What will SNO show ?

J.N. Bahcall, P.I.K. and A.Yu. Smirnov

- ⋆ Reactions
- ⋆ Uncertainties
- ⋆ Observables
- ⋆ Predictions
- ⋆ Conclusions

Observables

- CC: Rate, Spectrum, D – N, Seasonal
- NC: Rate, D – N, Seasonal
- ES: Rate, (Spectrum, D – N, Seasonal)
- NC/CC, ES/CC
- $[\text{Obs}] = [\text{Obs}]_{exp} \ / \ [\text{Obs}]_{SSM}$

Uncertainties

Energy Resolution

Energy Scale

Cross-Section

Trigger Efficiency

Statistics

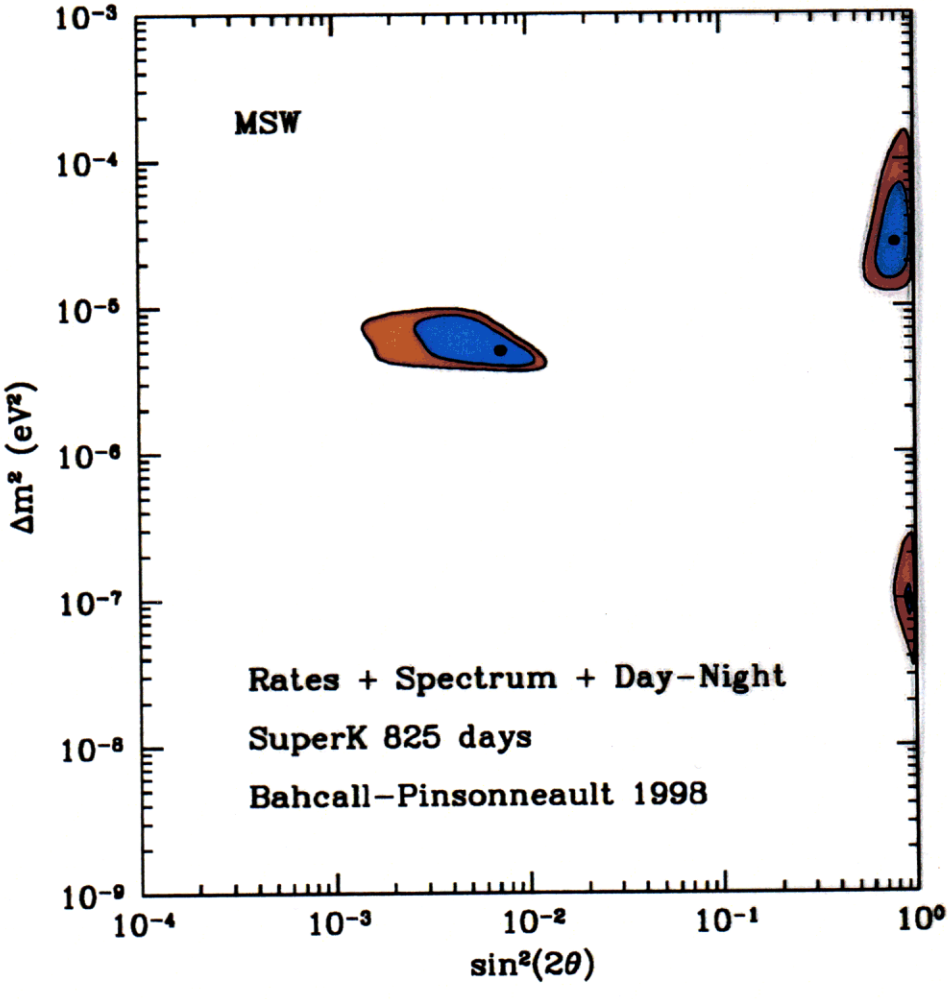
^{8}B Spectrum

hep

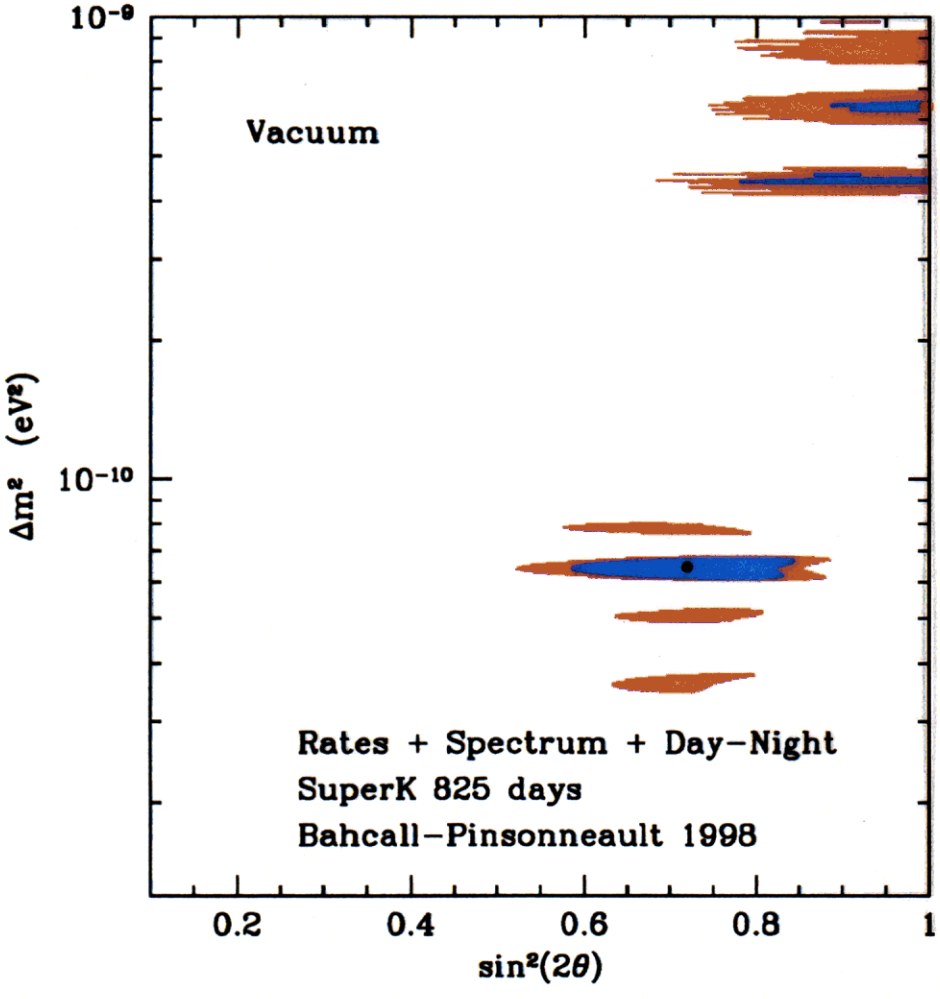
Uncertainties

Source	δT	$\delta\sigma$	δ [CC]	δ [NC]	δ [ES]	δ [NC]/[CC]	δ [ES]/[CC]
Energy resolution	0.3	1.4	0.4	~ 0	0.1	0.4	0.3
Energy scale	0.8	1.1	1.5	~ 0	0.5	1.5	1.0
B8 spectrum	0.4	0.8	1.9	1.6	1.4	0.3	0.6
Cross-section	0.03	0.15	5.8	6.4	~ 0	0.5	5.8
Statistics	0.35	1.1	1.4	2.9	4.7	3.2	4.9
hep	0.8	0.8	2.3	2.2	1.6	0.1	0.7
Total	1.3	2.4	6.7	7.4	5.2	3.6	7.6

