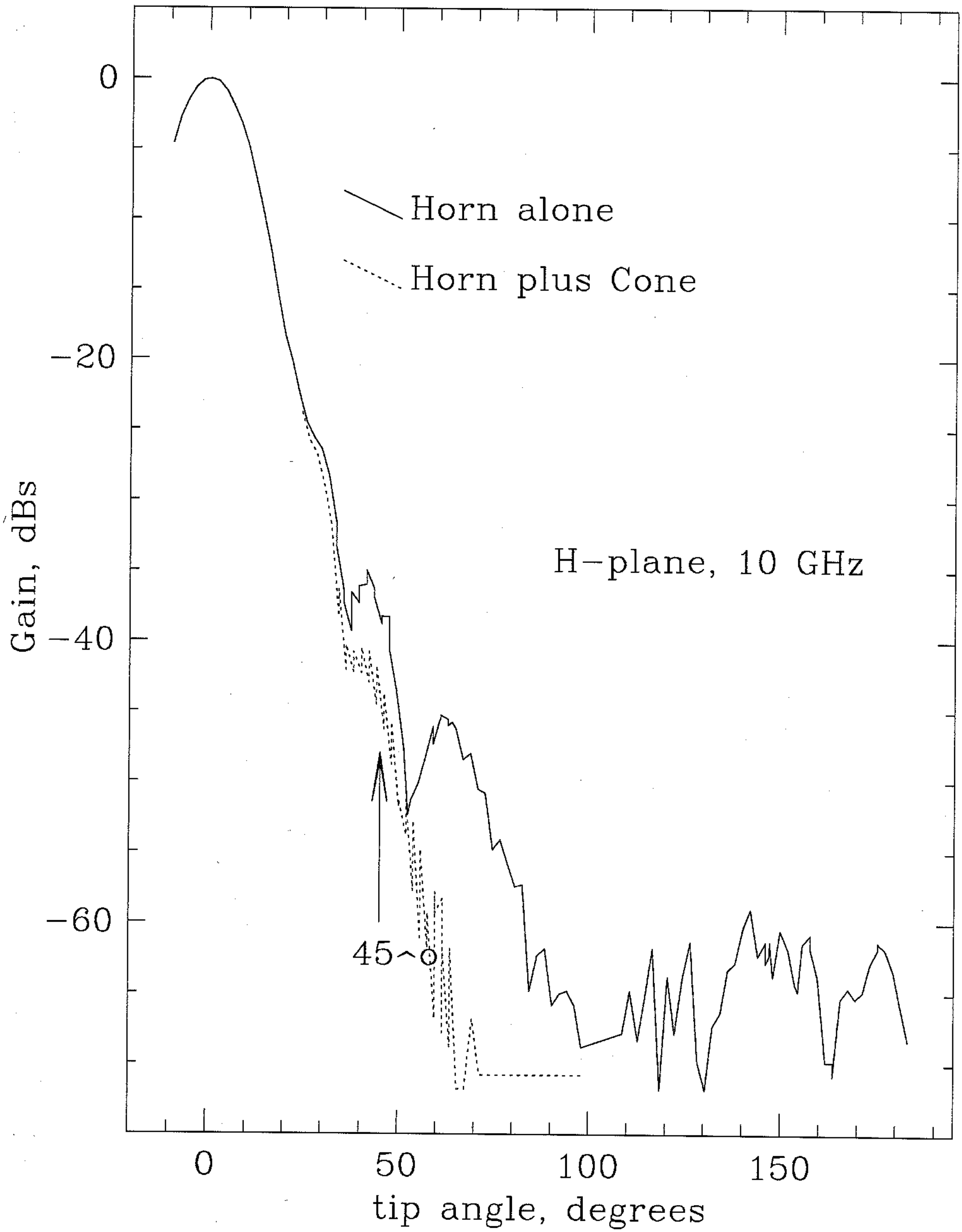
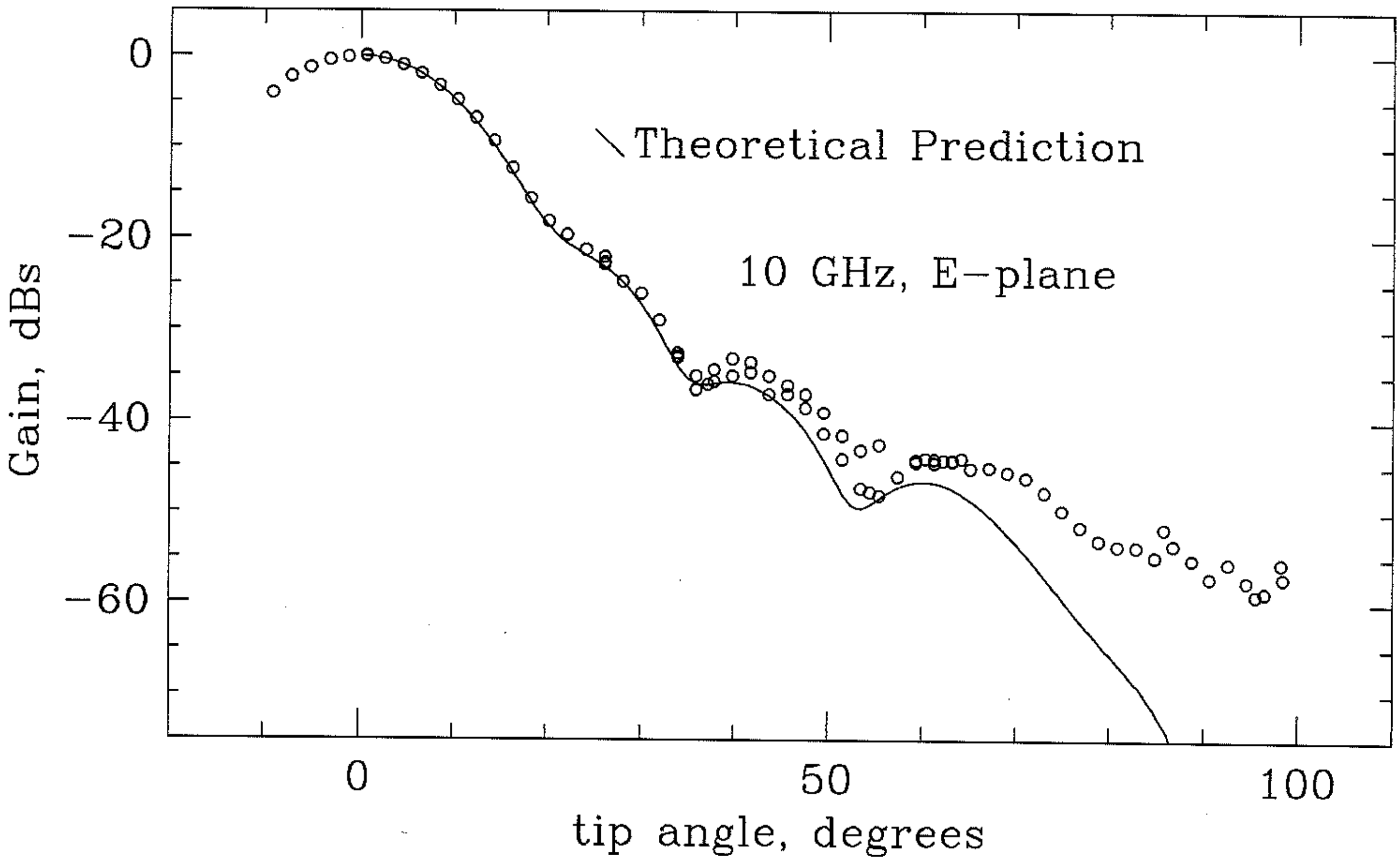
