

# Status of Trigger Rate Studies

Analysis Group meeting

3 March 2003

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# Update from Jan 27 meeting

Jan 27: Cremeavg broken

Now: Cremeavg fixed\*

Jan 27: Galactic electrons not implemented

Now: Galactic electrons implemented\*

Jan 27: Backgndavgpdr was low in rootplot

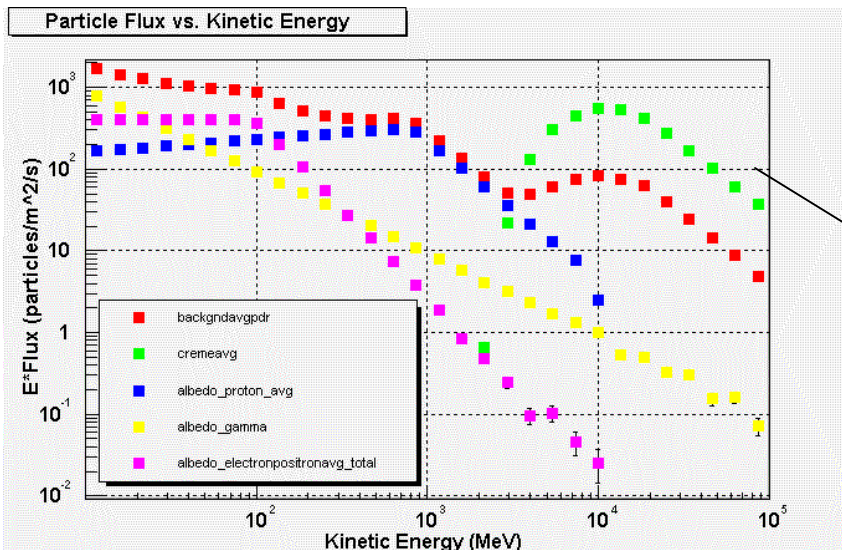
Now: Fixed\*

All fluxes are now implemented, and all look okay in rootplot (except for electronavg).

However, the trigger rates are presenting mysteries.

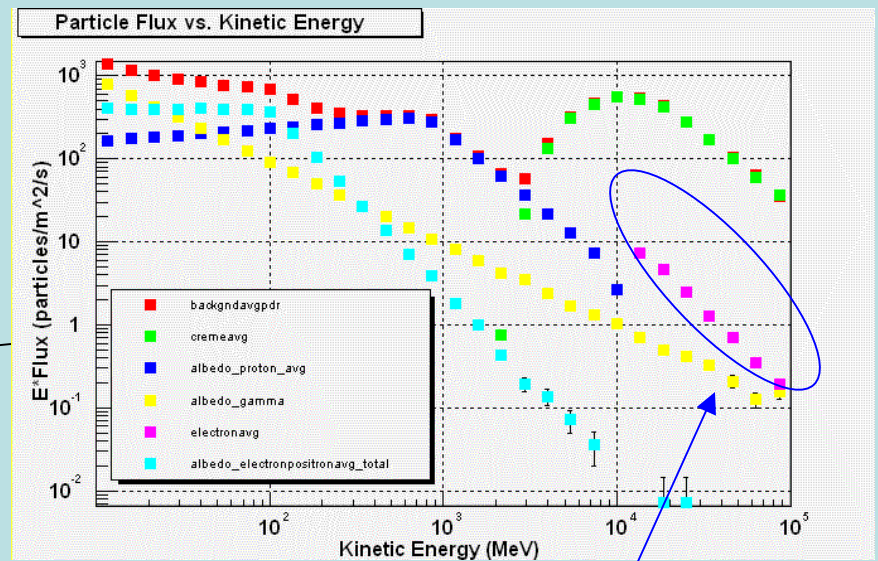
\*(Thanks to Sean and Toby)

Last meeting we had this (GlastRelease v0r3)