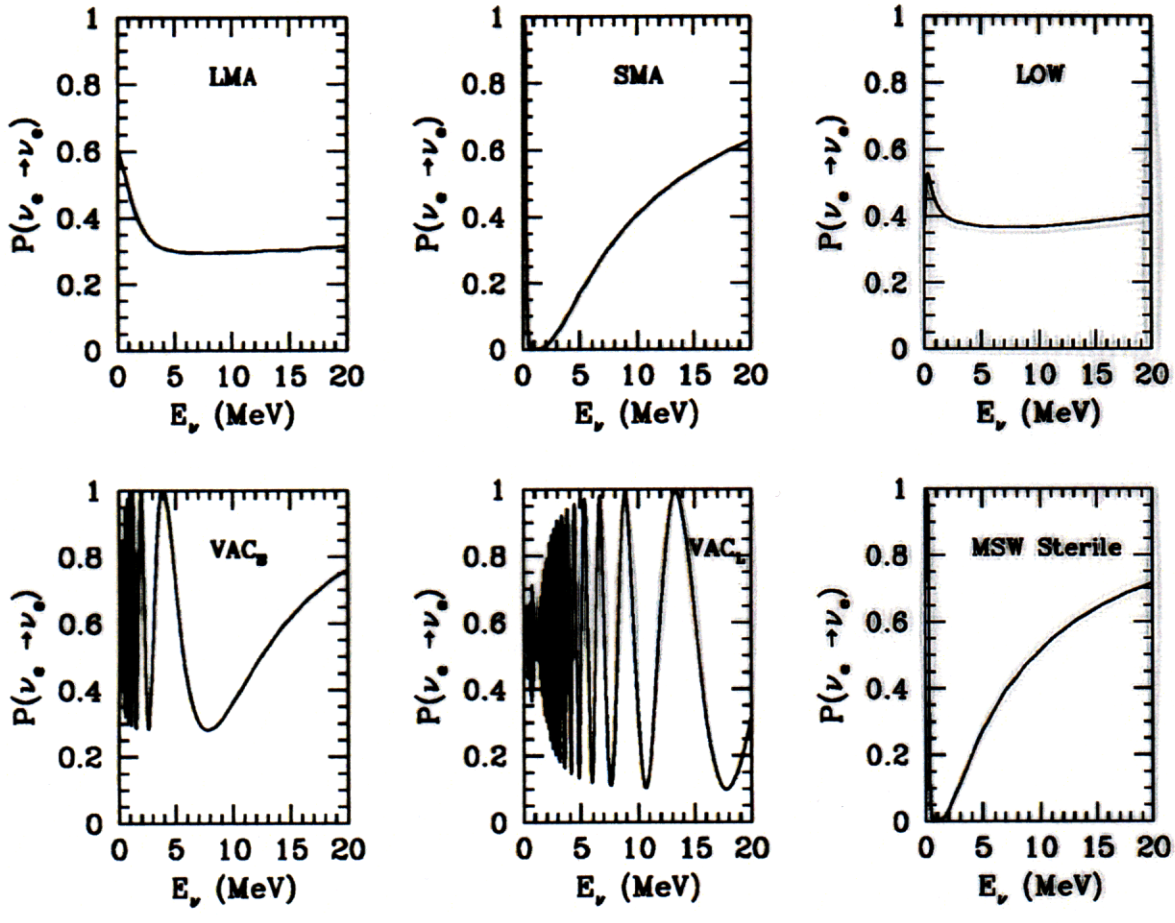
Allowed Regions: MSW



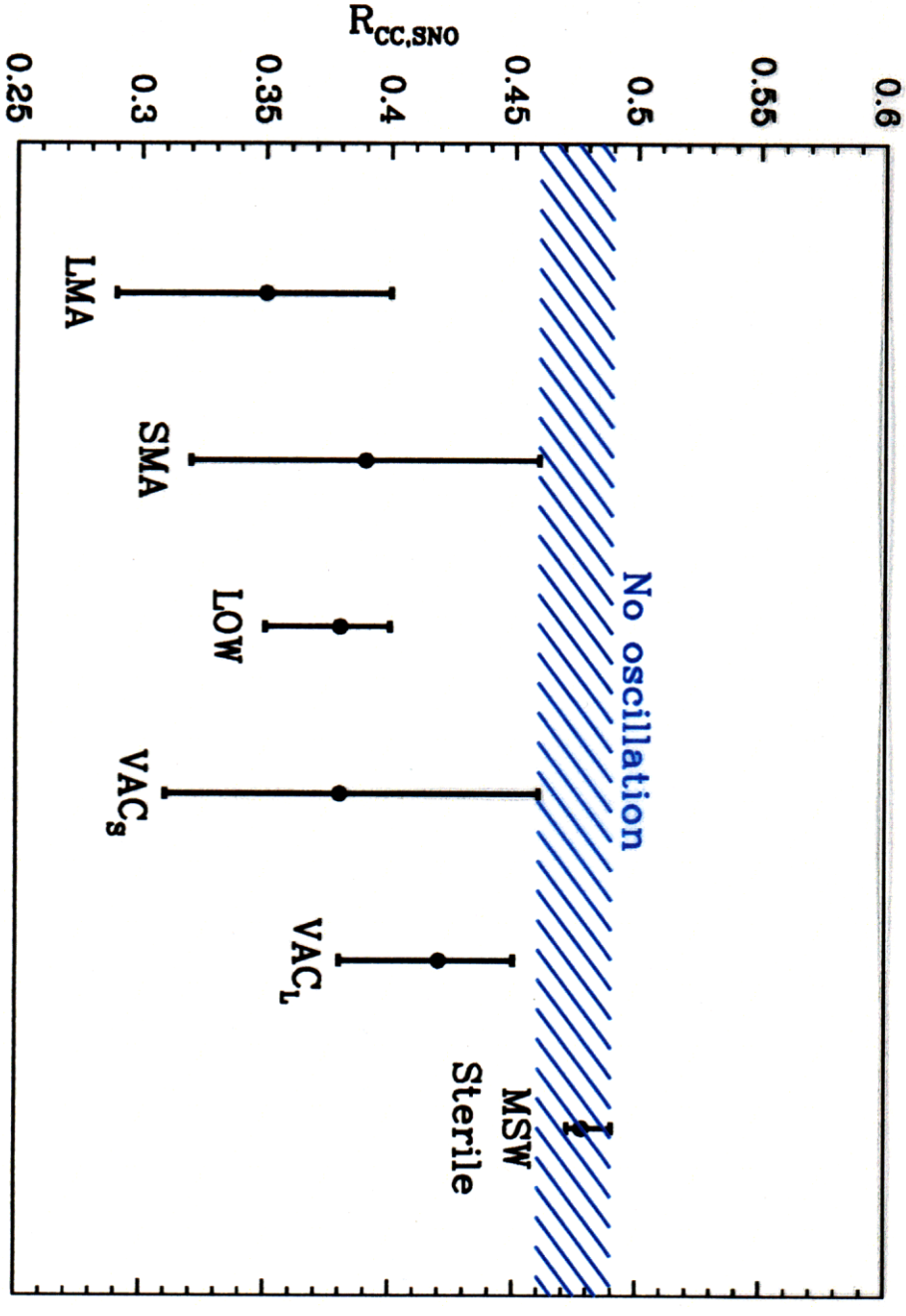
Allowed Regions: VAC



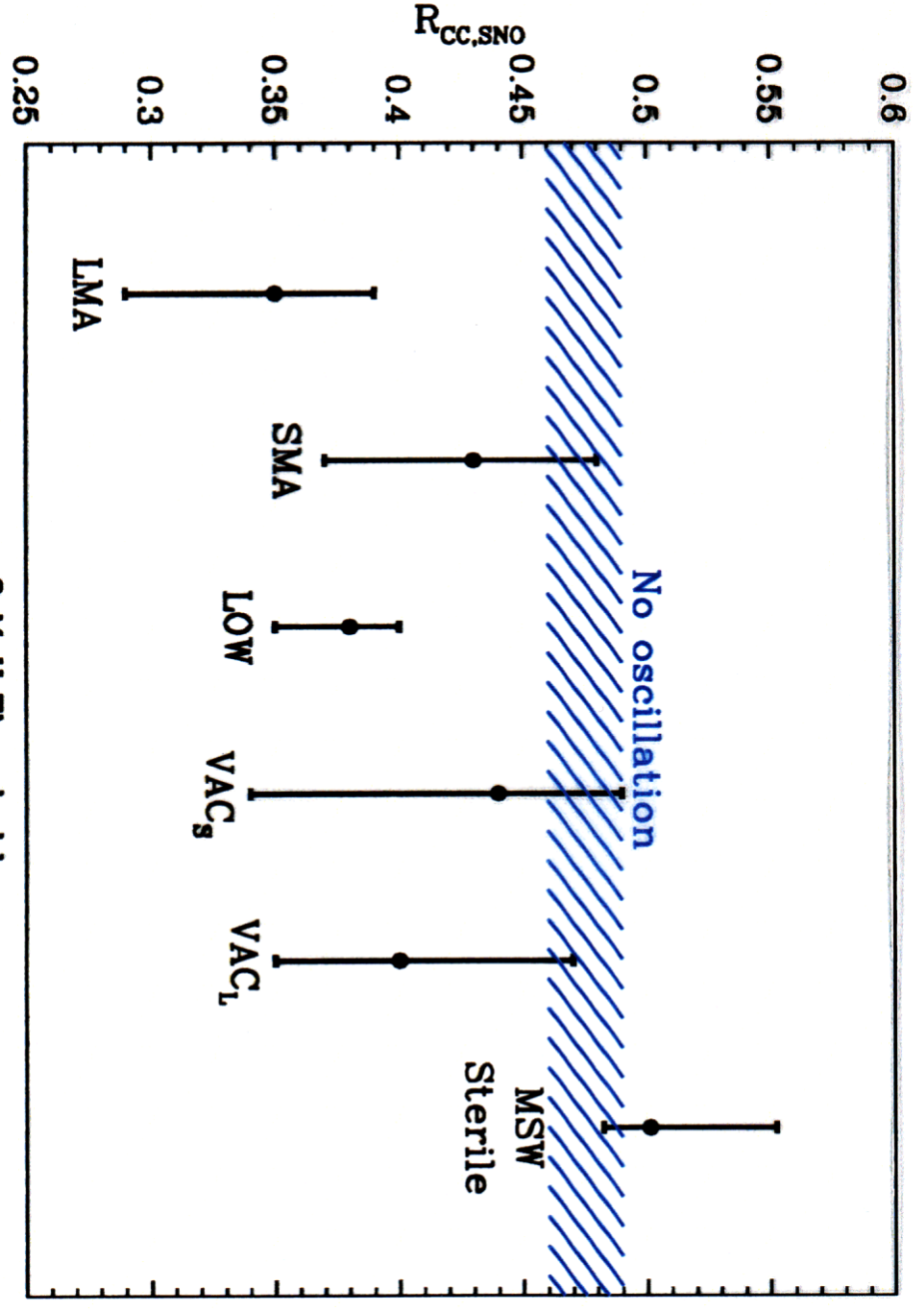
Survival Probabilities



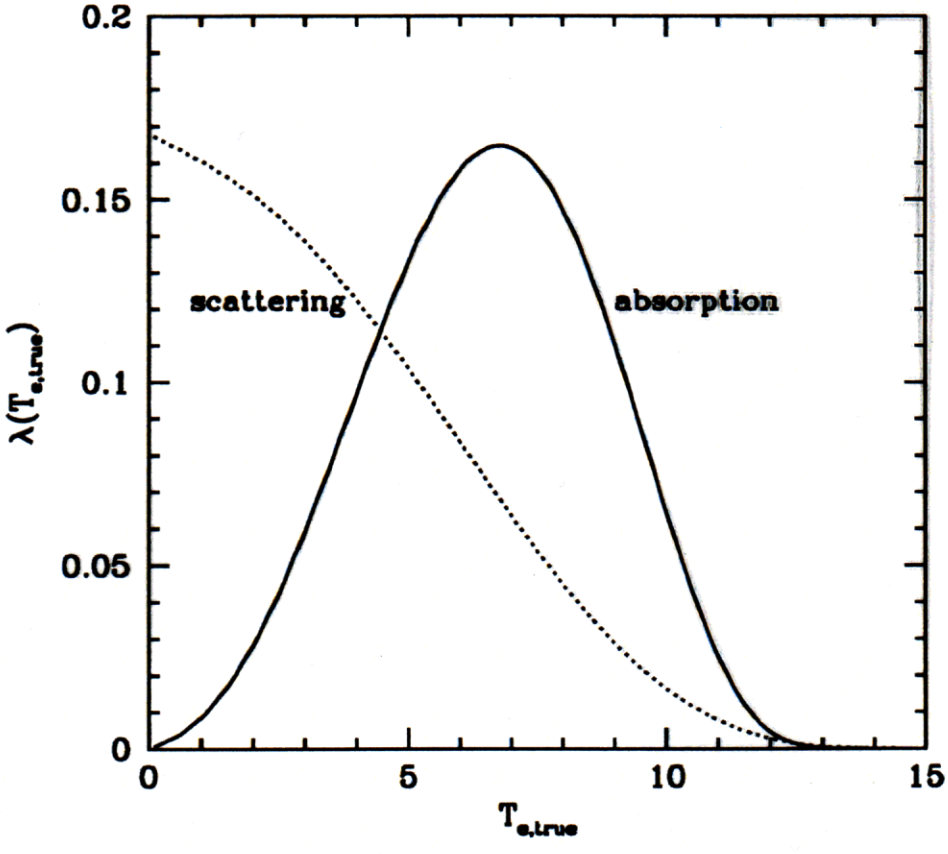
CC Rate (5 MeV)


0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
$R_{CC,SNO}$
No oscillation
MSW
Sterile
VAC_L
VAC_s
LOW
SMA
LMA
5 MeV Threshold

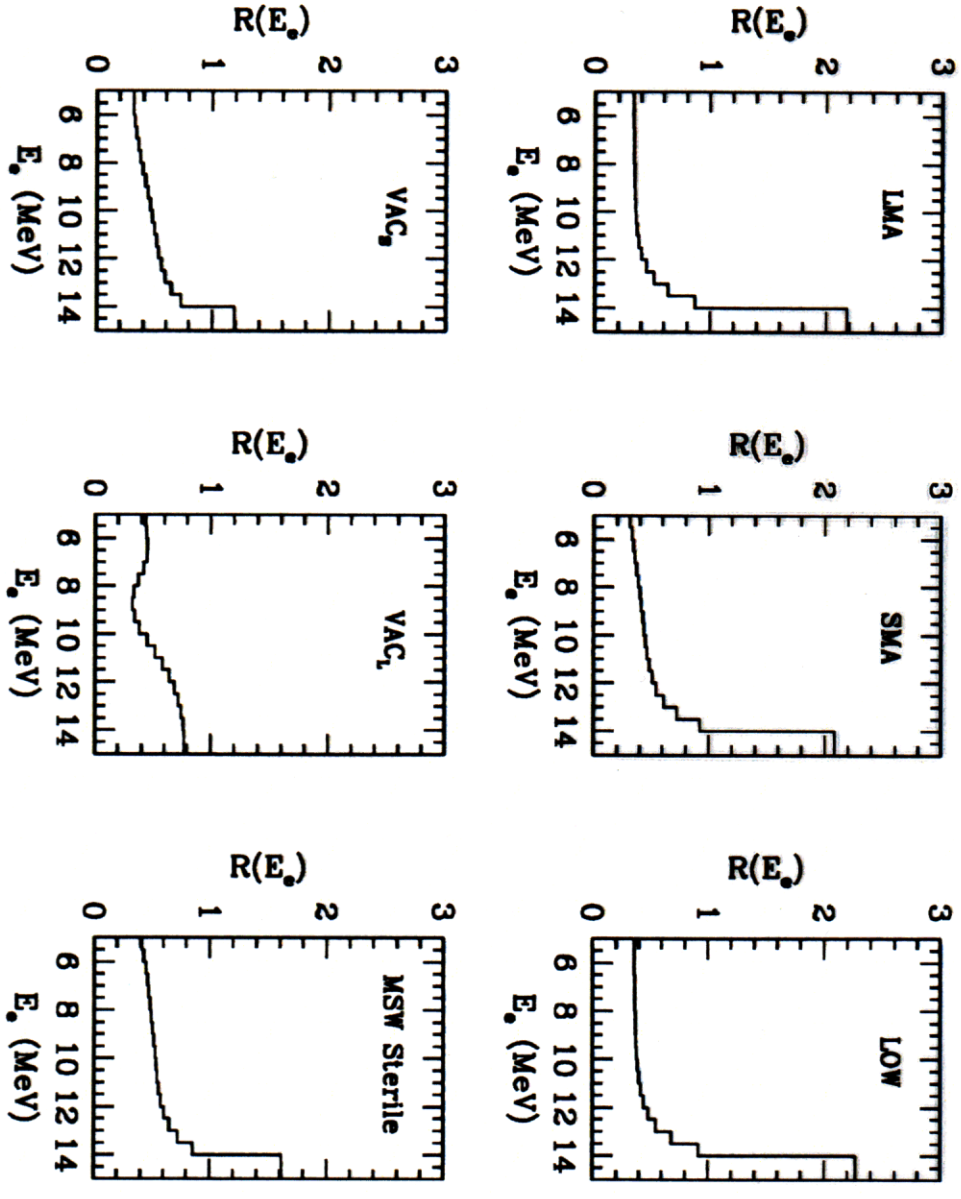
CC Rate (8 MeV)


0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
$R_{CC,SNO}$
No oscillation
MSW
Sterile
VAC_L
VAC_S
LOW
SMA
LMA
8 MeV Threshold