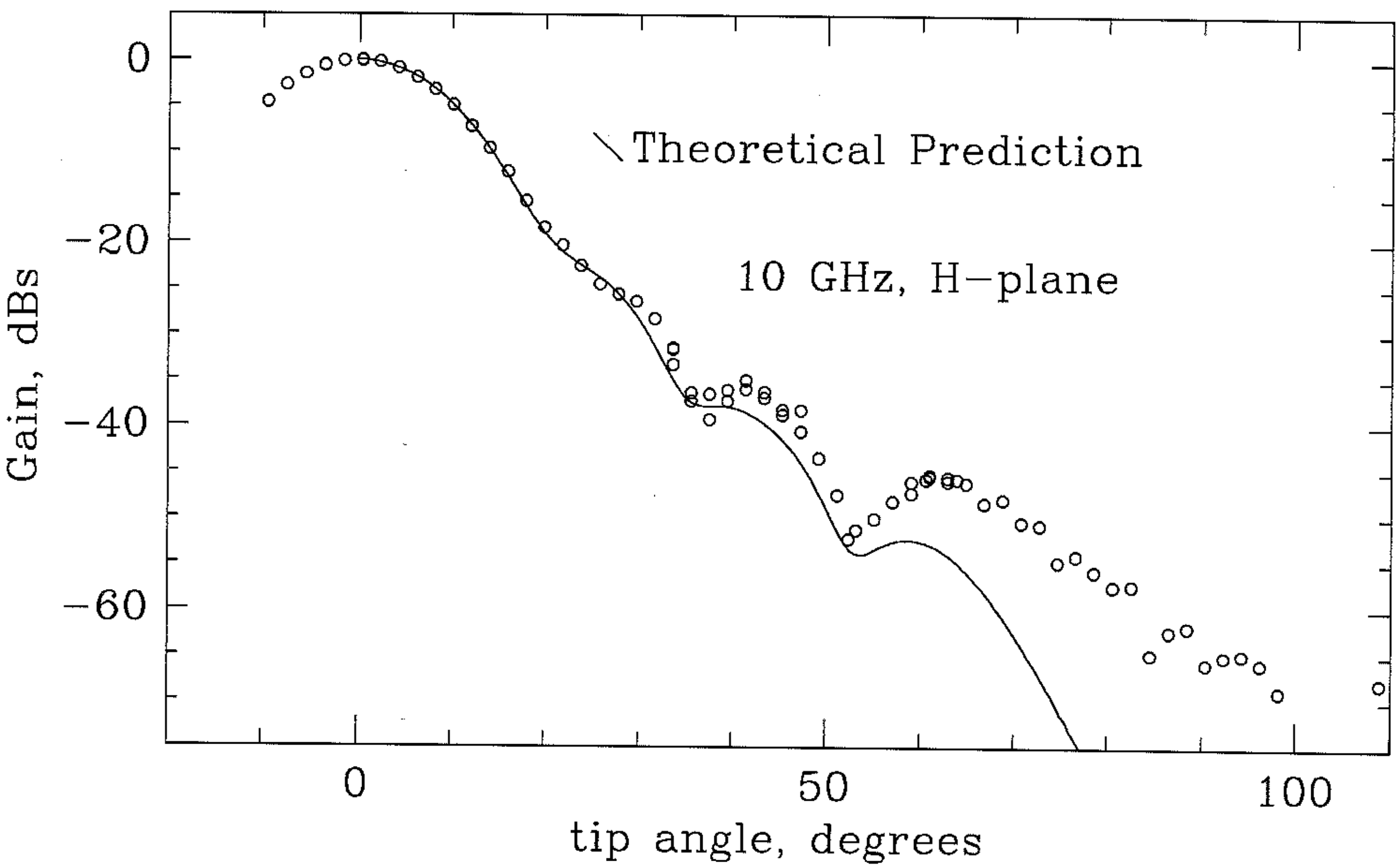


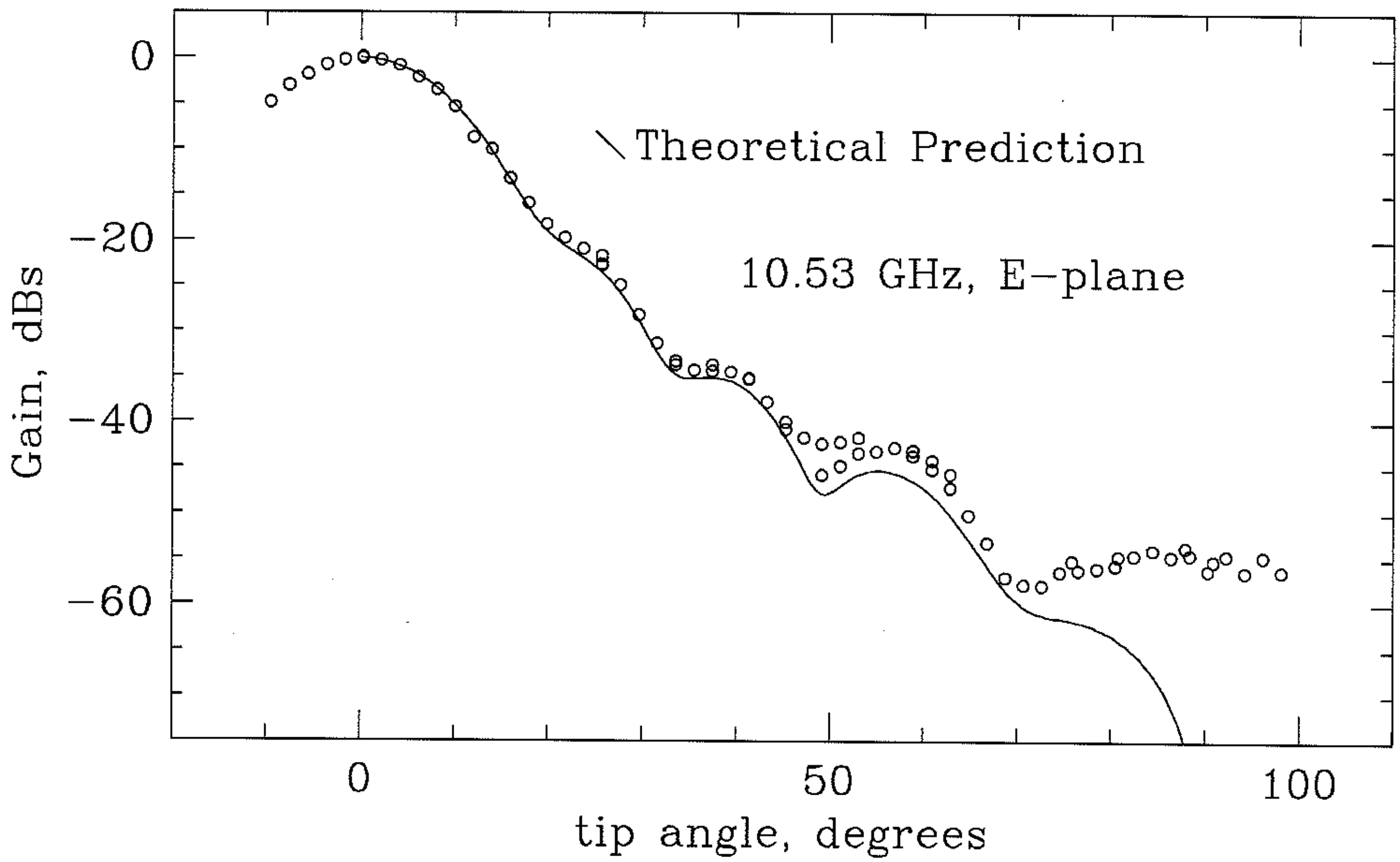
Horn alone
Horn plus Cone
