint tagging window	<input type="text" value="0.0012"/> GeV
Photon spectrum energy maximum	<input type="text" value="11.6"/> GeV	<input type="button" value="default"/>	GeV	<input type="button" value="default"/>
Photon spectrum energy minimum	<input type="text" value="0.0012"/> GeV	<input type="button" value="default"/>	High edge of endpoint tagging window	<input type="text" value="11.2"/> GeV
Radiator-collimator distance	<input type="text" value="75"/> m	<input type="button" value="default"/>		
Collimator diameter	<input type="text" value="0.005"/> m	<input type="button" value="default"/>		

Primary peak sum is 125146760
Average peak polarization 0.31253
Background flux sum is 2.639E+09
Endpoint tagged sum is 4.92158E+09
Total beam power/W is 1.31799

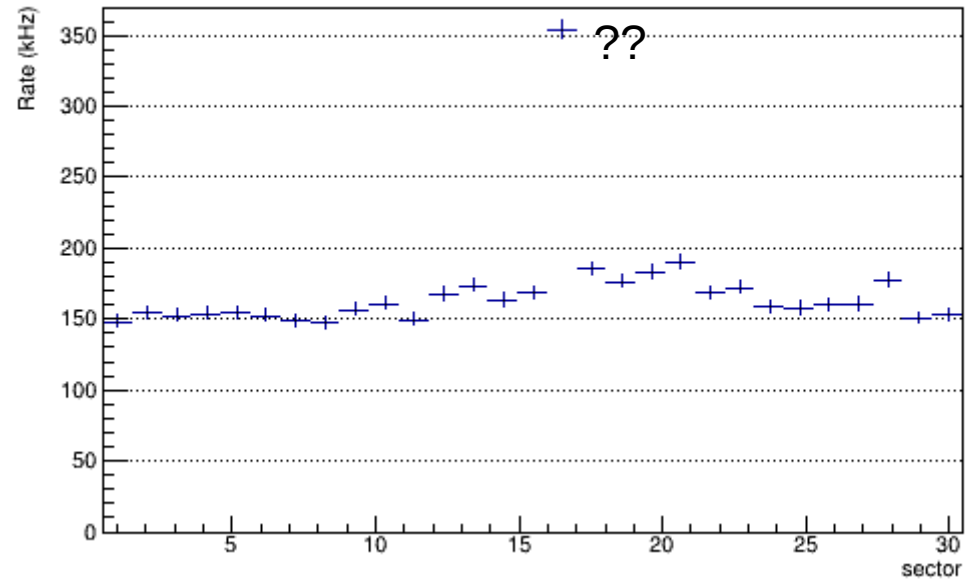
- Total rate at $I=900$ nA:
4.9 GHz



Start counter rates at 900 nA



Simulated rates



TOF rates at 900 nA

CSS

TOF Scalers

TOF Scaler Readouts

FADC

Disc: Readout 1

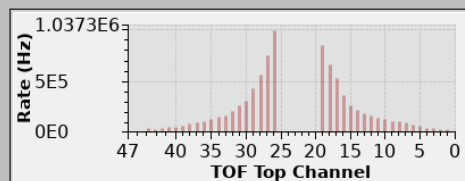
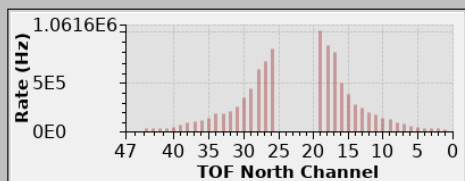
Disc: Readout 2

Disc: Trigger 1

Disc: Trigger 2

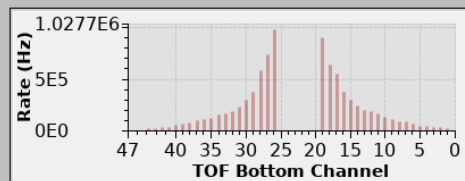
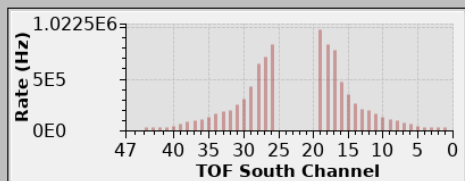
	1 - 10:	11 - 20:	21 - 30:	31 - 40:	41 - 44:		70,219	91,393	110,088	108,703	127,388
Top	28,513	31,206	37,423	41,986	61,496						
Bottom	143,930	162,314	187,330	220,206	263,490		361,603	525,927	664,074	840,183	0
North	0	0	0	0	0		987,548	759,517	567,543	430,659	303,135
South	261,556	202,486	162,490	146,950	128,813		109,681	93,134	78,381	67,019	48,462
	41 - 44:	50,020	40,430	31,907	35,488	0	0				