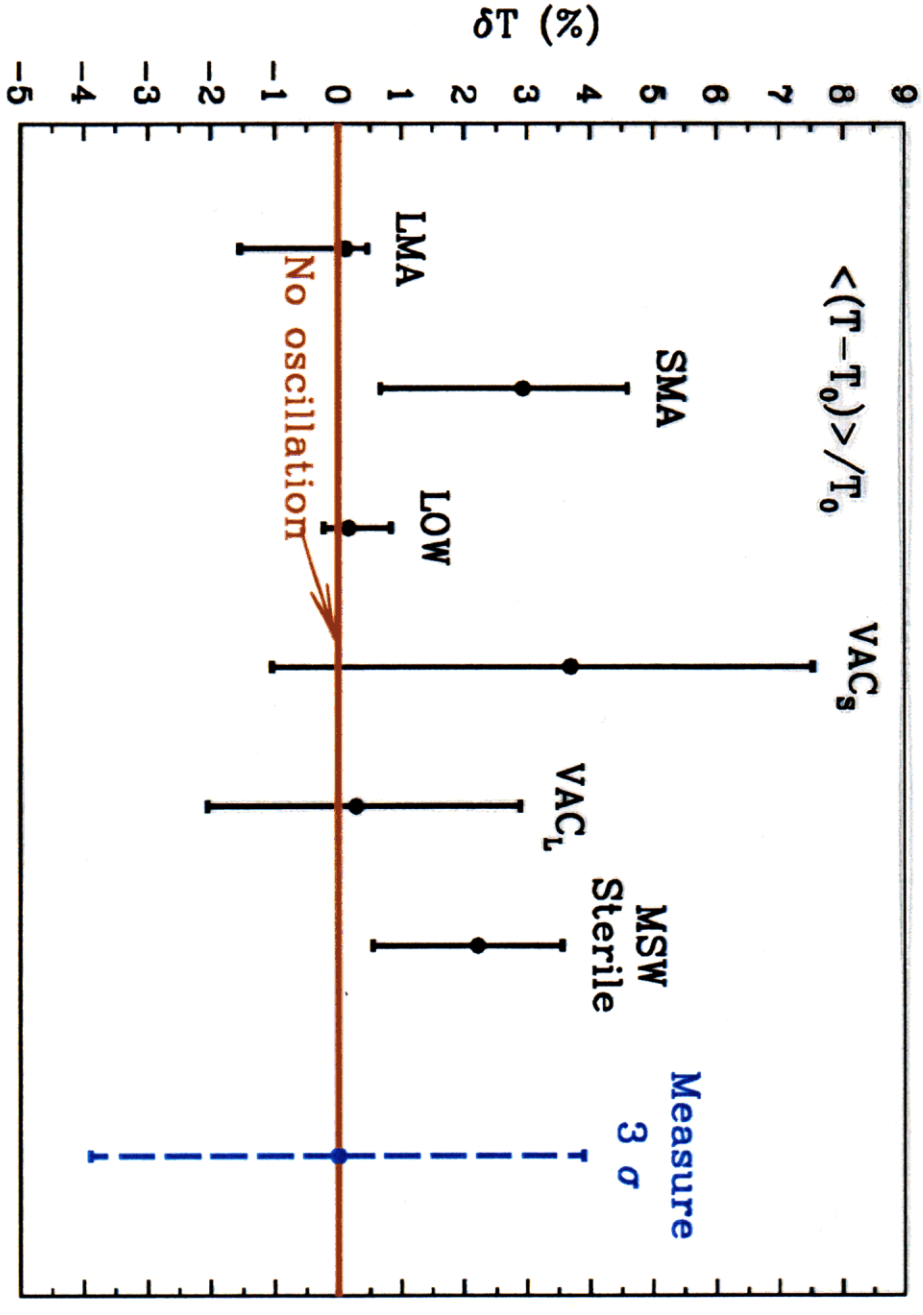
Recoil Spectra



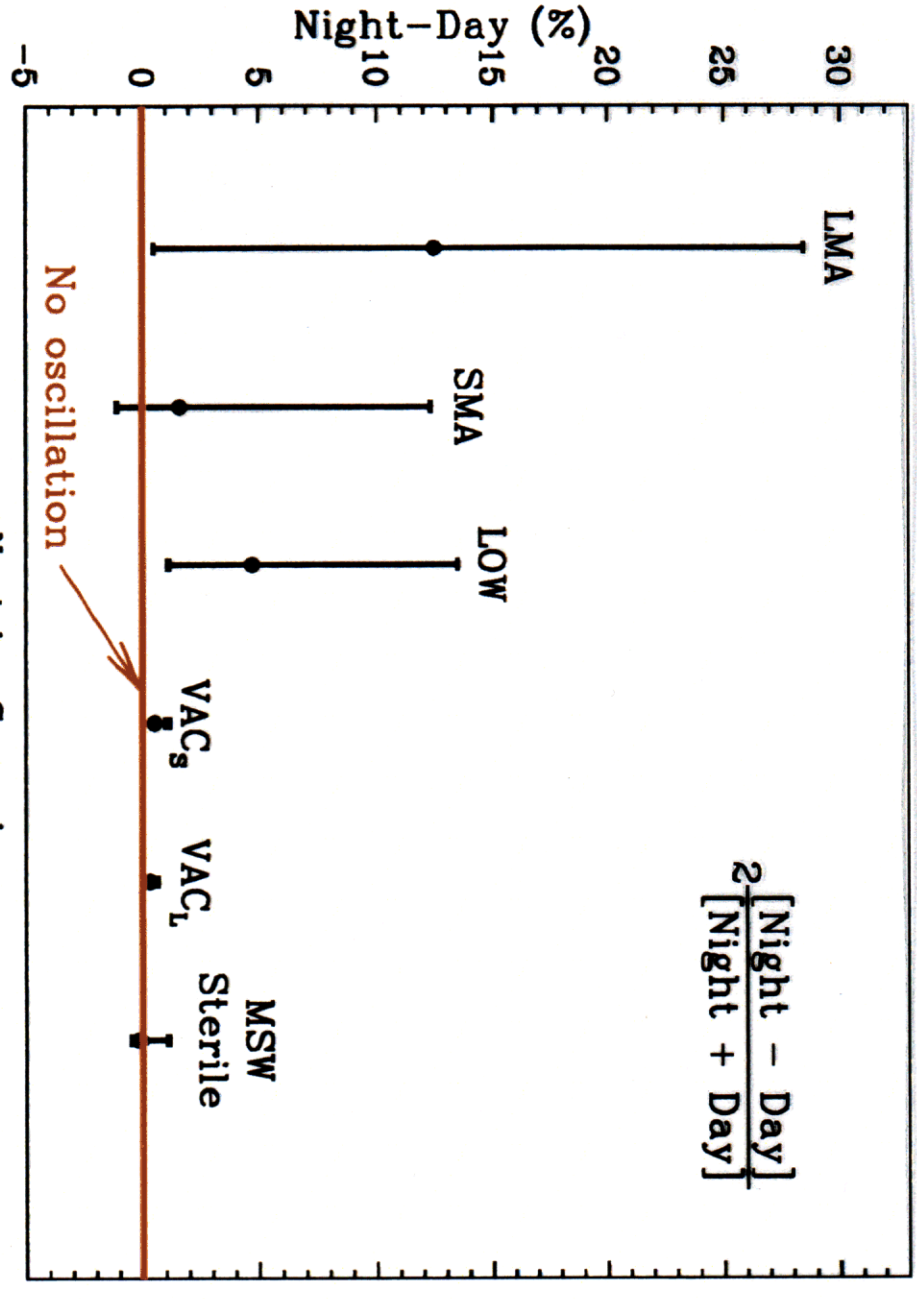
Best Fit Spectra



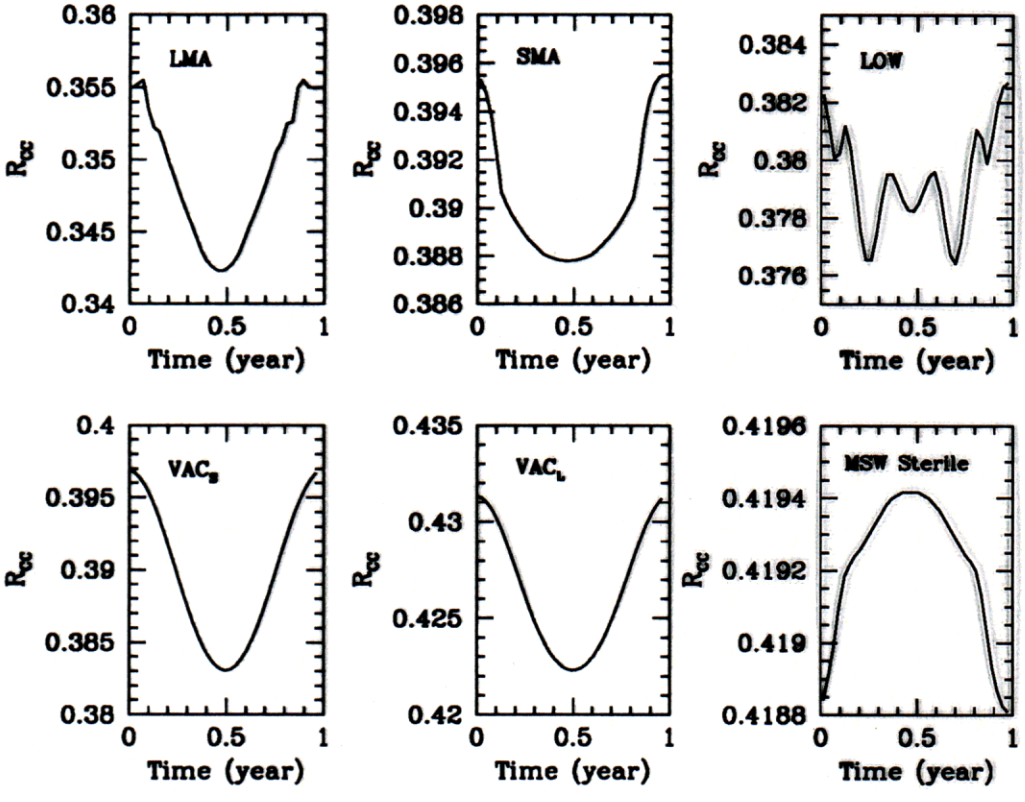
First Moment



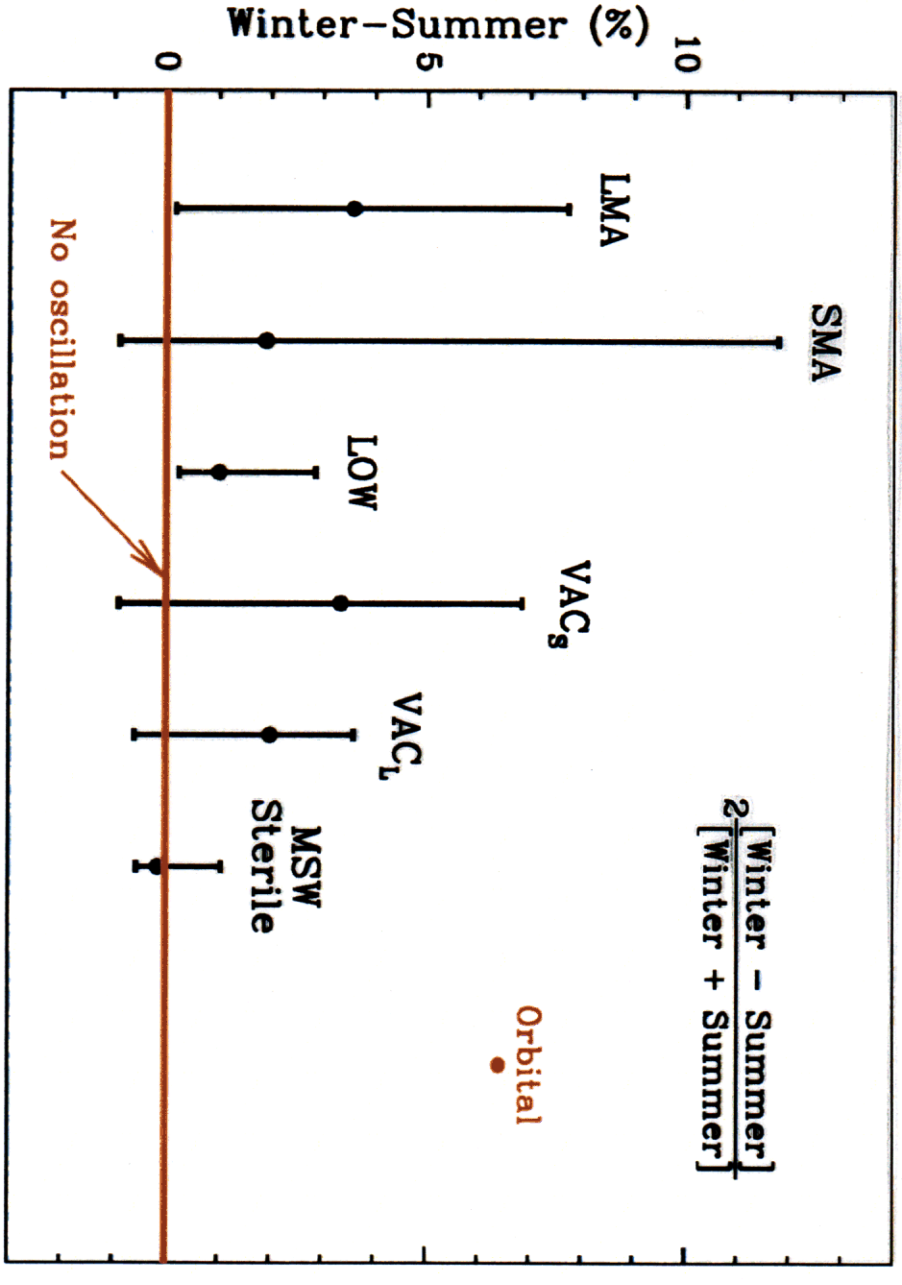
Day – Night Asymmetry