H−plane, 10 GHz
45~o
Gain, dBs
0
−20
−40
−60
0
50
100
150
tip angle, degrees

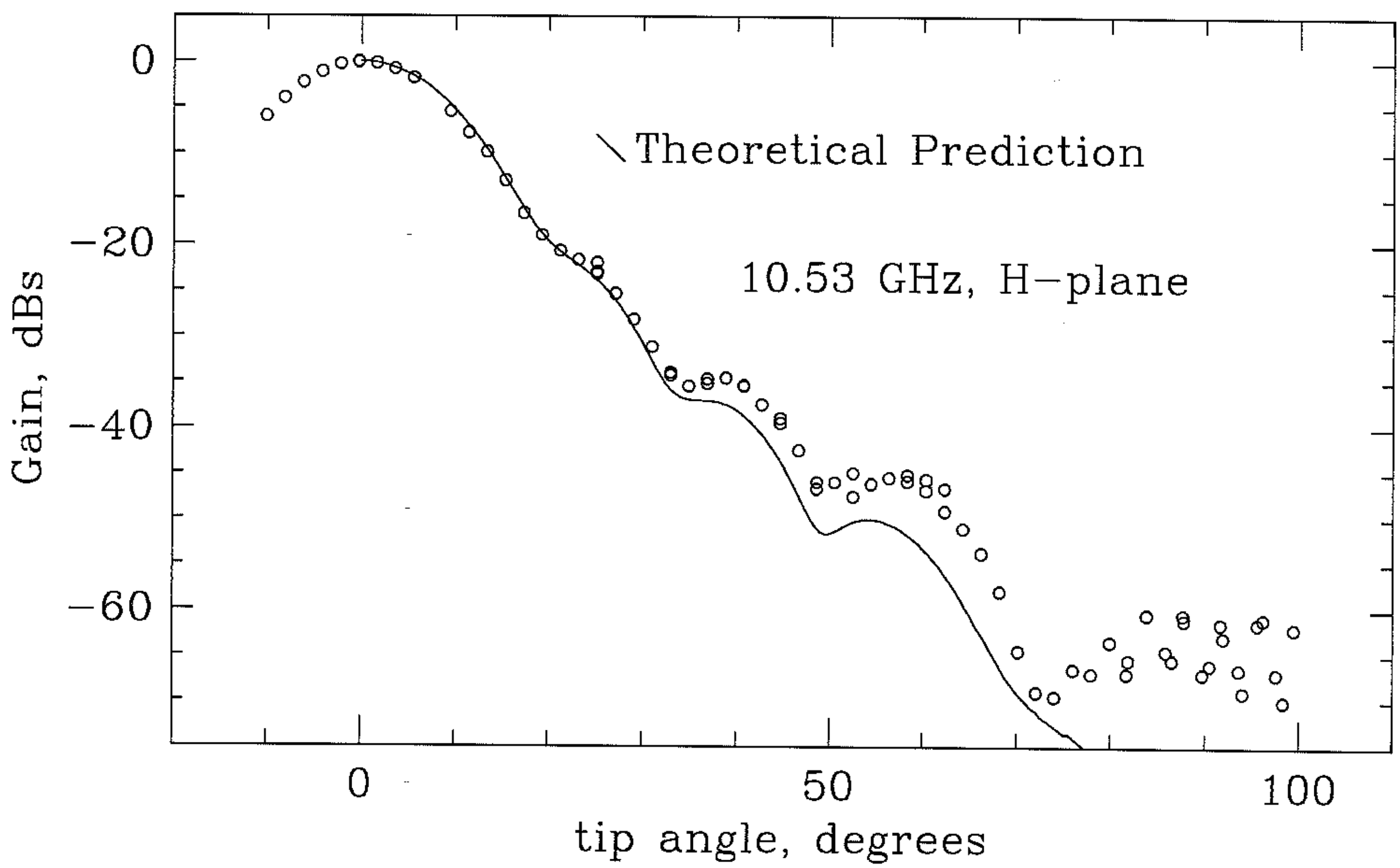
best–fit Gaussian parameters used for level and zero angle