Discriminator: Readout 1 Scalers

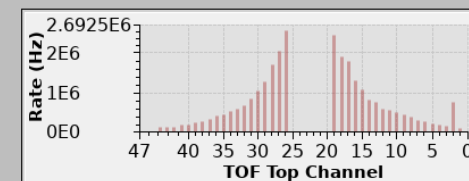
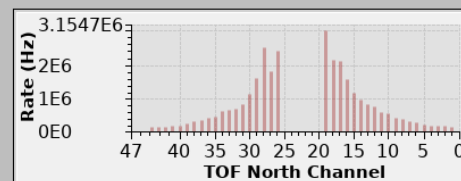


BOTTOM ← → TOP

NORTH ← → SOUTH

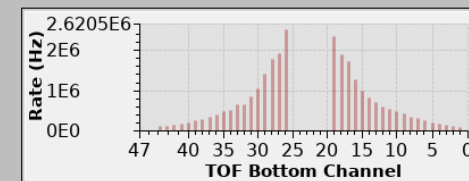
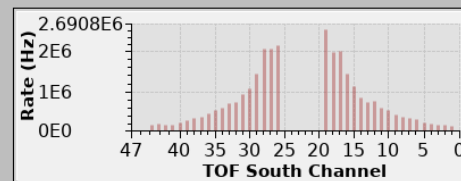