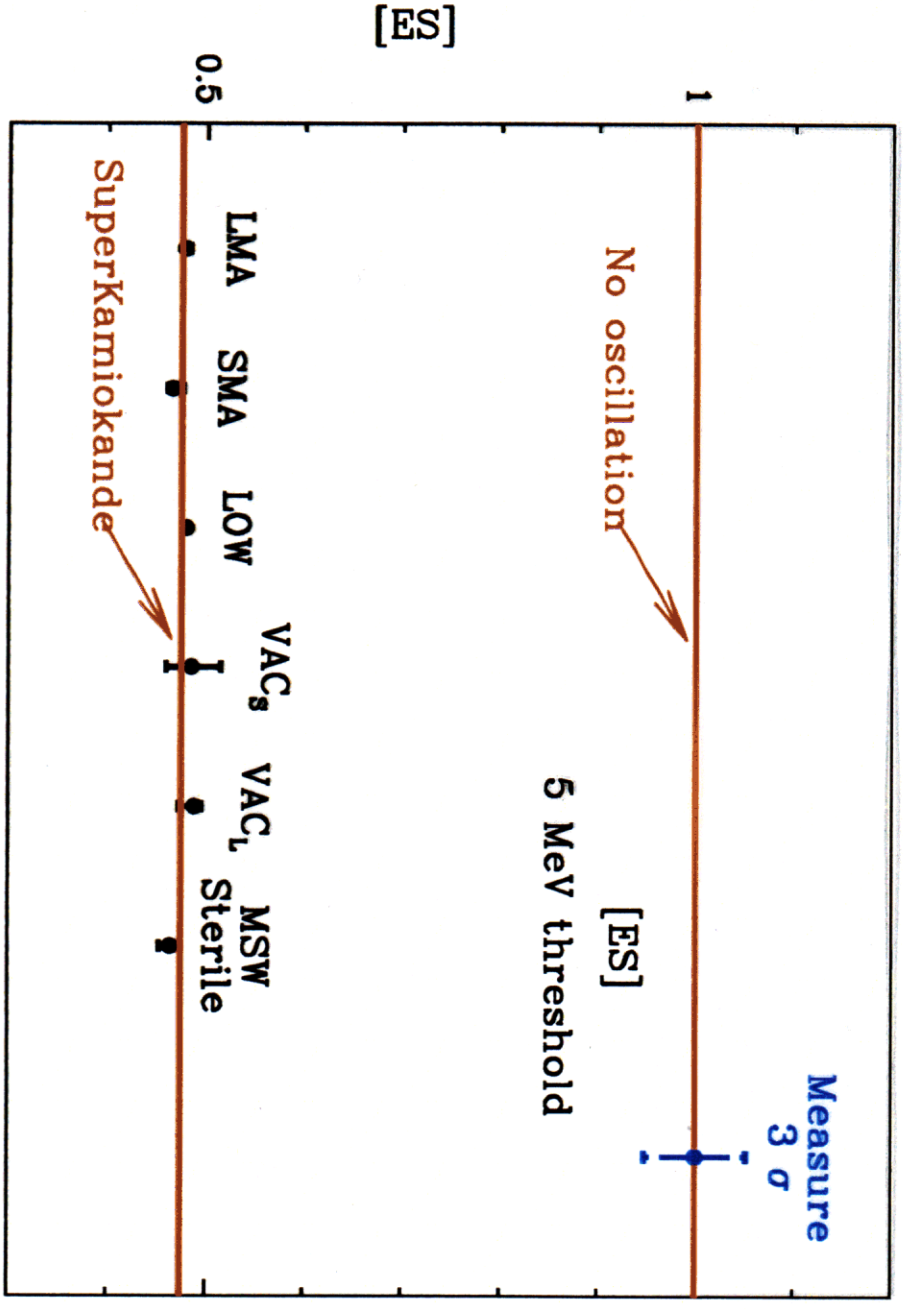
Seasonal Variations



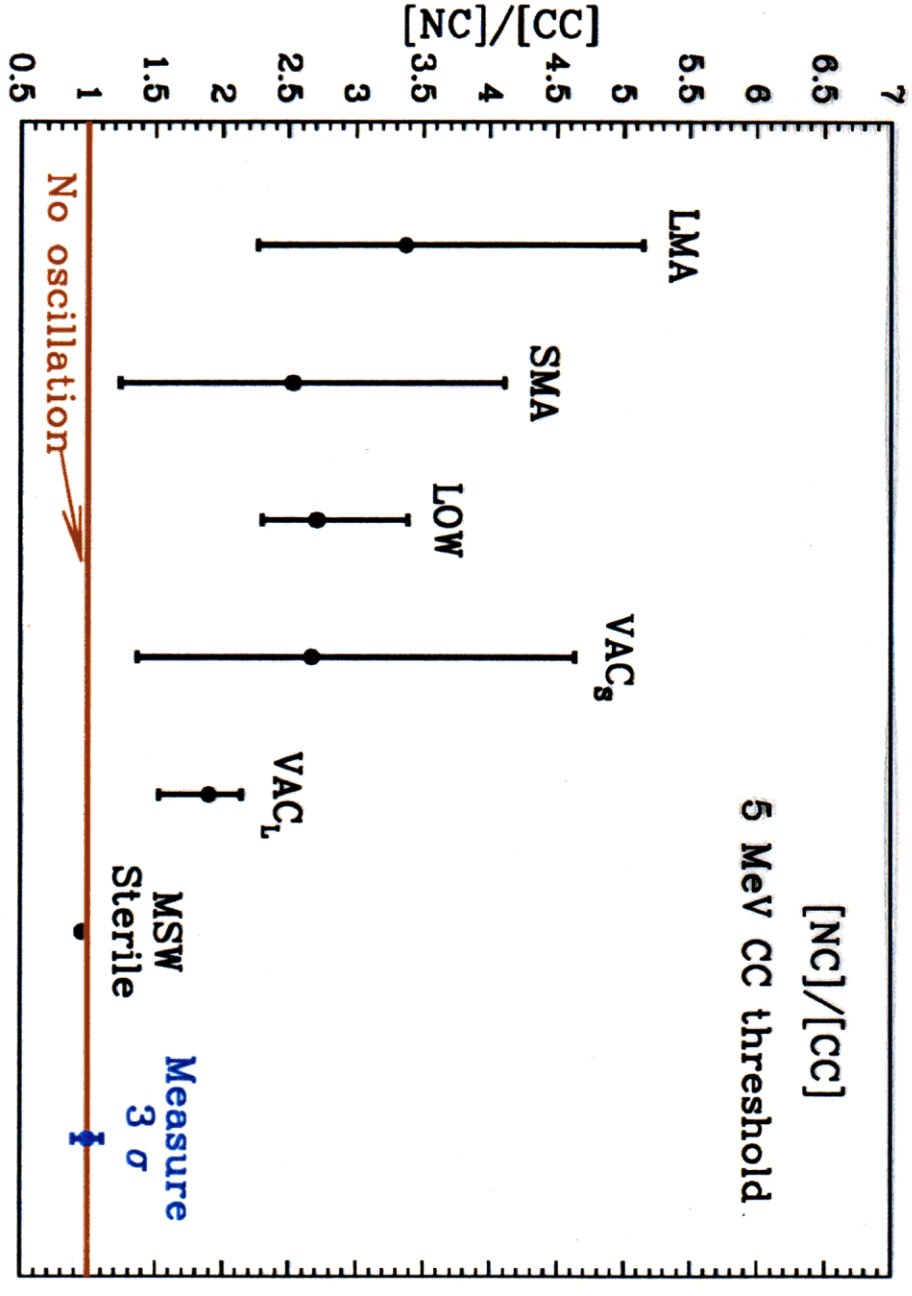
Winter - Summer Asymmetry



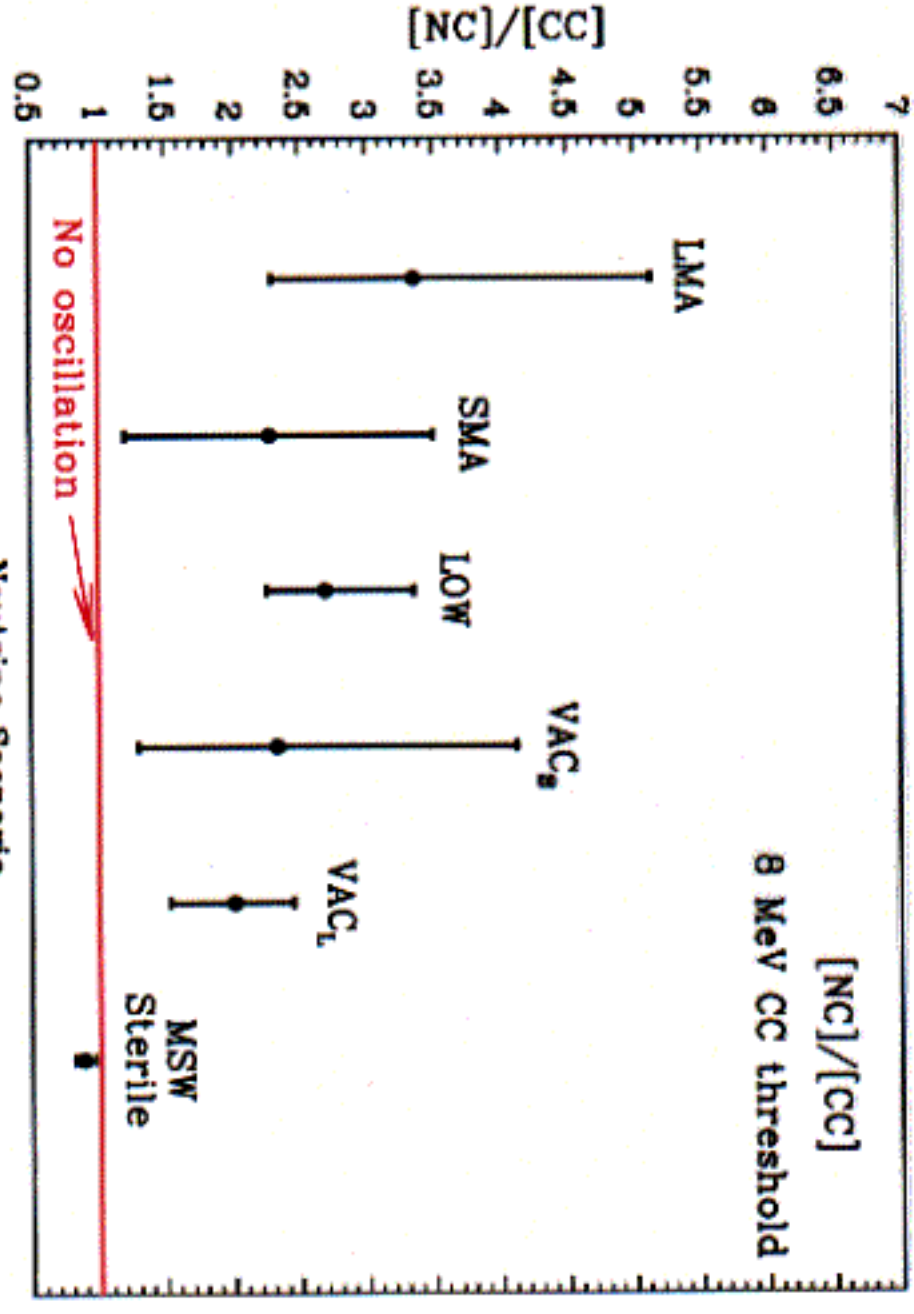
Electron Scattering



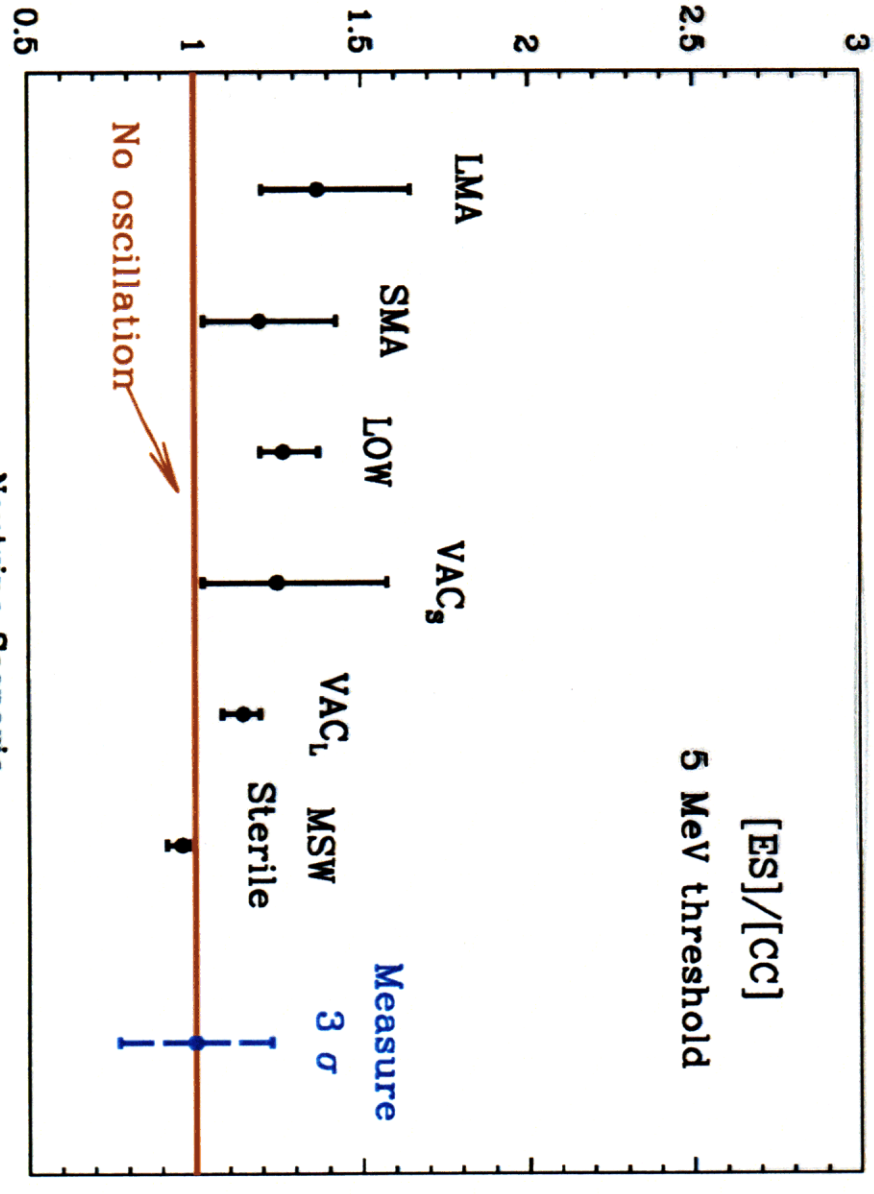
Double Ratio [NC]/[CC] (5 MeV)