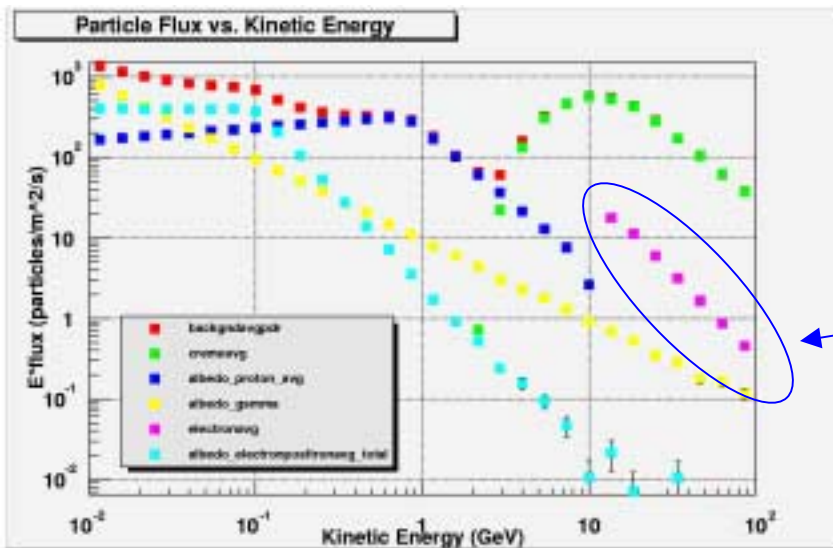


# Backgndavgpdr flux plots

Now we have this (GR v1r0, FluxSvc v6r2)



Which almost matches this (pdrApp)



Galactic electrons implemented (lavender), but flux is low

# backgndavgpdr fluxes from rootplot

Flux Type	Integrated Flux (kHz/m <sup>2</sup> ) in GlastRelease	Integrated Flux (kHz/m <sup>2</sup> ) in pdrApp
backgndavgpdr	4.2	4.2
	Breakdown:	
cremeavg	0.94	0.94
albedo_proton_avg	1.2	1.2
albedo_gamma	0.92	0.92
albedo_electronpositron avg_total	0.0053	0.01
albedo_electronpositron _total	1.1	1.1

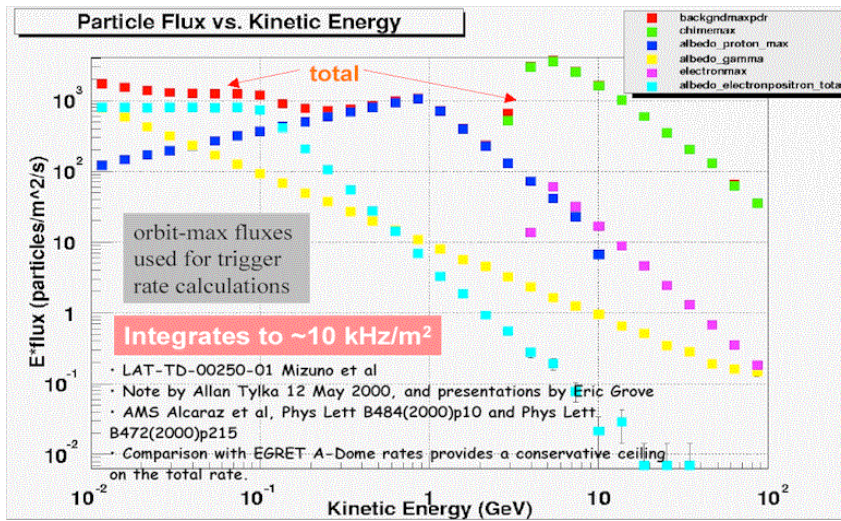
## Current Backgnd **avg** pdr L1T Rates – **cremeavg** is low

	Total	Cremeavg	albedo_p_avg	albedo_gamma	electronavg	albedo_e+e-avg
<b>GlastRelease</b>						
L1T rate (Hz)	3566	1597	977	187	9	796
L1T (fract)	1	0.08	0.45	.09	NA	0.38
TKR rate (Hz)	3324	1462	900	165	8	790
CAL-LO rate (Hz)	854	624	127	27	6	70
CAL-LO and NOT TKR	242	135	77	22	2	6
CAL-HI rate (Hz)	79	73	0	1	5	0
CAL-HI and NOT TKR	10	9	0	0	1	0
<b>pdrApp*</b>						
L1T rate (Hz)	4107	1660	1250	262	25	910
L1T (fract)	1	0.40	0.30	0.06	0.01	0.22
<b>L1T Percent Difference</b>						
GlastRelease/pdrApp L1T	0.8683	0.962	0.7816	0.71374	0.36	0.875
<b>GlastRelease under by</b>	<b>13%</b>	<b>4%</b>	<b>22%</b>	<b>29%</b>	<b>64%</b>	<b>13%</b>

