January 29, 1993

Addendum to PBAR Note # 529 "Tuning the Dispersion in the Accumulator"

This study is in response to the question whether it is possible to avoid the decrease in dispersion in high-dispersion straight section while tuning it to zero in the zero dispersion straight section. The short answer to this question is "yes" for small changes of dispersion (up to about 10 cm), "no" for larger changes.

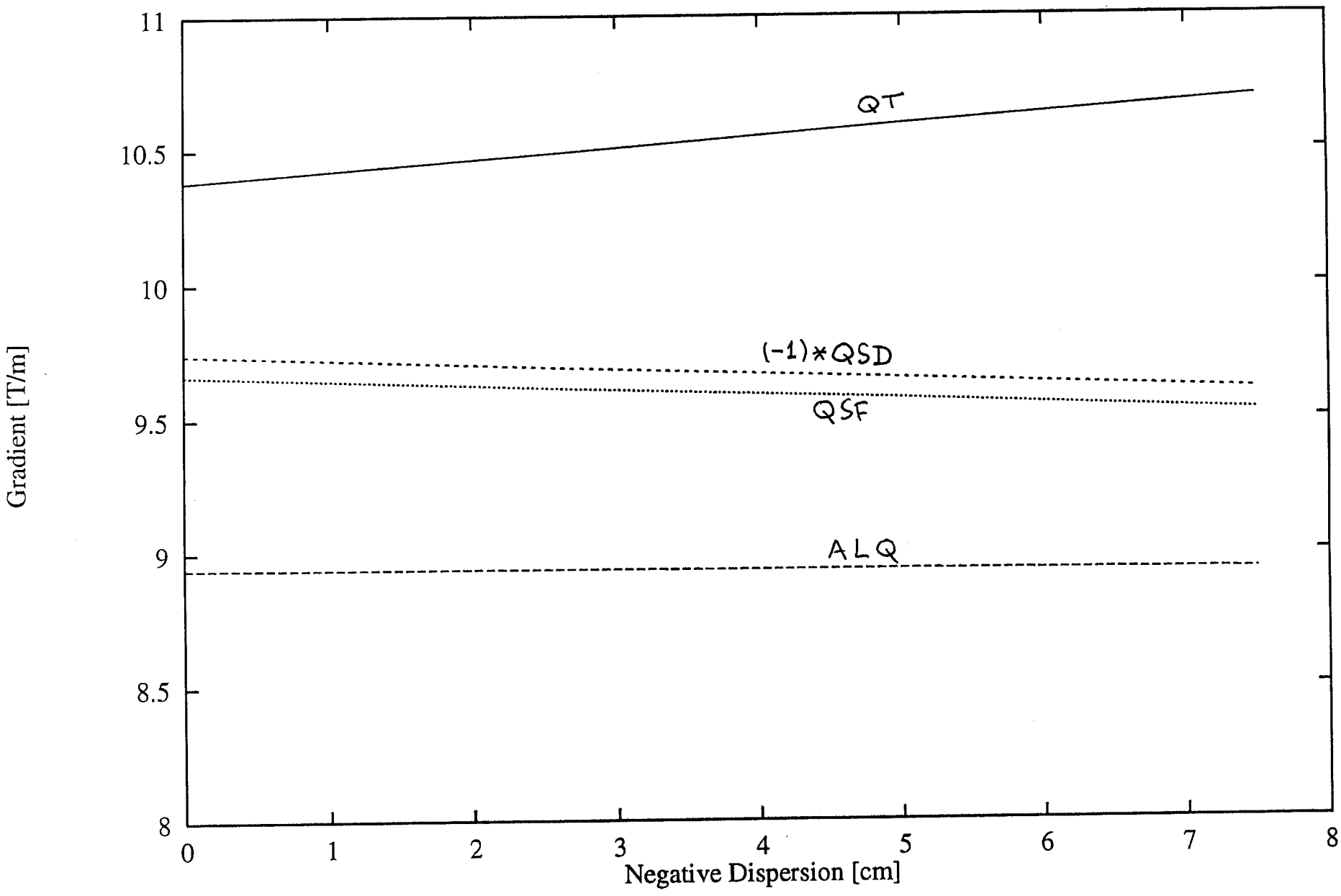
The problem that needs to be solved is how to vary the Accumulator lattice so as to