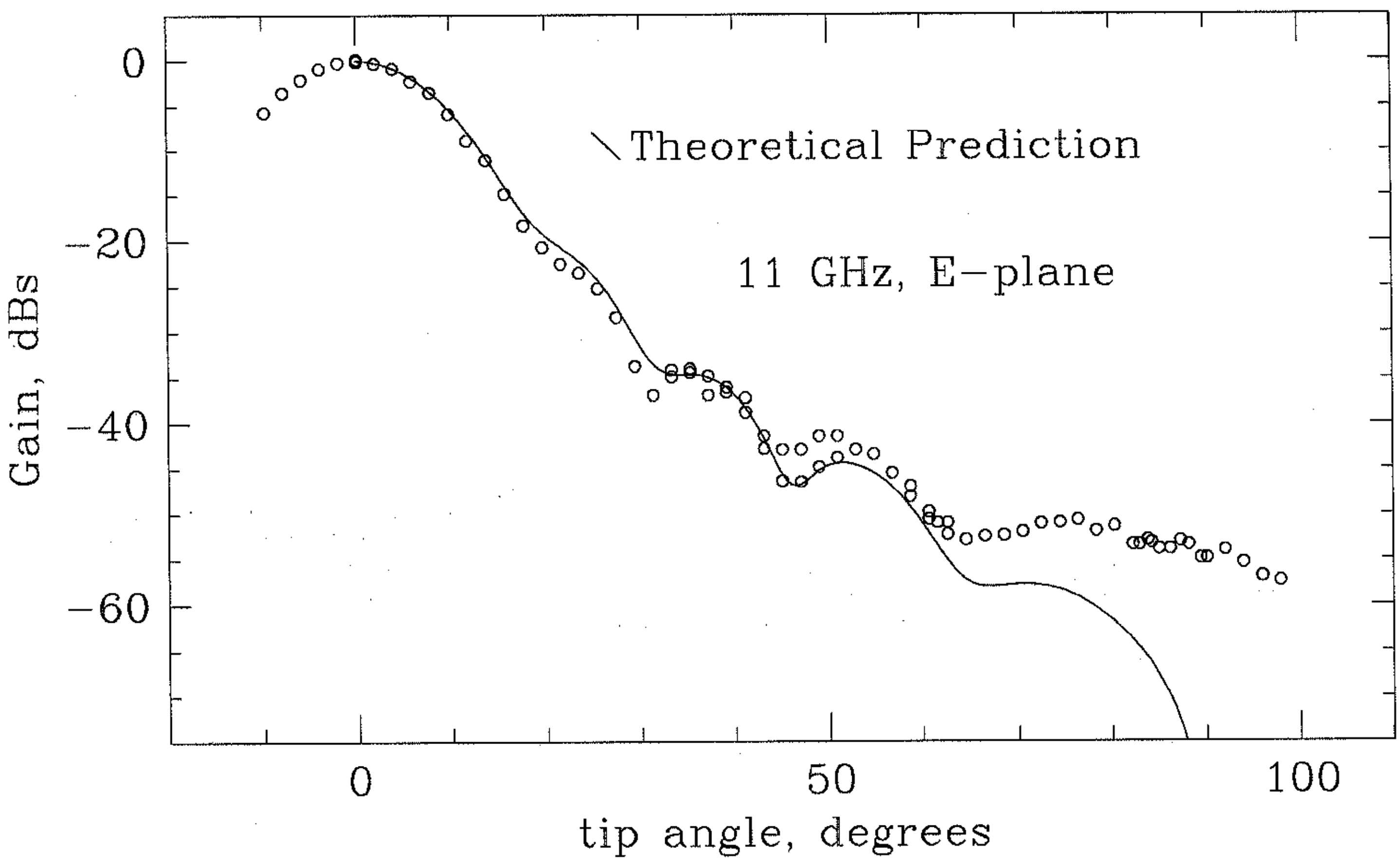


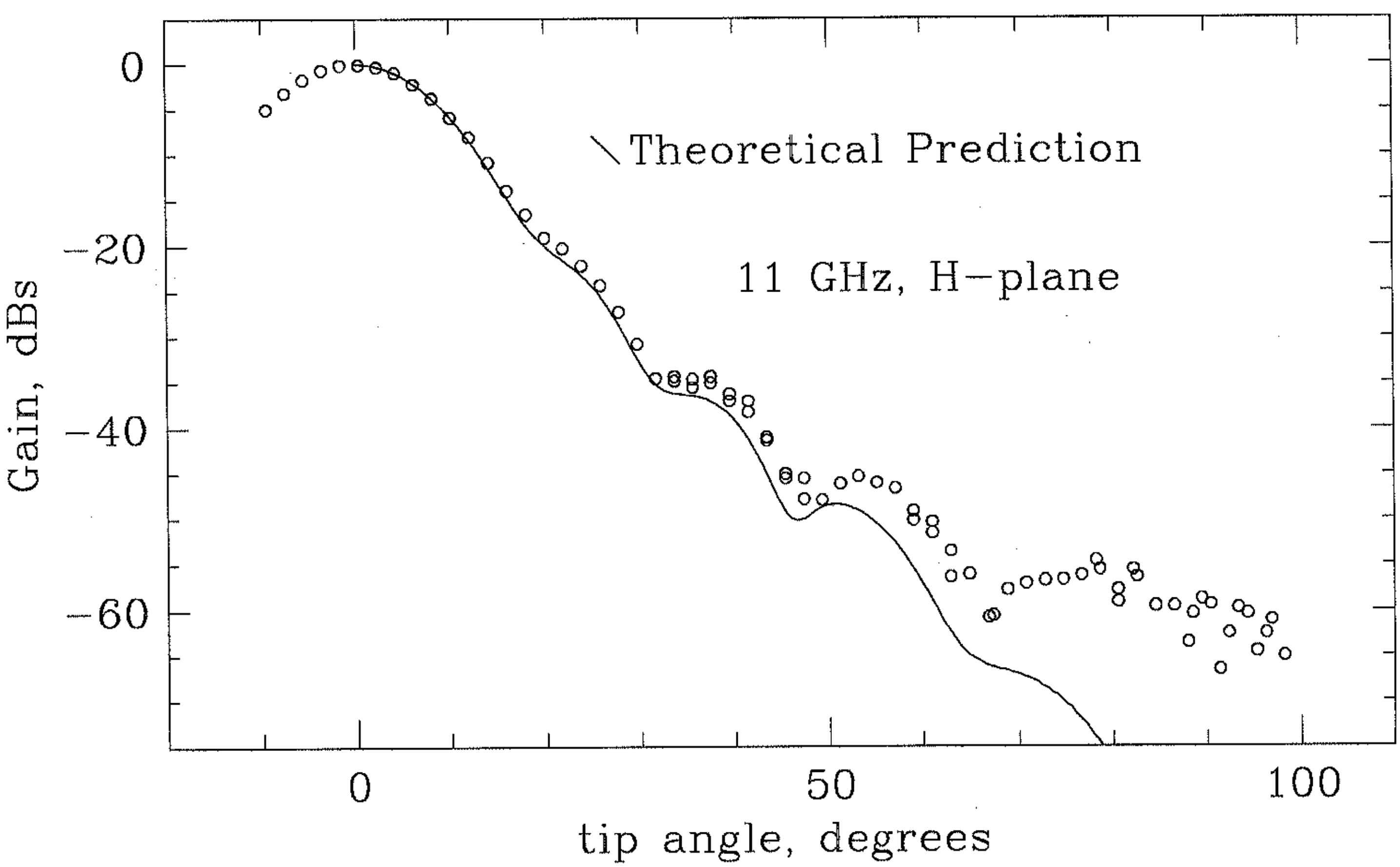
best-fit Gaussian