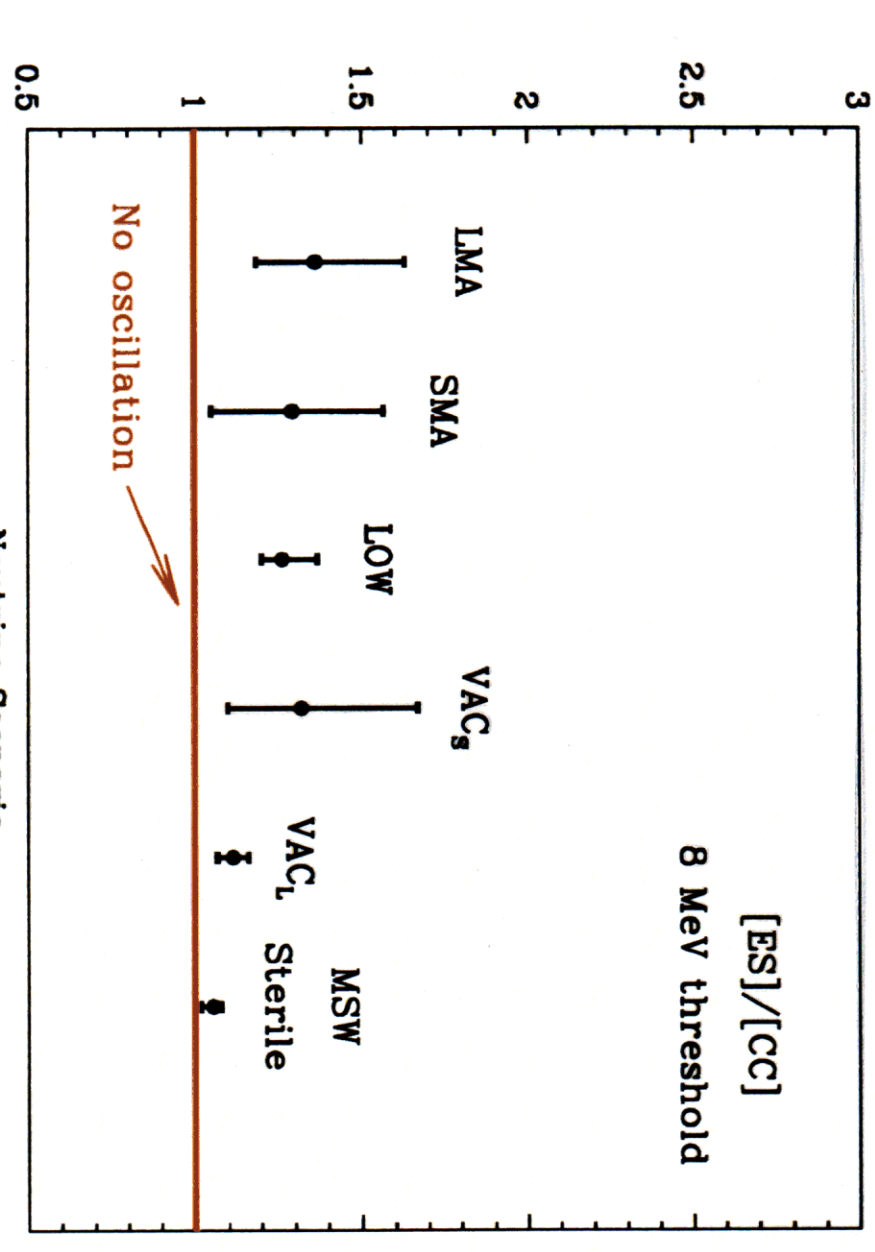
Double Ratio [NC]/[CC] (8 MeV)



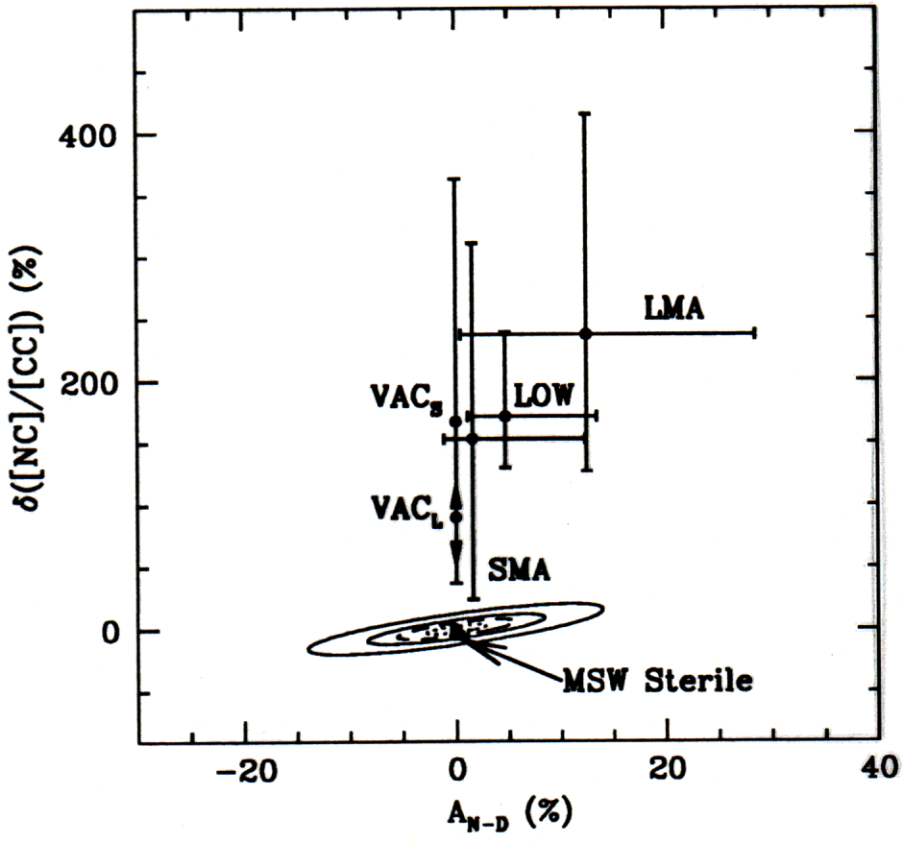
Double Ratio [ES]/[CC] (5 MeV)



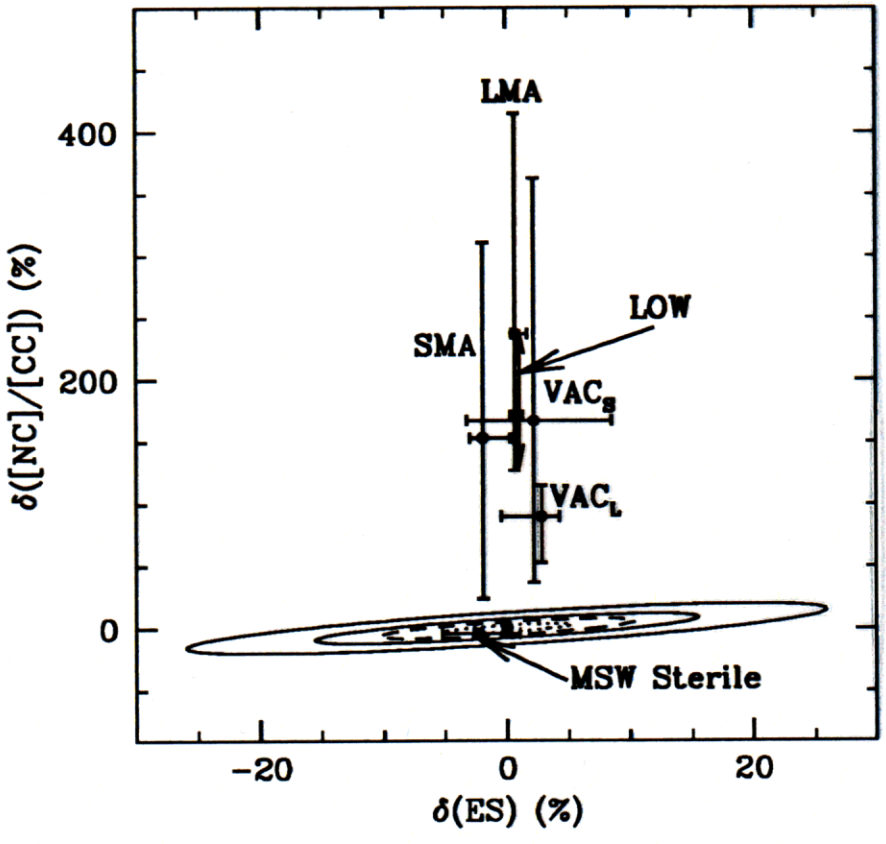
Double Ratio [ES]/[CC] (8 MeV)



