Cleaning and Proximity Analysis

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Subtraction of some Events associated with Cosmic Rays

- Hyp 1 : 2 or more P31 close together in frame reveals High Energy CR interaction.
- Hyp 2 : 2 or more ’destabilised’ events very nearby together reveal a P31 suppressed by E1+E2>4096
- Hyp 3 : High Energy CR could be associated with δ rays.
- ==> Suppression of each event nearby P31 pair.

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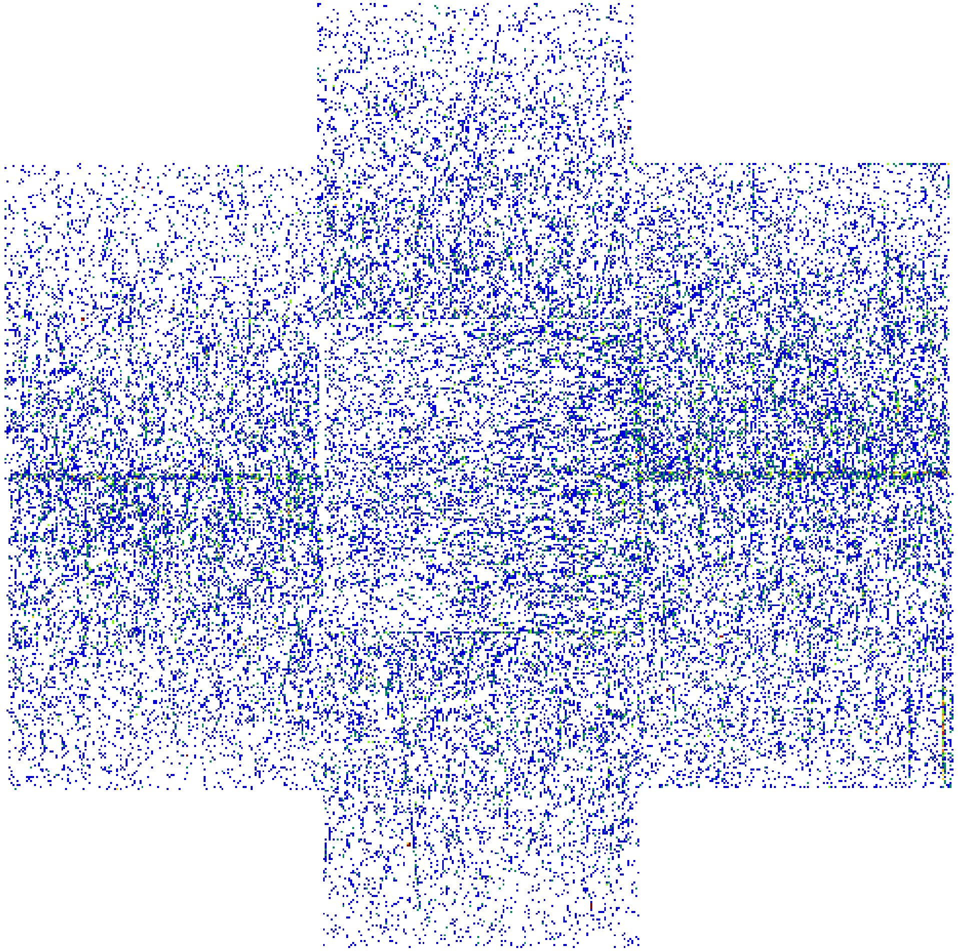
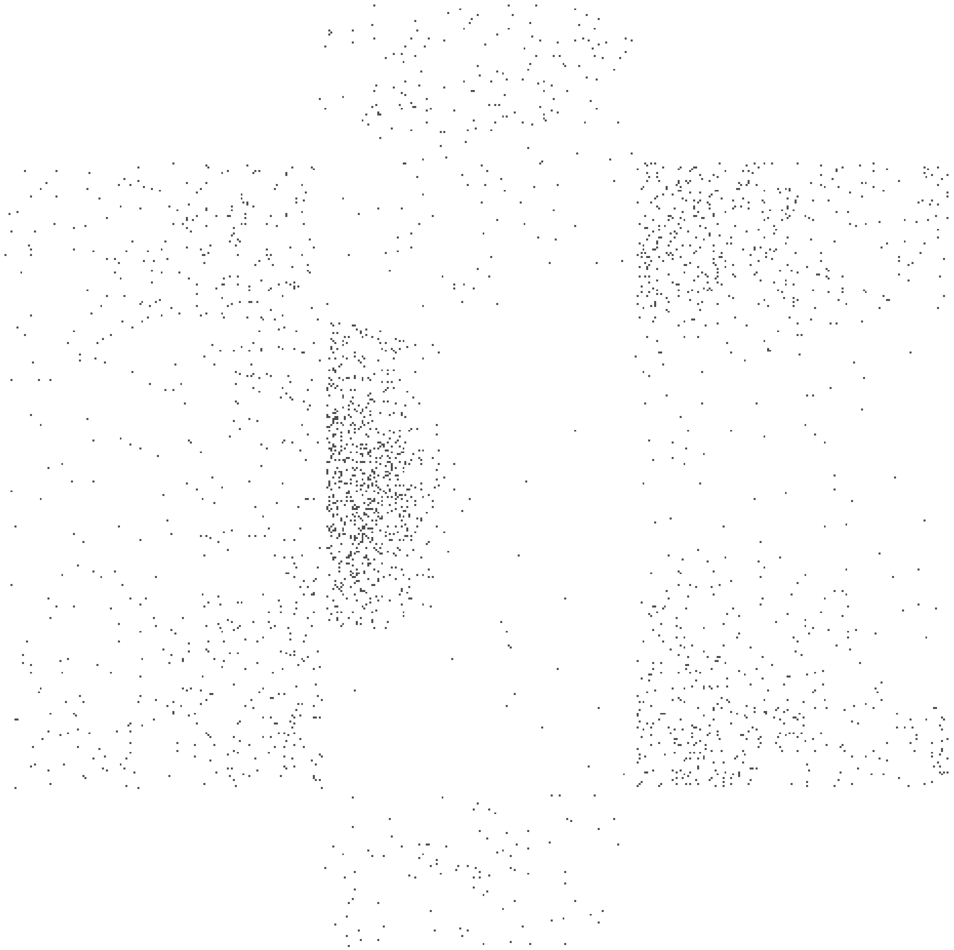
All Events nearby P31 Pair.
17500 evts