FADC Scalers

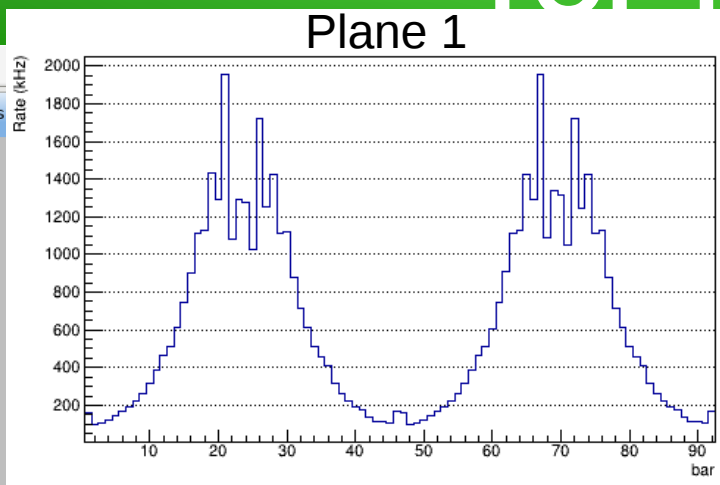


BOTTOM ← → TOP

NORTH ← → SOUTH



TOF rates at 900 nA

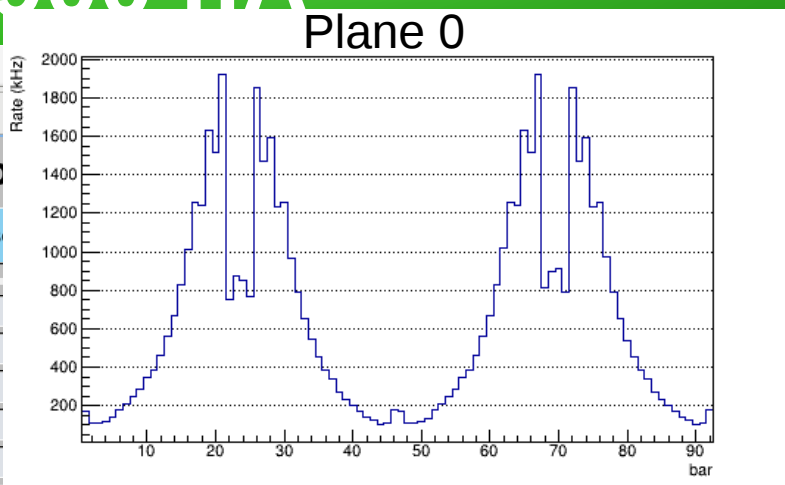


CSS

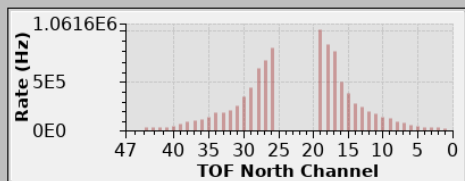
Scaler Readout

Disc: Readout 2 Dis

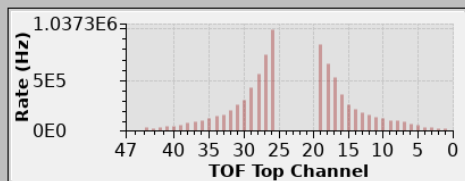
86	61,496	70,219
006	263,490	361,603
	0	987,548
050	128,813	109,681
88	0	0



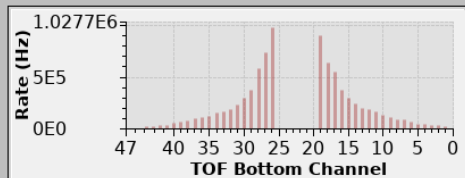
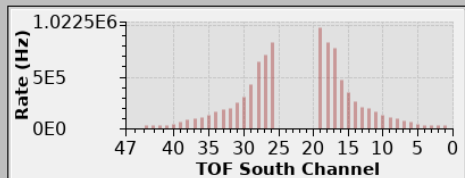
Discriminator: Readout 1 Scalers



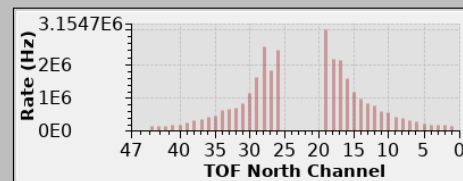
BOTTOM ← → TOP



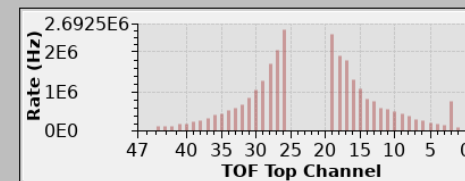
NORTH ← → SOUTH



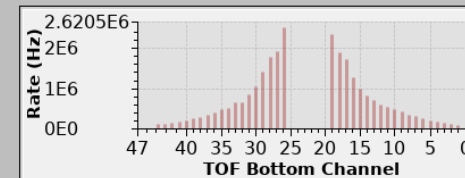
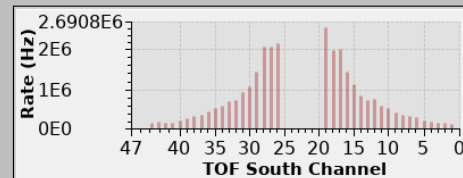
FADC Scalers