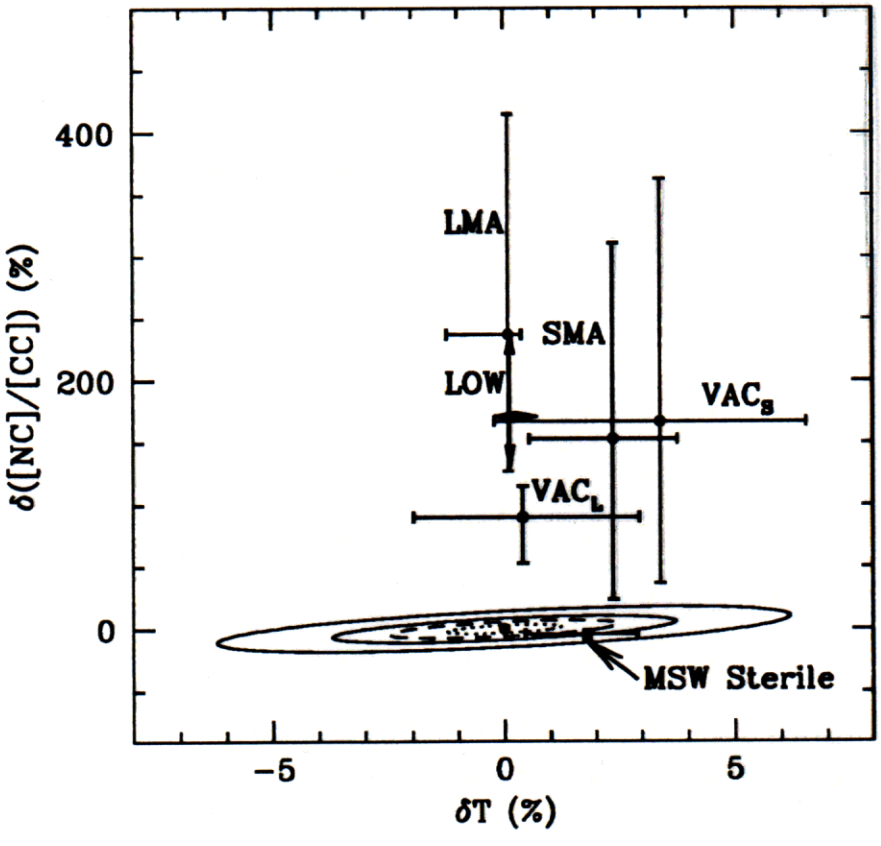
[NC]/[CC] vs Day-Night



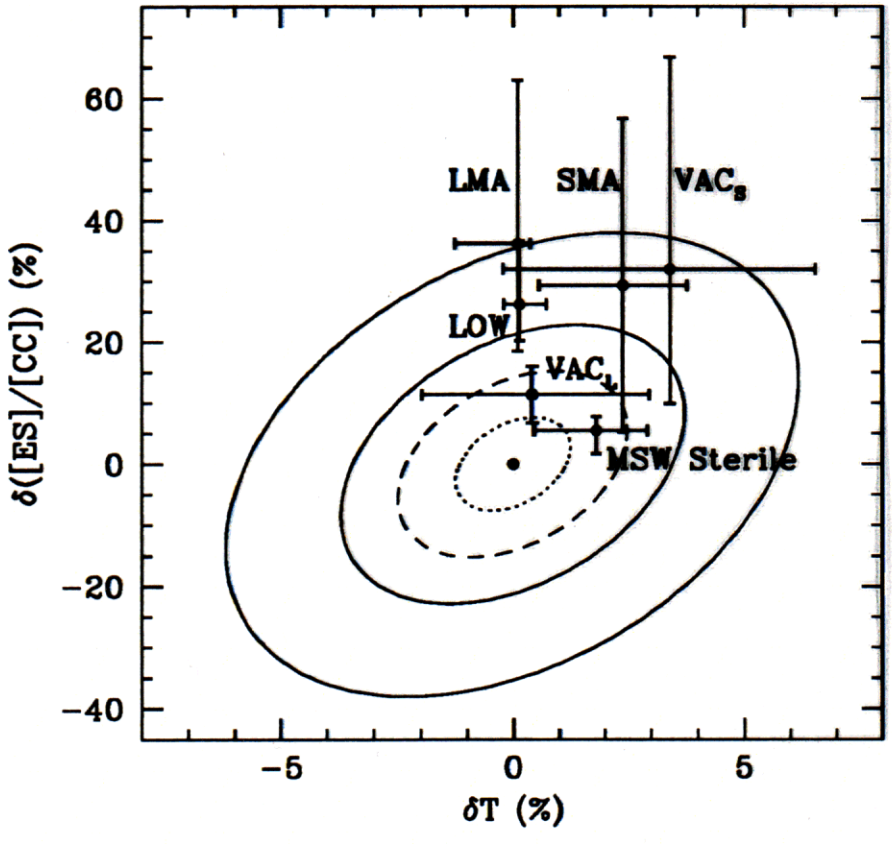
[NC]/[CC] vs Electron Scattering



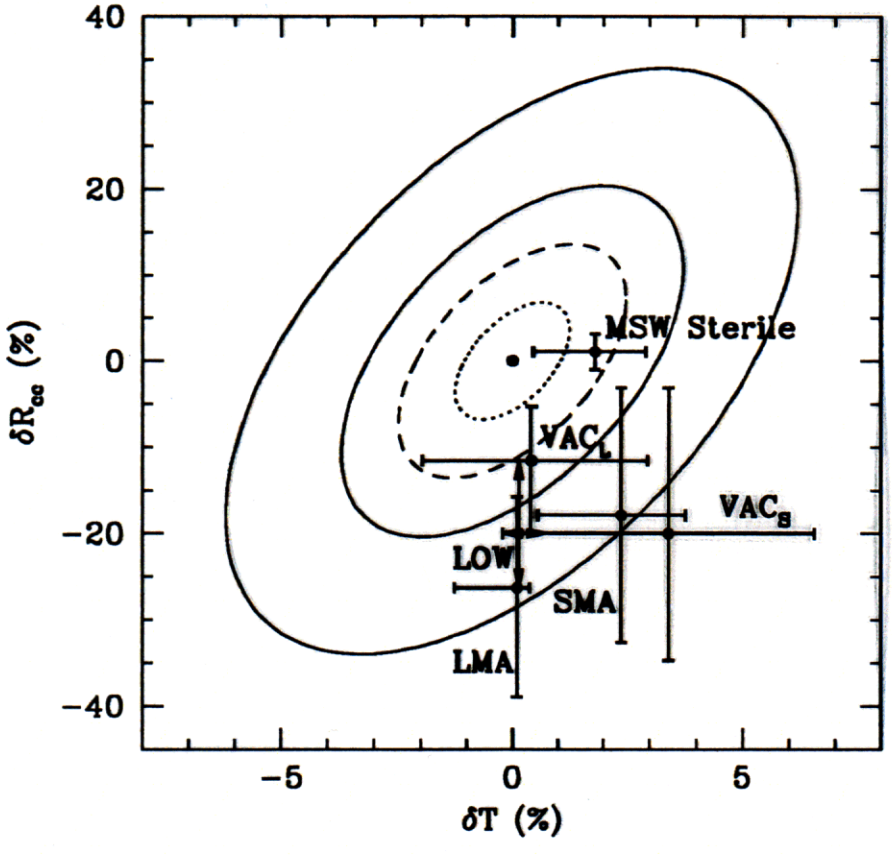
[NC]/[CC] vs Spectrum



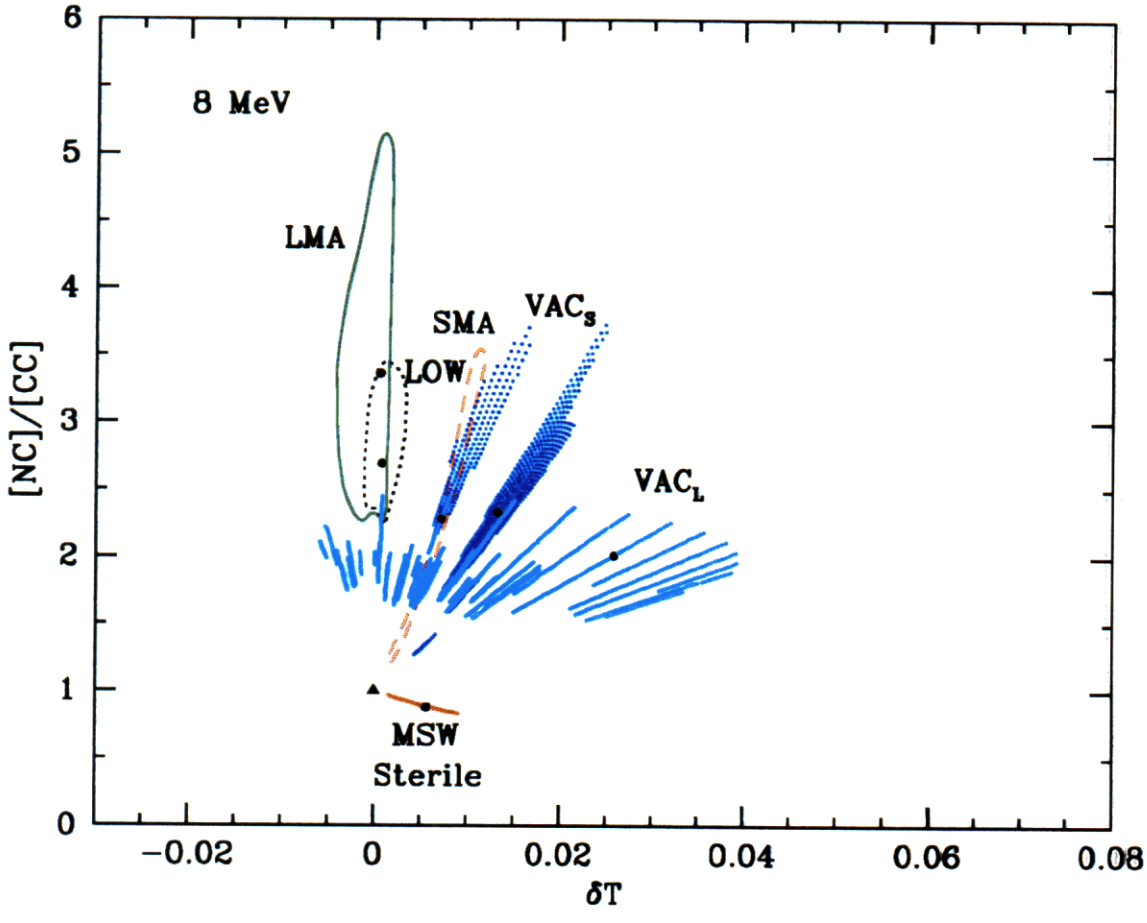
[ES]/[CC] vs Spectrum



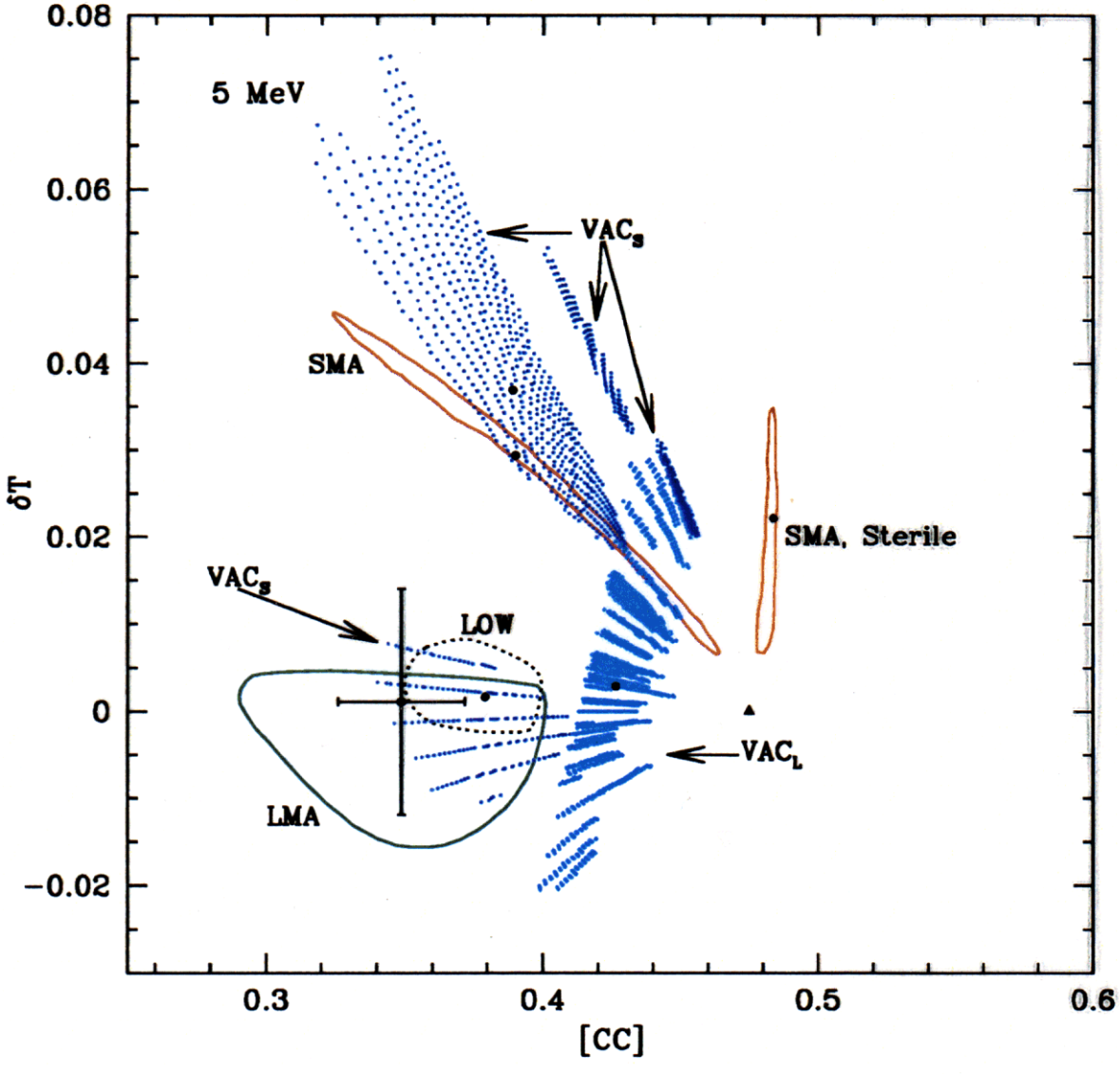
CC Rate vs Spectrum



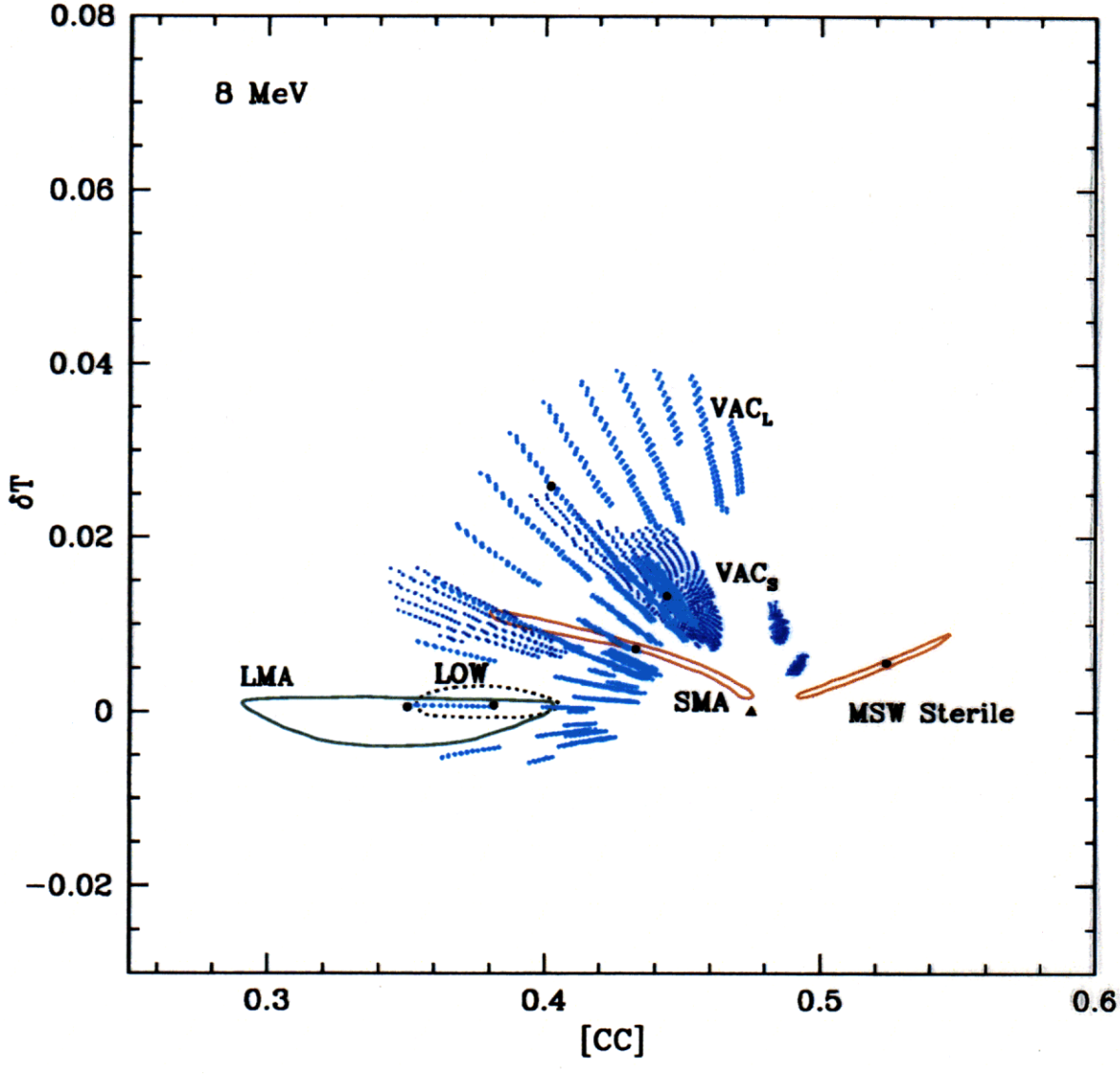
[NC]/[CC] - Spectrum (8 MeV)



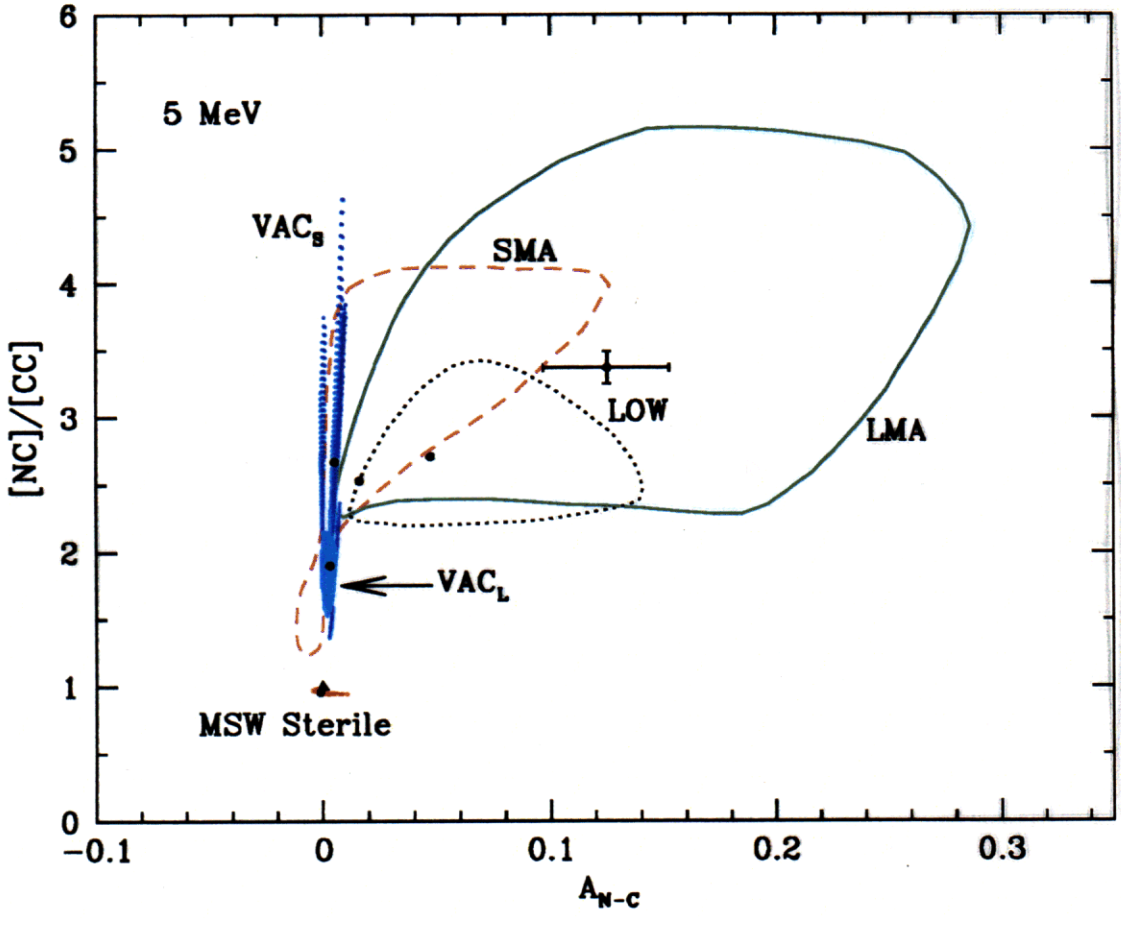
Spectrum - Rate (5 MeV)