All Pattern<12 nearby P31 Pair
2640 evts..~1%



N.B.: ~220 000 good events ; not a GOOD Event suppressed...
This cleaning improve S/N for..... the P31 !!!

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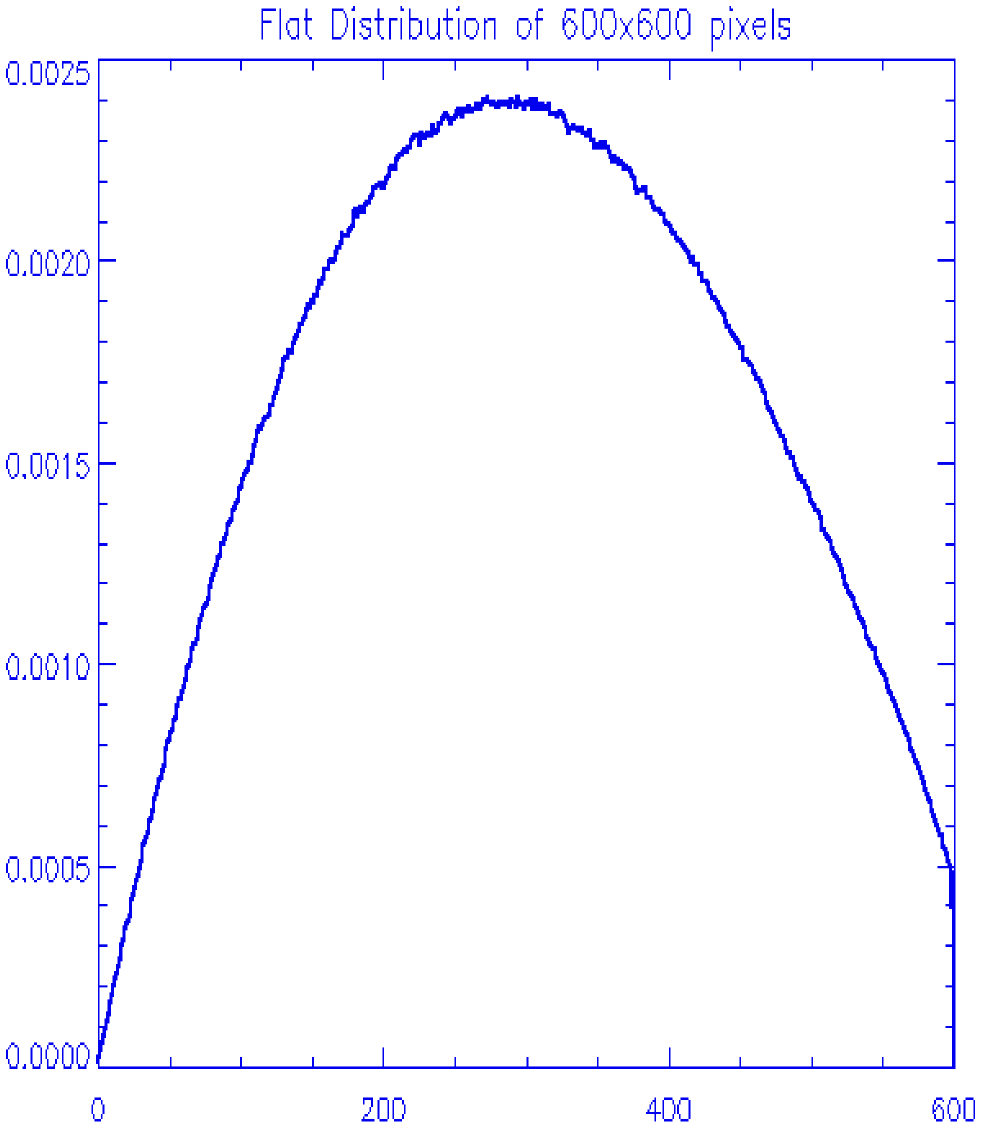
Proximity Analysis of events per frame