parameters used for level and zero angle



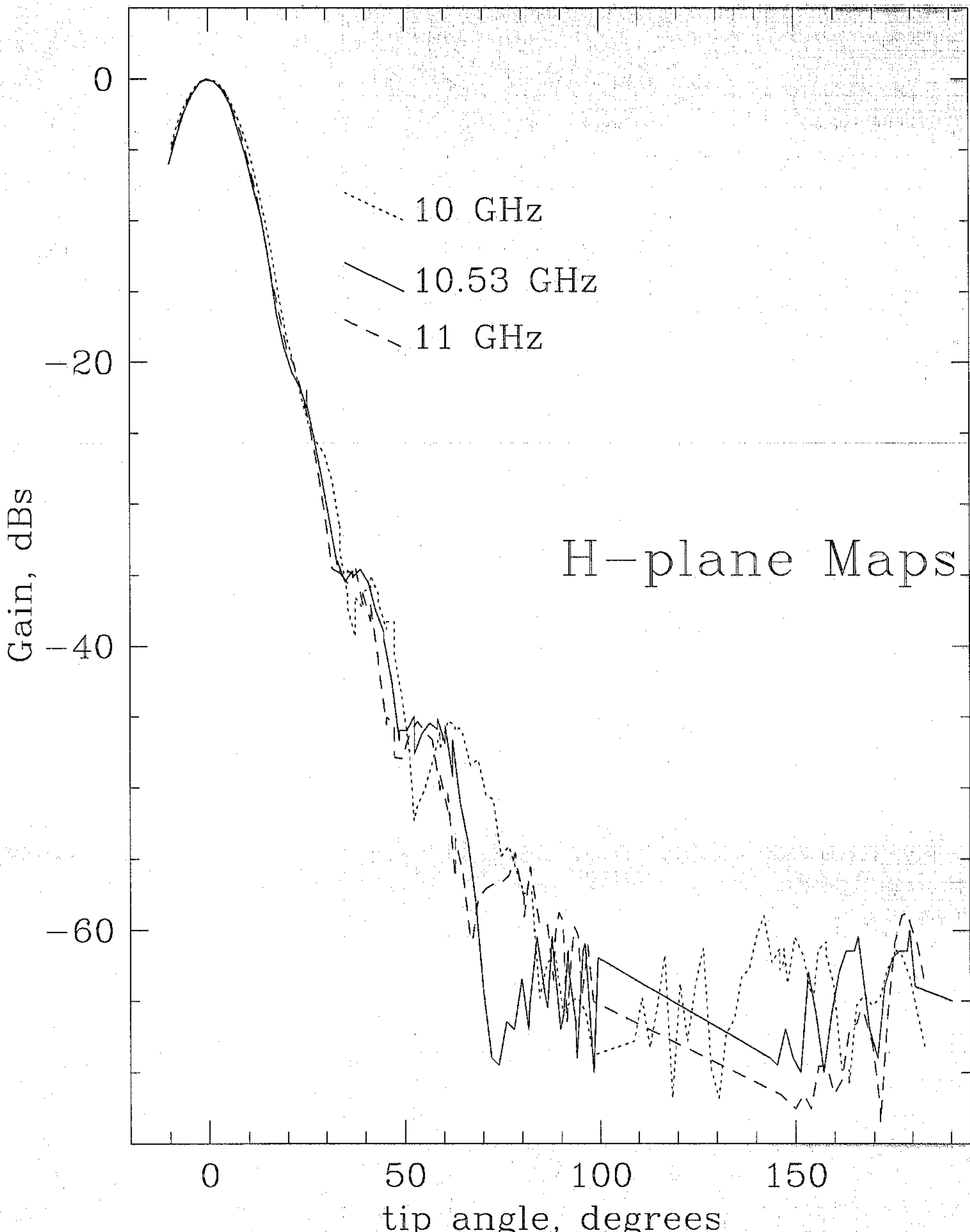