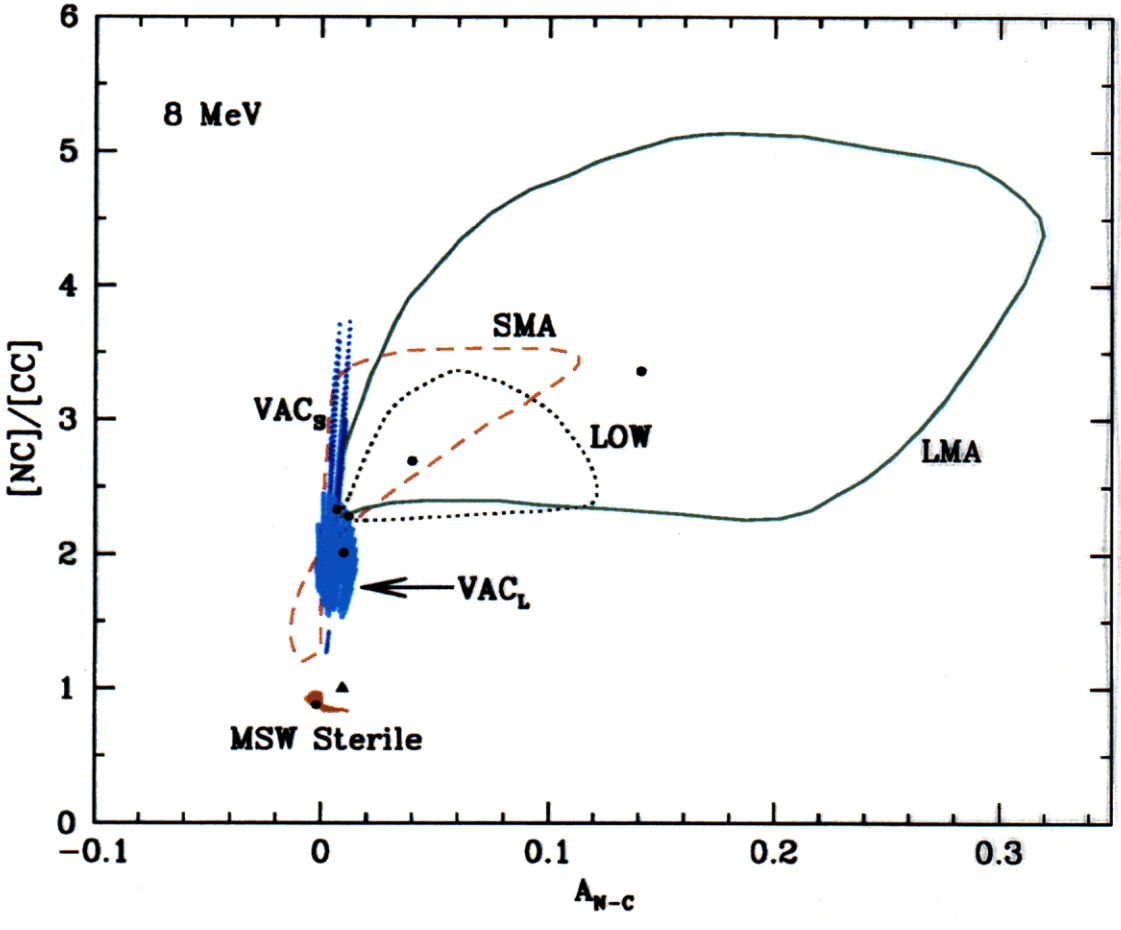
Spectrum - Rate (8 MeV)



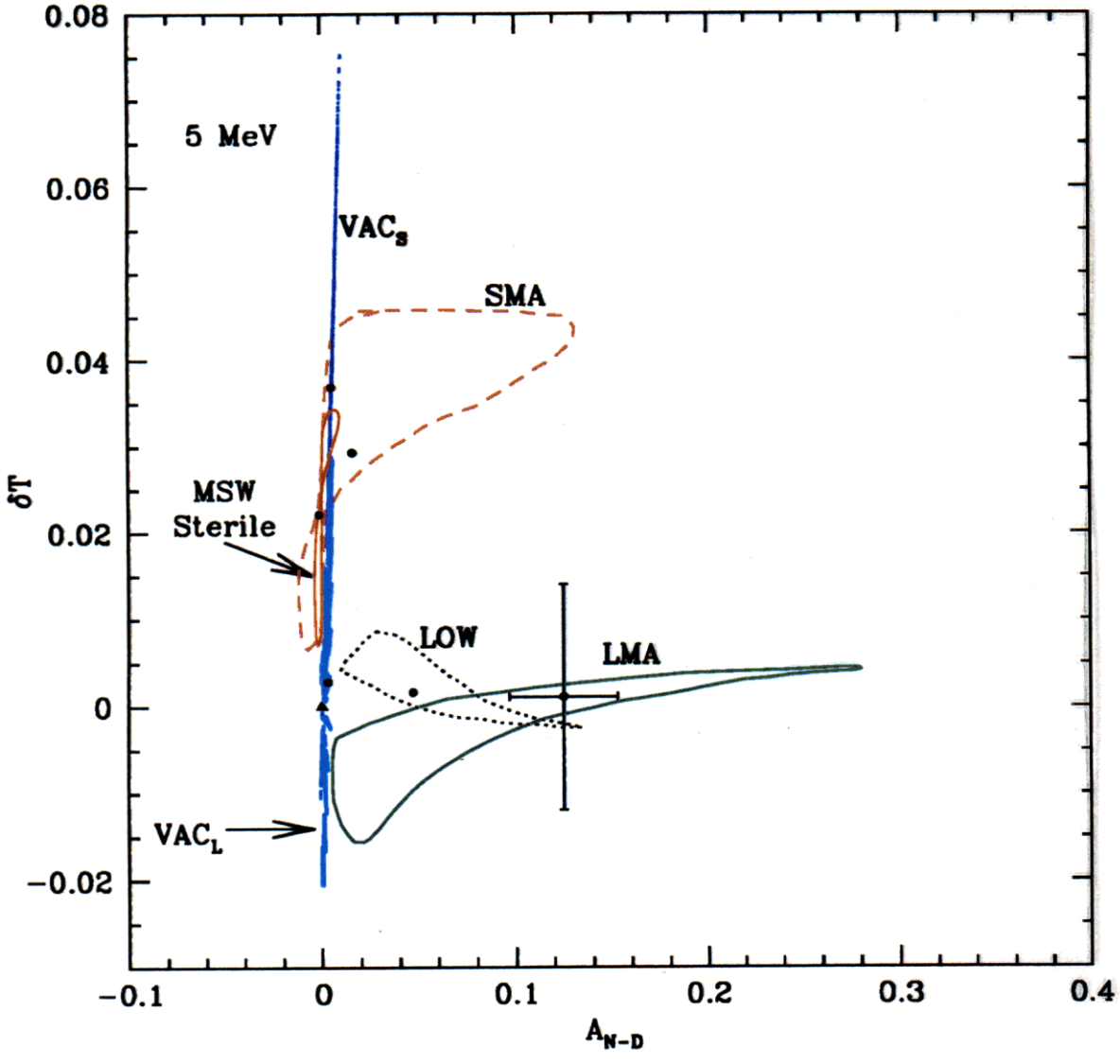
[NC]/[CC] - Day-Night (5 MeV)



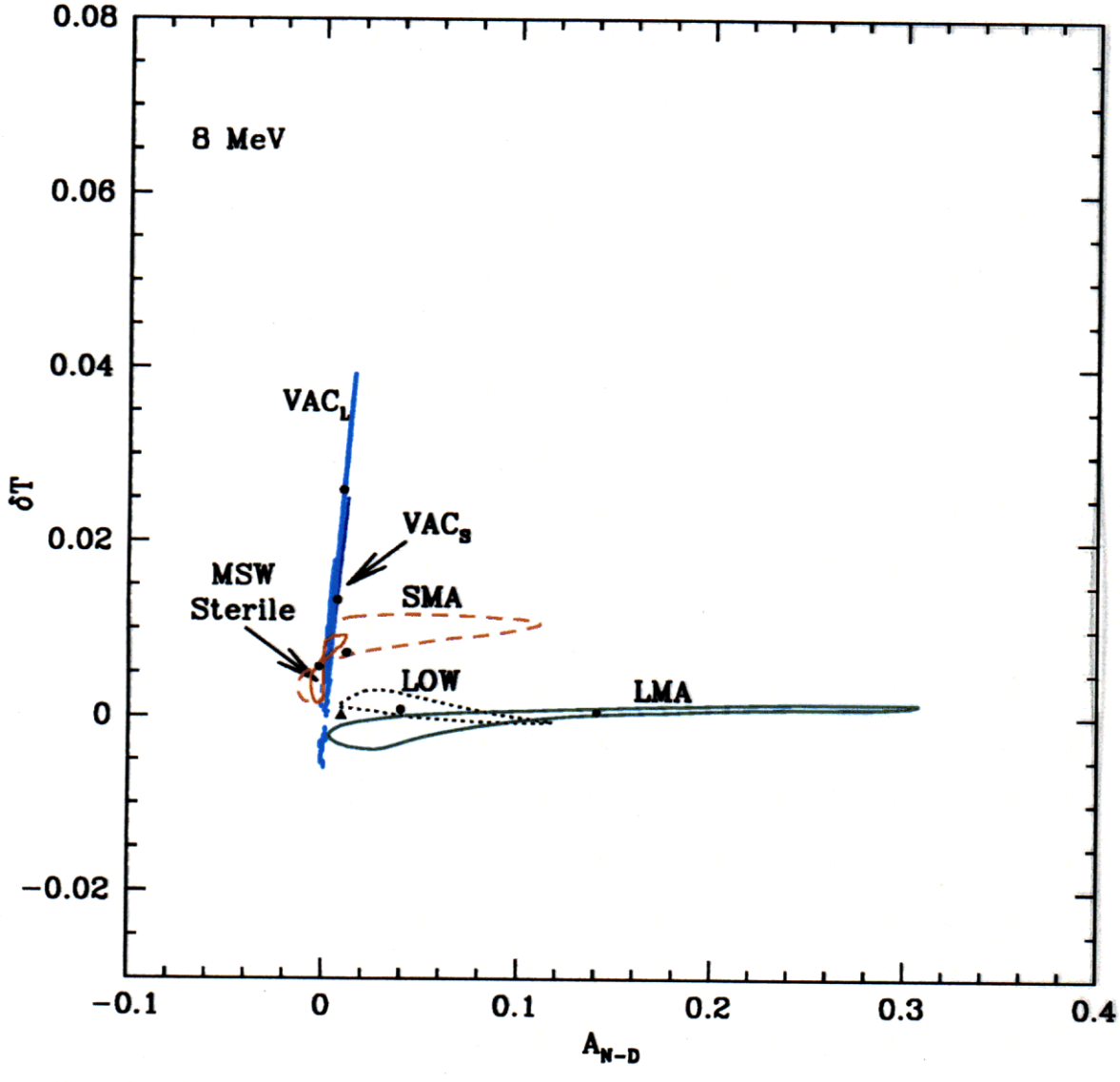
[NC]/[CC] - Day-Night (8 MeV)