- Hyp 1 : Events belonging to Electronic Noise have been COMPLETELY subtracted.
- Compute histogram of distance between each events of the same frame. Then sum of these histograms and Normalisation to flat distribution.
- In "Close" observation, one waits for completely binomial distribution. i.e. NO correlation.
- Using Obs M1S_0039_0099711101009 (with EMDH upper threshold set to a high value)

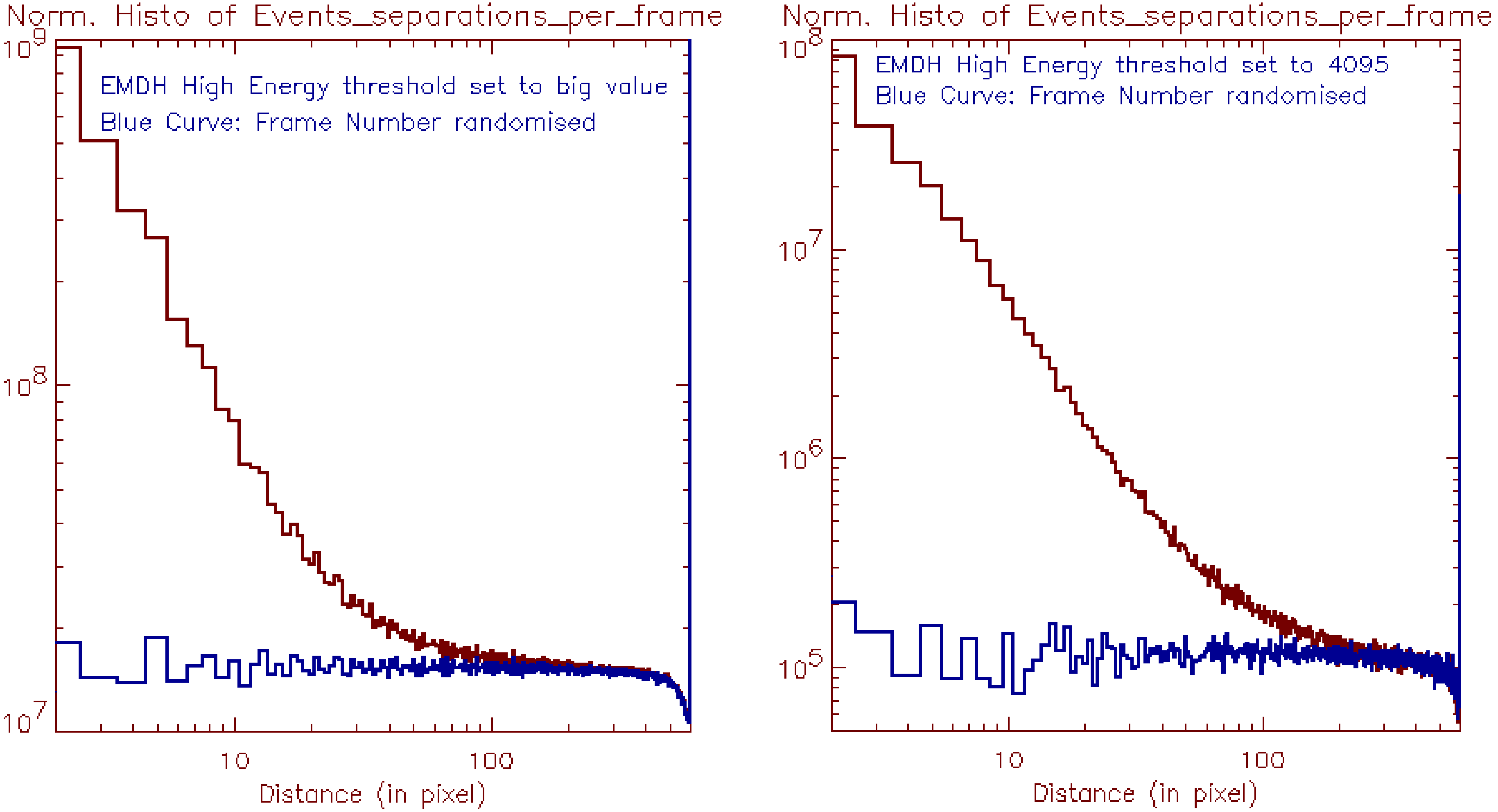