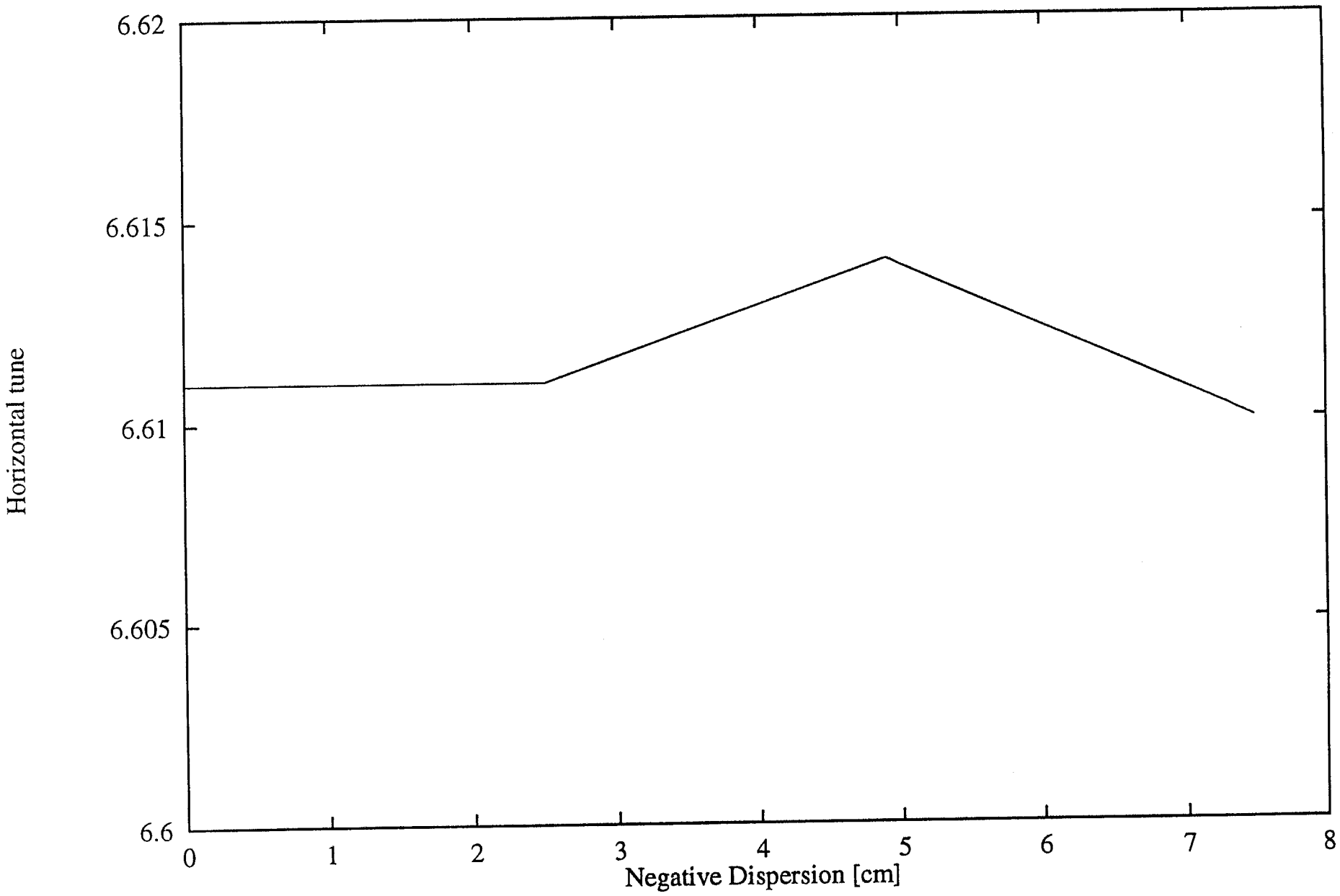
(i) decrease the dispersion in zero-dispersion straight section,
(ii) keep its value in high-dispersion straight section unchanged,
(iii) keep the tunes constant, and
(iv) allow only small changes in η.