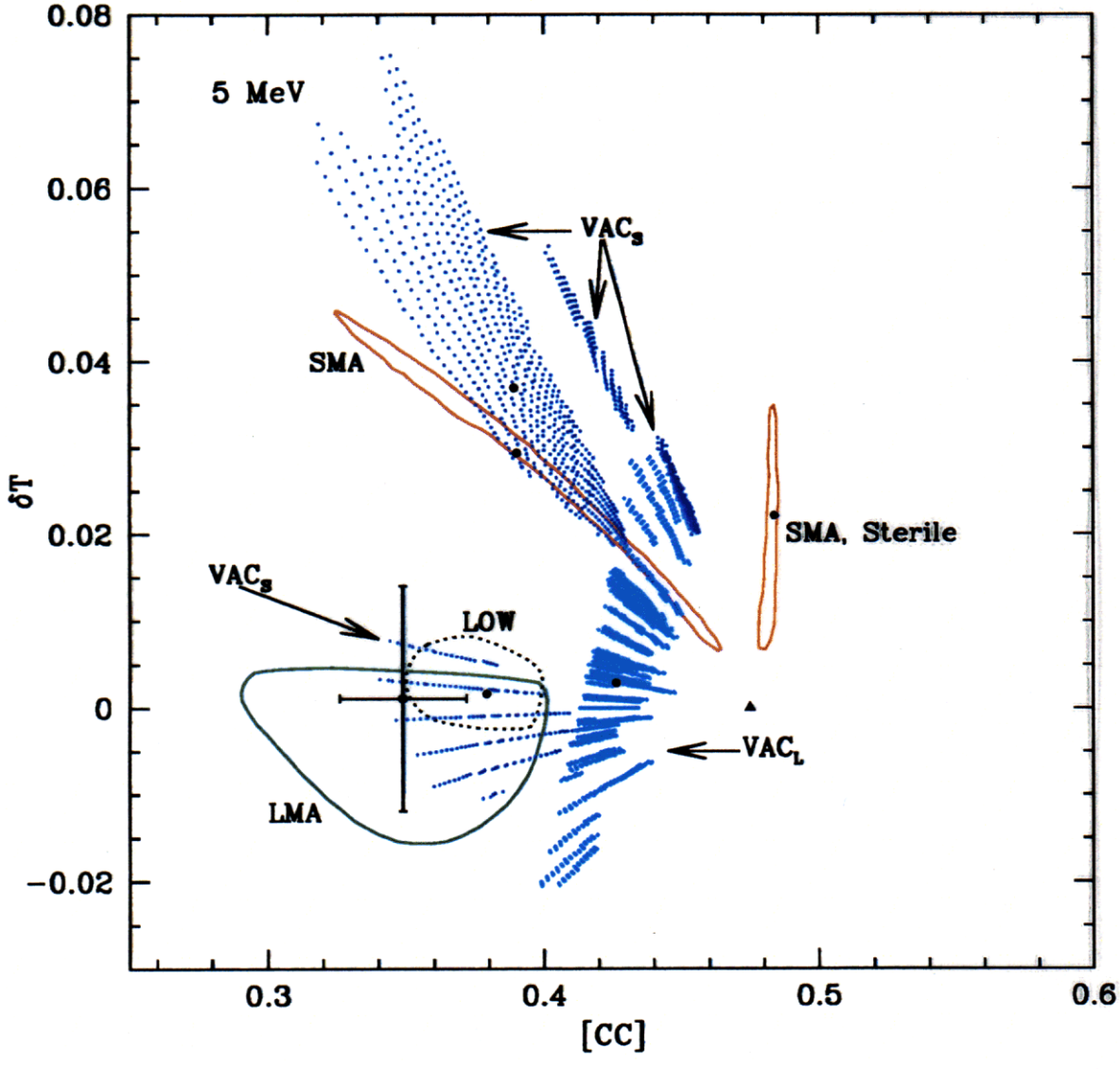
Spectrum - Day-Night (5 MeV)



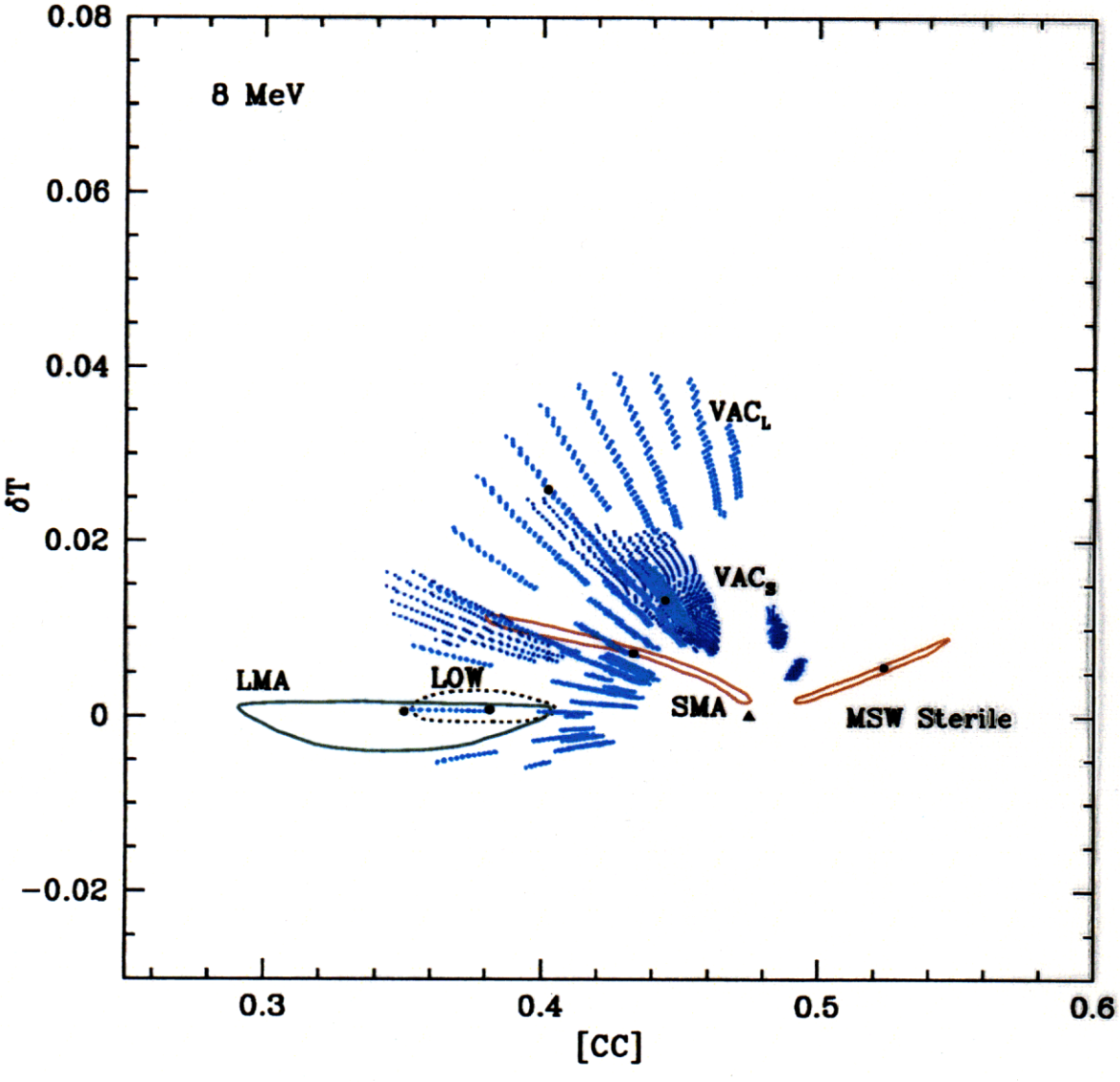
Spectrum - Day-Night (8 MeV)



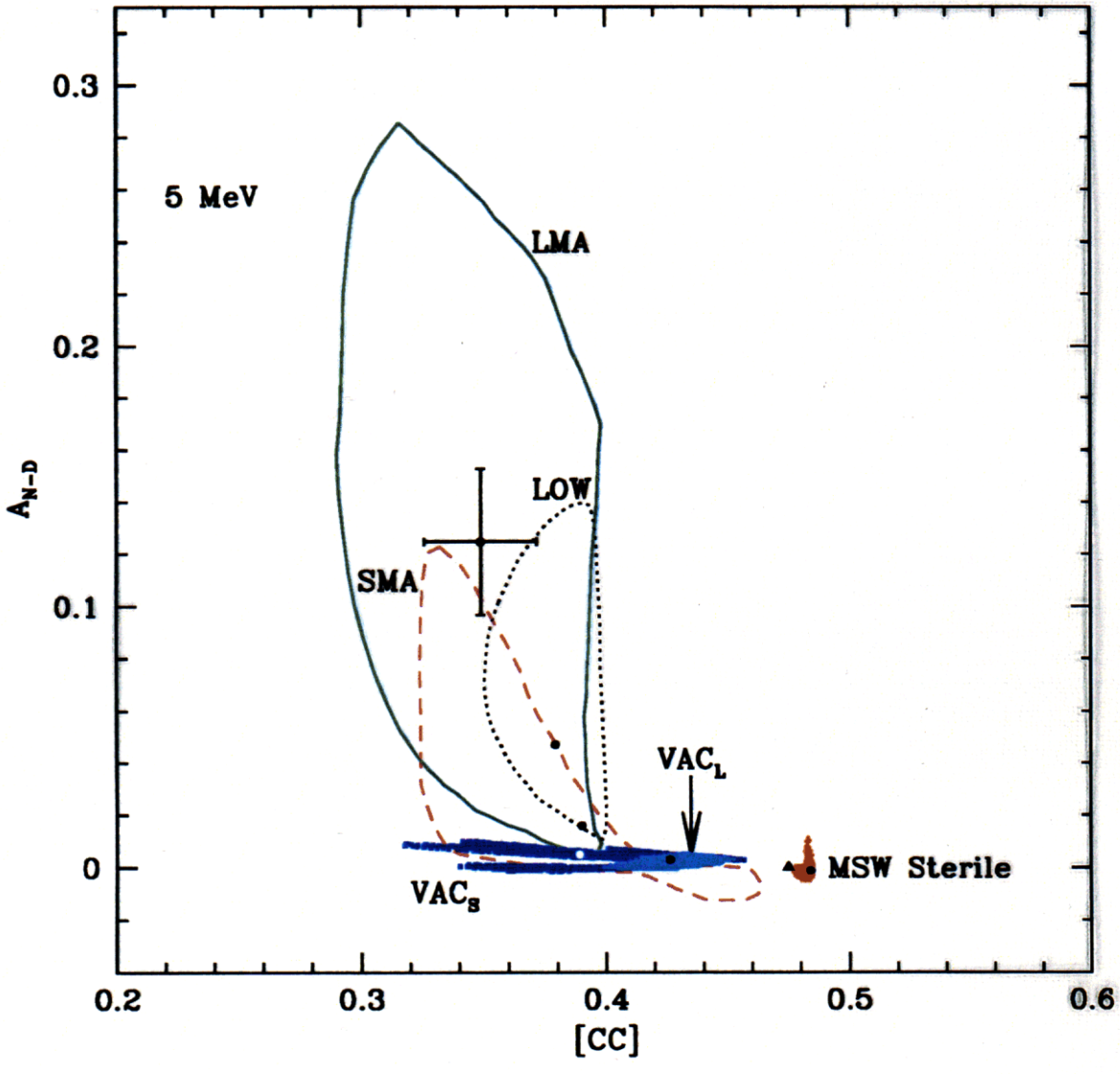
Rate - Spectrum (5 MeV)



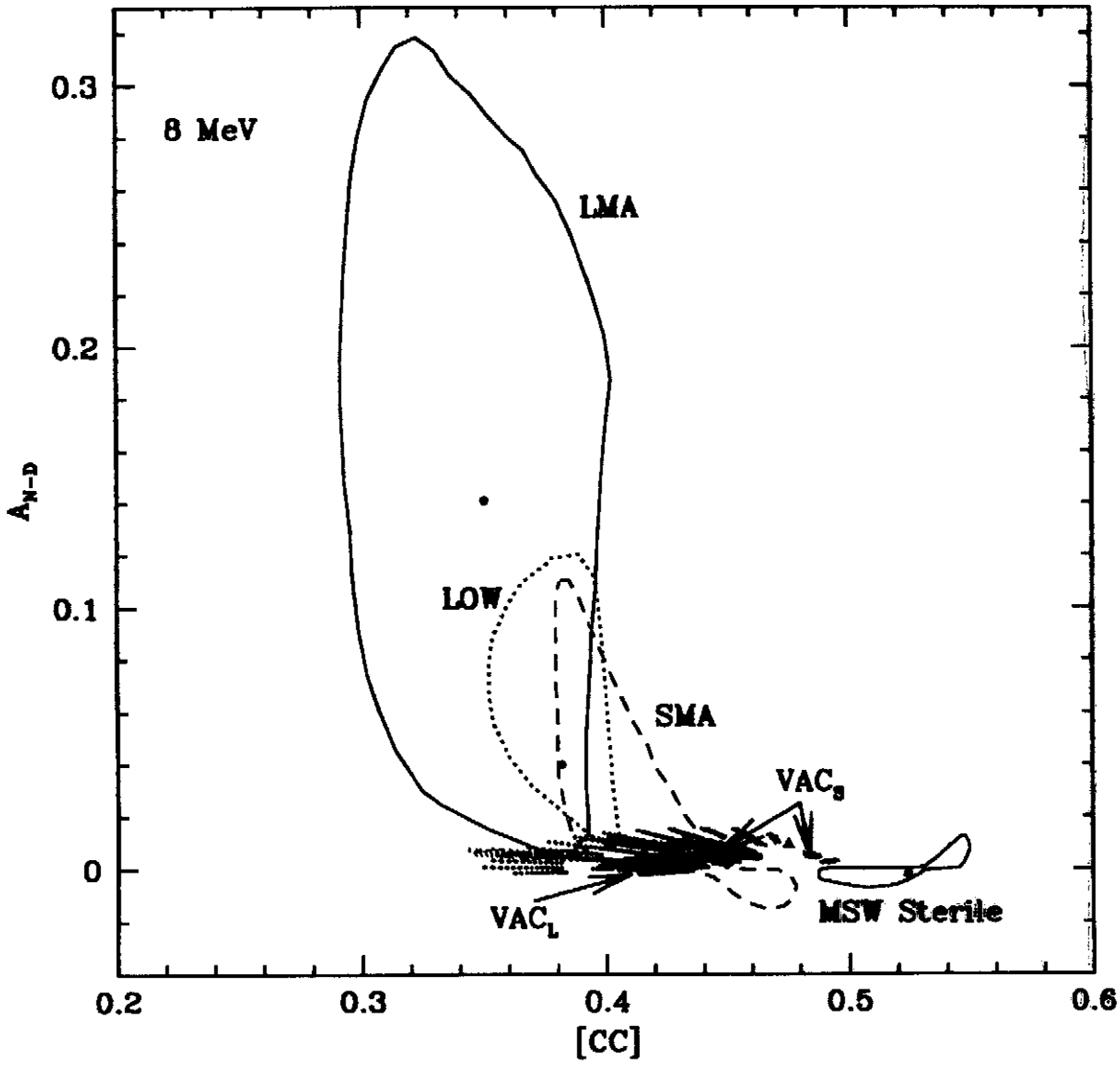
Rate - Spectrum (8 MeV)



Rate - Day-Night (5 MeV)



Rate - Day-Night (8 MeV)



Summary

- SNO VERY important
- [NC]/[CC] VERY important
- [NC]/[CC] vs Day - Night best smoking guns
- The End of the SNP ?