Normalisation Function



- Histogram of flat distribution of pair in 600x600 pixels normalised to unity.
- Computed up to distance < 600 pixels

Normalised Histograms of pair distances.

Brown: Observed.   Blue : Randomised.



Cl. : Cosmic Rays exhibit strong small Distance correlation.

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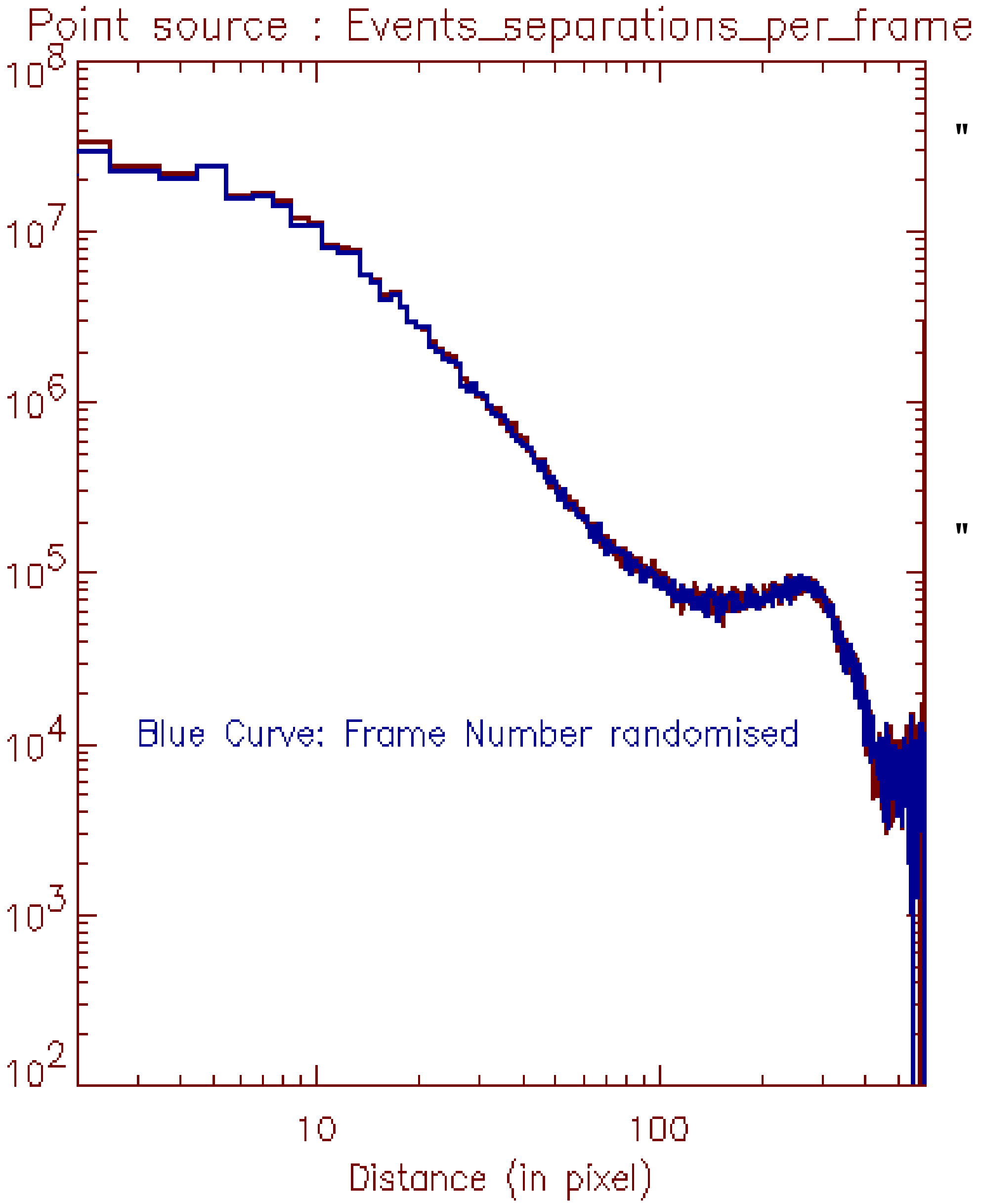
Point source analysis