BOTTOM ← → TOP

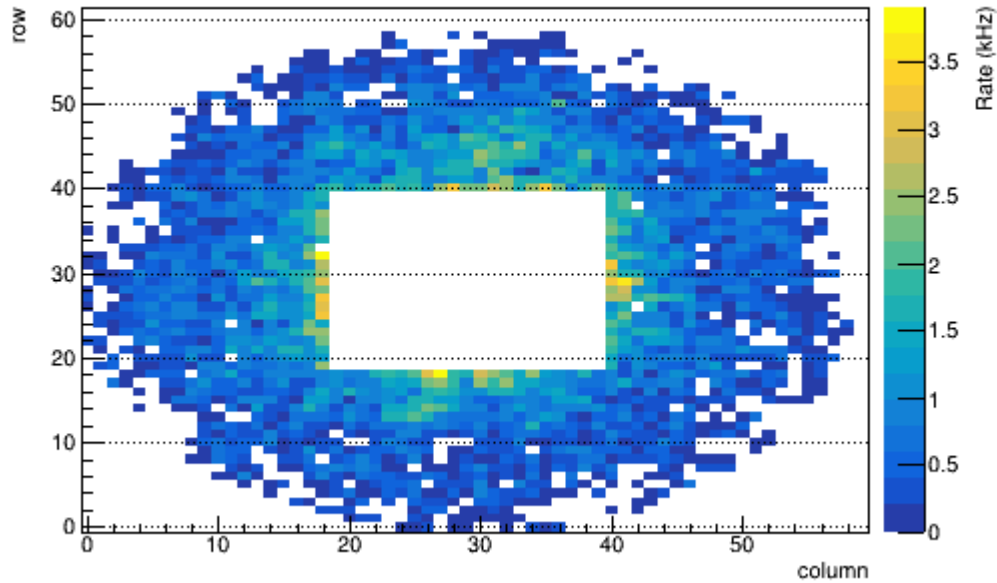


NORTH ← → SOUTH

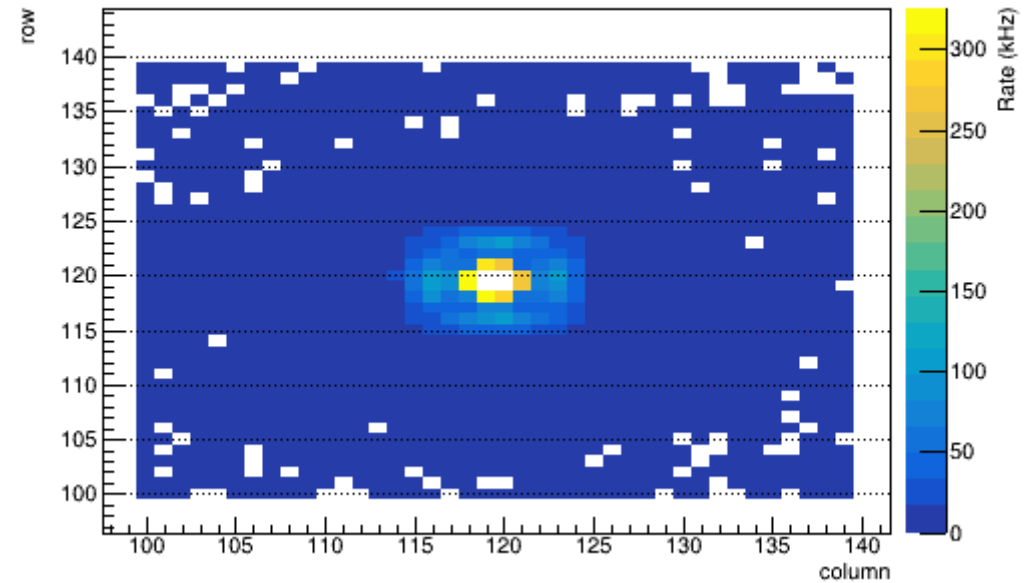


Simulated rates for FCAL

Lead glass

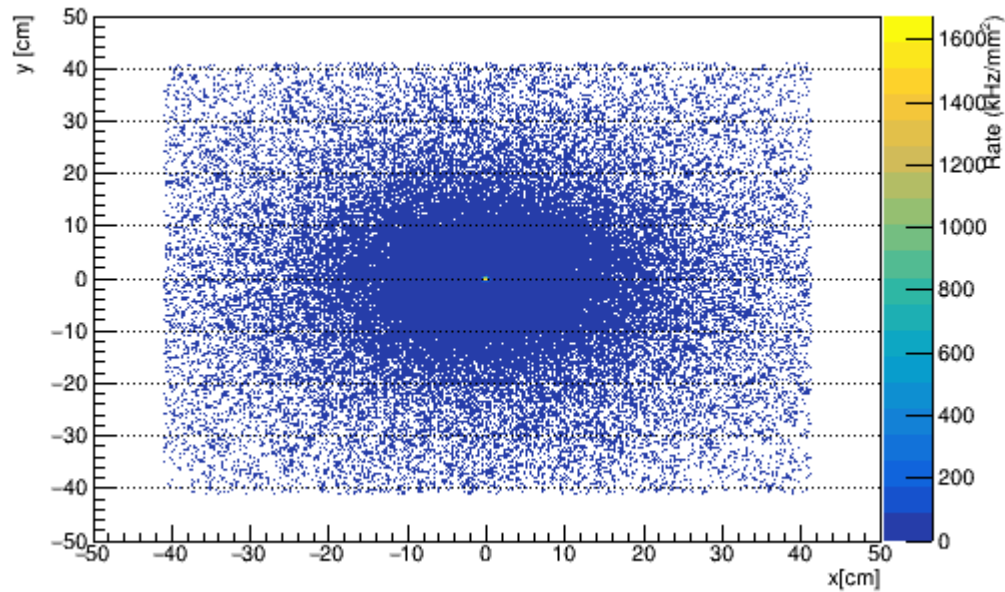


Insert



Simulated rates for ITOF

ITOF occupancy



ITOF occupancy