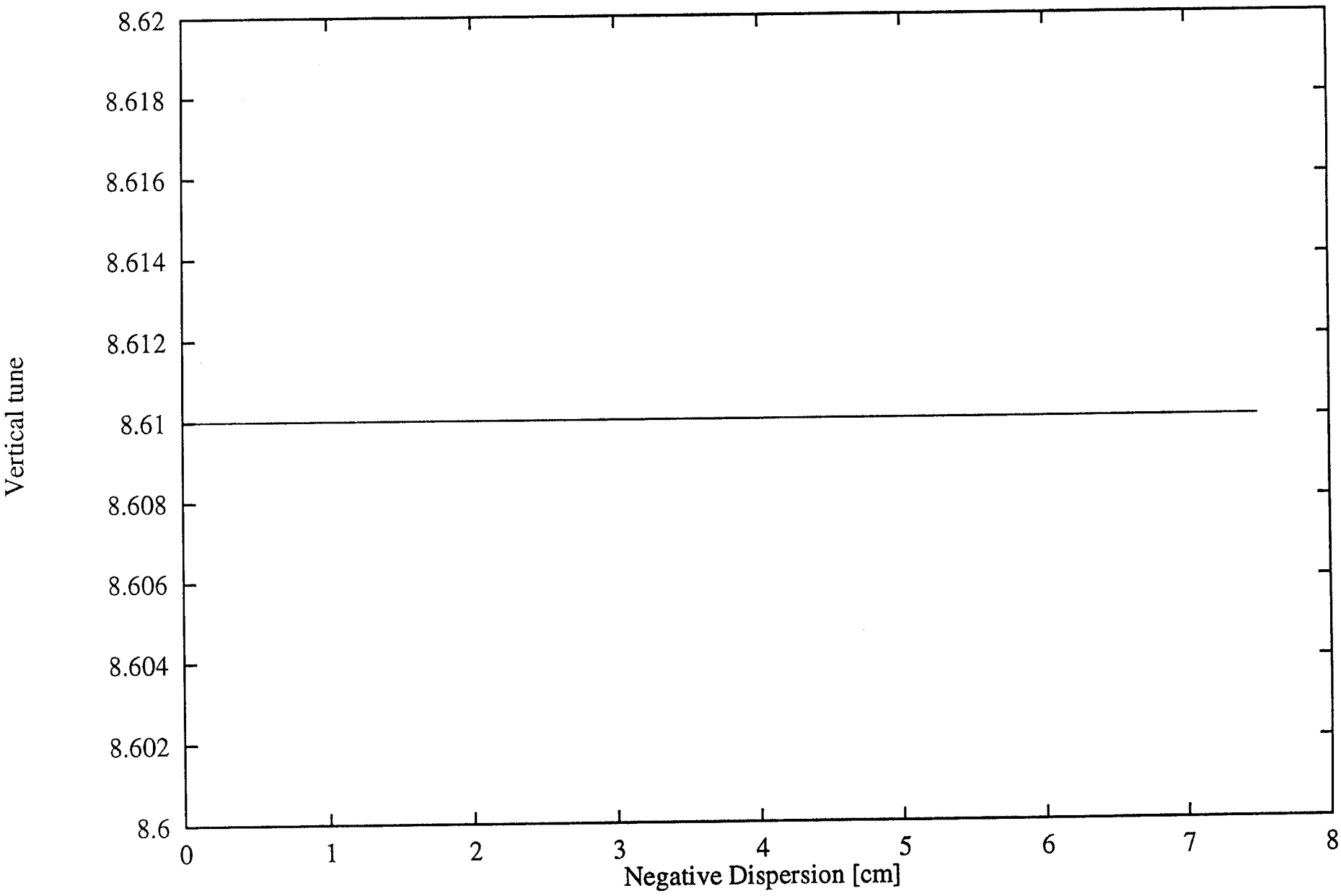
It turns out, however, that the above requirements present very tight constraints for a fixed lattice and leave little room for variation of quadrupole buses which are the only variable parameters. In the paper the constraint (ii) was relaxed resulting in a decrease of dispersion in high-dispersion straight section by maximum of 45 cm.