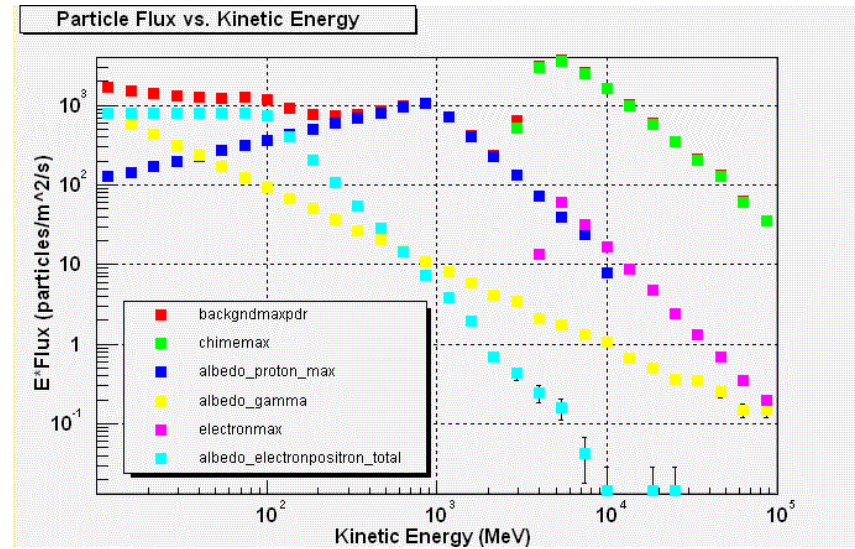
\*Known to be high due to old CAL-LO trigger

# backgndmaxpdr flux plots

pdrApp



GlastRelease



Good agreement between  
pdrApp and GlastRelease

# backgndmaxpdr fluxes from rootplot

Flux Type	Integrated Flux (kHz/m <sup>2</sup> ) in GlastRelease/Gleam	Integrated Flux (kHz/m <sup>2</sup> ) in pdrApp
backgndmaxpdr	9.9	9.9
chimemax	4.2	4.2
albedo_proton_max	2.6	2.6
albedo_gamma	0.92	0.92
electronmax	0.043	0.043
albedo_electronpositron_total	2.2	2.2

numbers match

## Current Backgnd **maxpdr** L1T Rates – **chimemax** fixed

<b>GlastRelease</b>	Total	chimemax	albedo_p_max	albedo_gamma	electronmax	albedo_e+e-
L1T rate (Hz)	11787	7070	2890	179	92	1556
L1T (fract)	1	0.60	0.25	0.02	0.01	0.13
TKR rate (Hz)	10804	6386	2640	159	75	1544
CAL-LO rate (Hz)	3085	2566	428	25	51	16
CAL-LO and NOT TKR	983	684	250	20	17	11
CAL-HI rate (Hz)	151	126	0	1.2	23	0
CAL-HI and NOT TKR	38	29	0	0	8.4	0
<b>pdrApp</b>						
Flux (kHz/m^2)	9.9	4.2	2.6	0.92	0.043	2.2
L1T rate (Hz)	13134	7419	3501	242	79	1893
L1T (fract)	1	0.56	0.27	0.02	0.01	0.14
TKR rate (Hz)	11221					
CAL-LO rate (Hz)	5297					
CAL-LO and NOT TKR	1913					
CAL-HI rate (Hz)	84					
CAL-HI and NOT TKR	10					
<b>Percent Difference</b>						
GlastRelease/pdrApp L1T	0.823	0.953	0.825	0.74	1.16	0.822
<b>GlastRelease under by</b>	<b>18%</b>	<b>5%</b>	<b>18%</b>	<b>26%</b>	<b>-16% (16% high)</b>	<b>18%</b>



# L1T Rate Recap

<b>Backgndavgpdr</b>	Total	cremeavg	albedo_proton_avg	albedo_gamma	electronavg	albedo_e-e+_avg
GlastRelease is under by	<b>13%</b>	<b>4%</b>	<b>22%</b>	<b>29%</b>	<b>64%</b>	<b>13%</b>
<b>Backgndmaxpdr</b>	Total	chimemax	albedo_proton_max	albedo_gamma	electronmax	albedo_e-e+_max
GlastRelease is under by	<b>18%</b>	<b>5%</b>	<b>18%</b>	<b>26%</b>	<b>-16% (16% high)</b>	<b>18%</b>

All rates are lower than pdrApp except for galactic electrons at maximum. Rates are not uniformly lower. Instead, they differ by source.

# Summary

- GlastRelease is still presenting trigger rate mysteries.
  - All fluxes are implemented, and integrated fluxes look good (except electronavg).  
However, trigger rates are lower than pdrApp (except electronmax), and not by a uniform amount.
- Why did the rates go down when all but one integrated flux looks okay?  
Possible factors:
  - The TKR trigger was changed
  - The CAL-LO trigger is different
  - Digitization was changed
  - Move from Gismo to GEANT4
  - For electronavg, the flux is half what of expected
    - Fixing this would likely raise the trigger rate (which is 64% too low)
  - Is there a problem with timekeeping? Compared simulated elapsed time per event for both versions.
    - No, it matches to within 0.4%. That's not it.

# What we (and others) are investigating now

– Looking at TKR rates and number of hits

- The CAL-LO trigger change (~15% effect) does not impact TKR rate. Looking at TKR is a better gauge than the overall L1T.

– Possible effects of digitization changes

(Leon is looking into this)