- Histogram of Events Distance for all event except 'electronics' ones.
- Blue curve : Idem but frame number have been randomised (i.e. No more time correlation)

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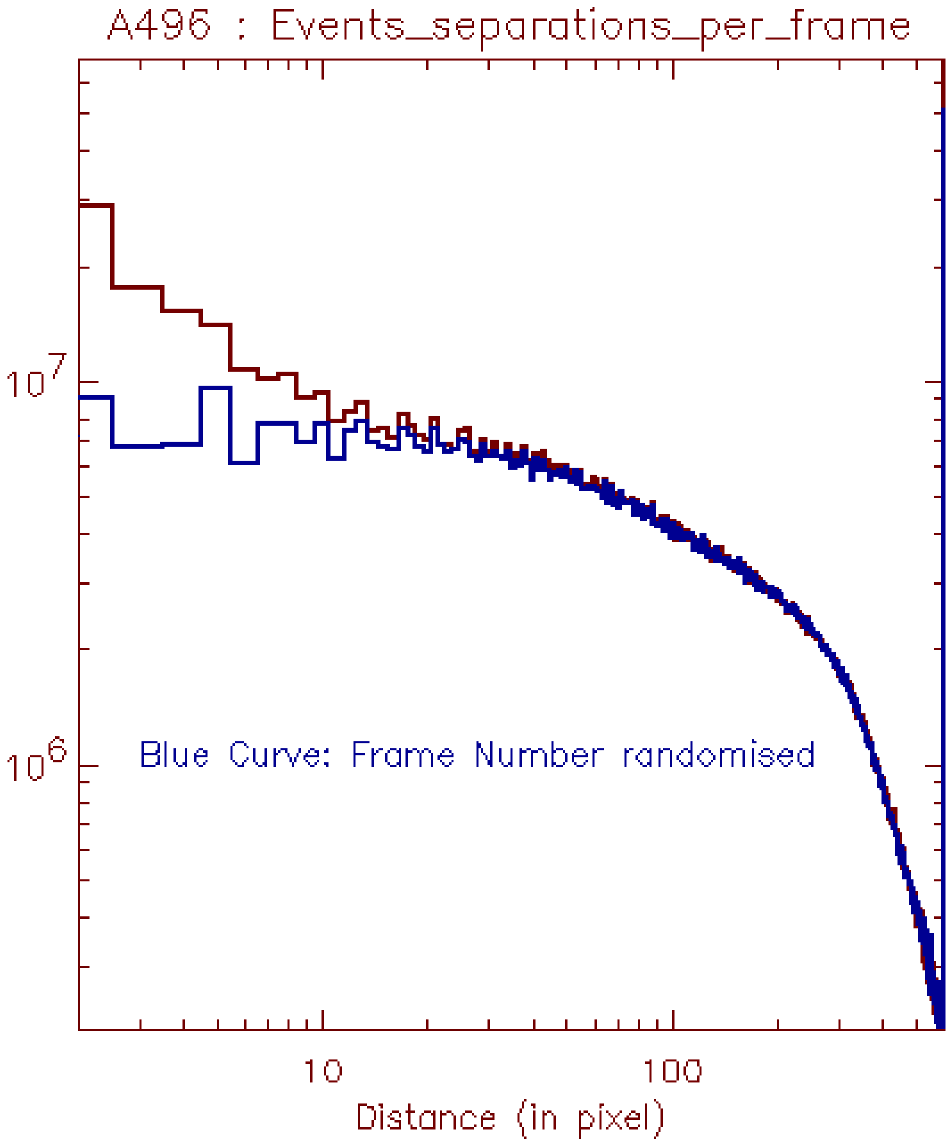
M1U_0048_9999990055002



- Upper : Hist. Of Events Distance for all event except 'electronics' ones.
- Blue curve : Idem but frame number have been randomised (i.e. No more time correlation)
- CL: Good tool to seek for doubtful correlation

Conclusion

- Cosmic Ray tracks can be removed via proximity analysis to Pattern 31 and ellispe masking.
- Proximity analysis :

  Cosmics rays exhibit small distance correlation

  Time randomisation of cleaned events list of NOT variable extended source should be used to determine cleaning parameter for cosmics rays.