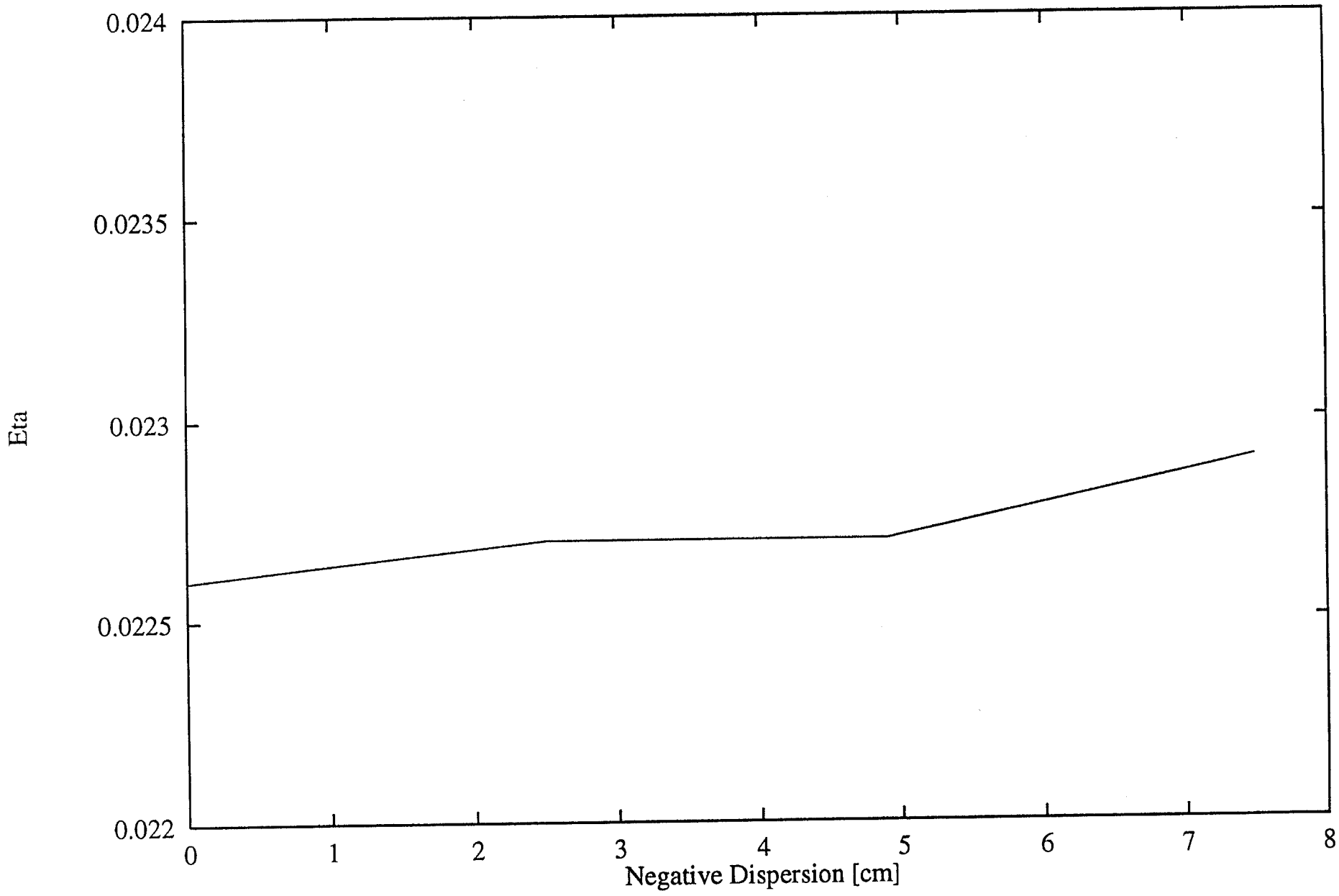
For dispersion corrections of up to about 10 cm these constraints can be satisfied and the results are shown in the attached Figures. For larger changes, the computation requires that at least one of the above constraints be relaxed.