best-fit Gaussian parameters used for level and zero angle

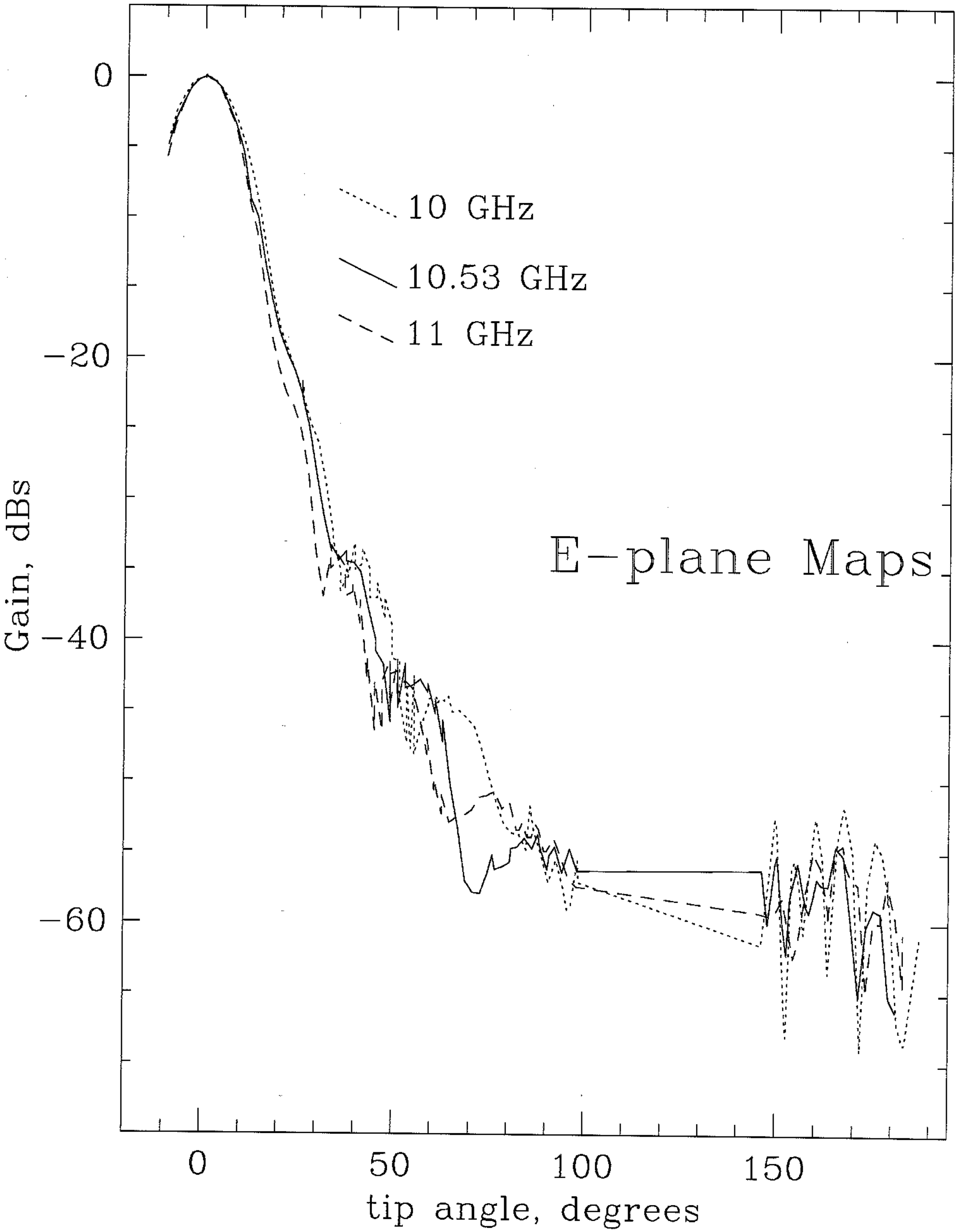