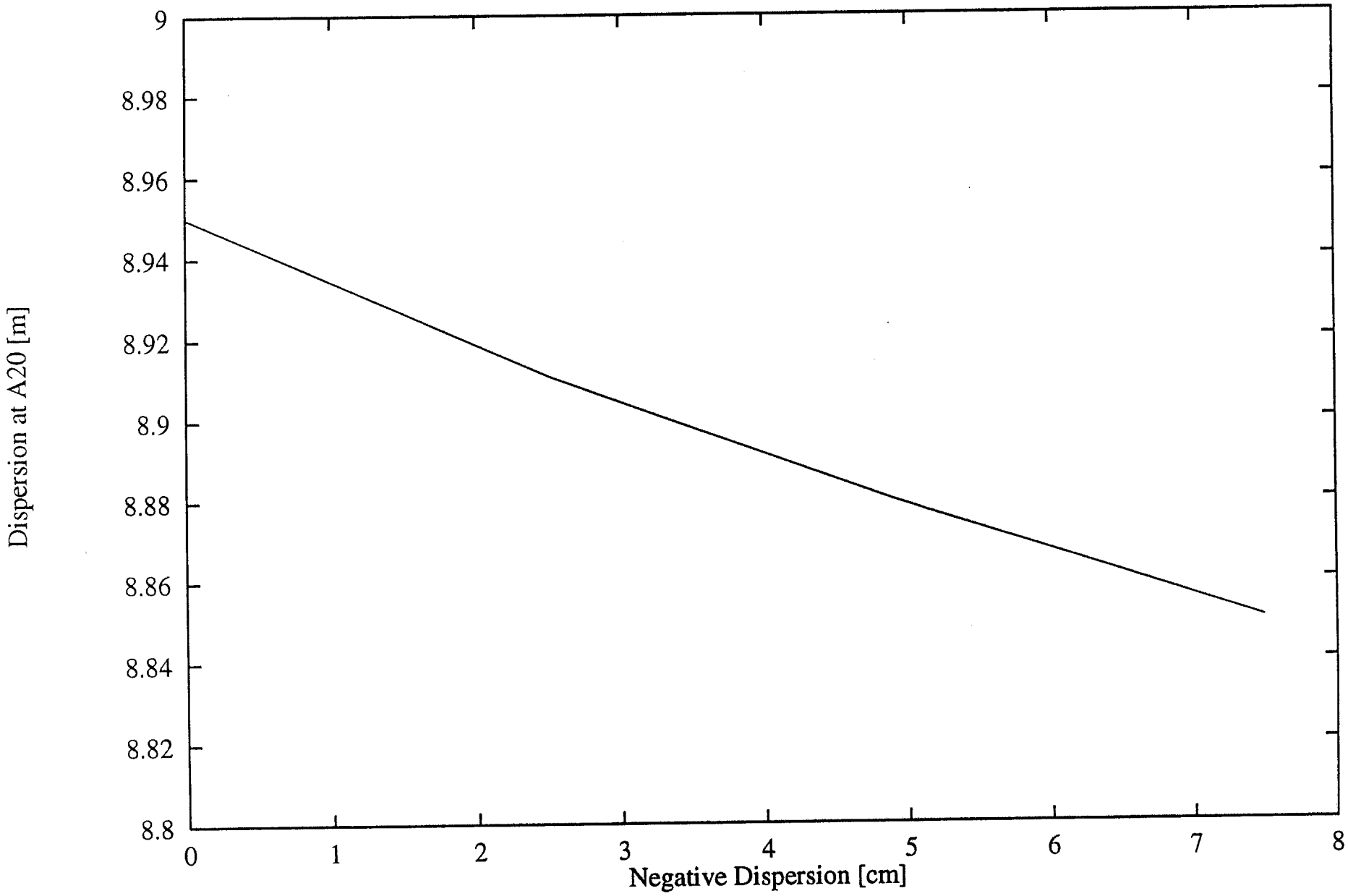
In conclusion, for small changes of dispersion in zero-dispersion section we should use the values presented here, while for larger values the results from PBAR Note # 529 should be applied.


11
10.5
10
9.5
9
8.5
8
0
1
2
3
4
5
6
7
8
Gradient [T/m]
Negative Dispersion [cm]
QT
(-1)*QSD
QSF
ALQ


6.62
6.615
6.61
6.605
6.6
Horizontal tune
0
1
2
3
4
5
6
7
8
Negative Dispersion [cm]


8.62
8.618
8.616
8.614
8.612
8.61
8.608
8.606
8.604
8.602
8.6
Vertical tune
0
1
2
3
4
5
6
7
8
Negative Dispersion [cm]


0.024
0.0235
0.023
0.0225
0.022
Eta
0
1
2
3
4
5
6
7
8
Negative Dispersion [cm]


Dispersion at A20 [m]
9
8.98
8.96
8.94
8.92
8.9
8.88
8.86
8.84
8.82
8.8
0
1
2
3
4
5
6
7
8
Negative Dispersion [cm]