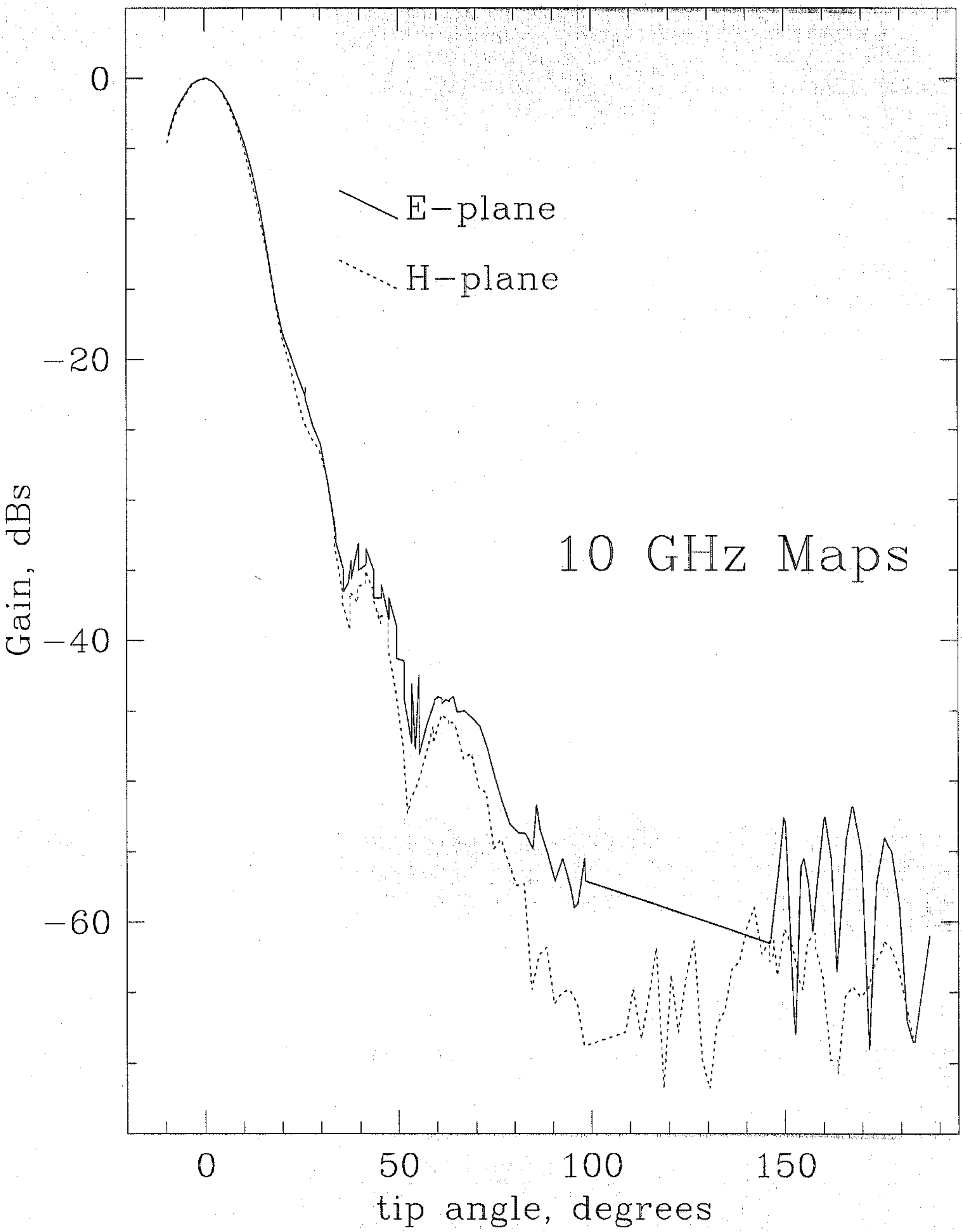
best-fit Gaussian parameters used for level and zero angle

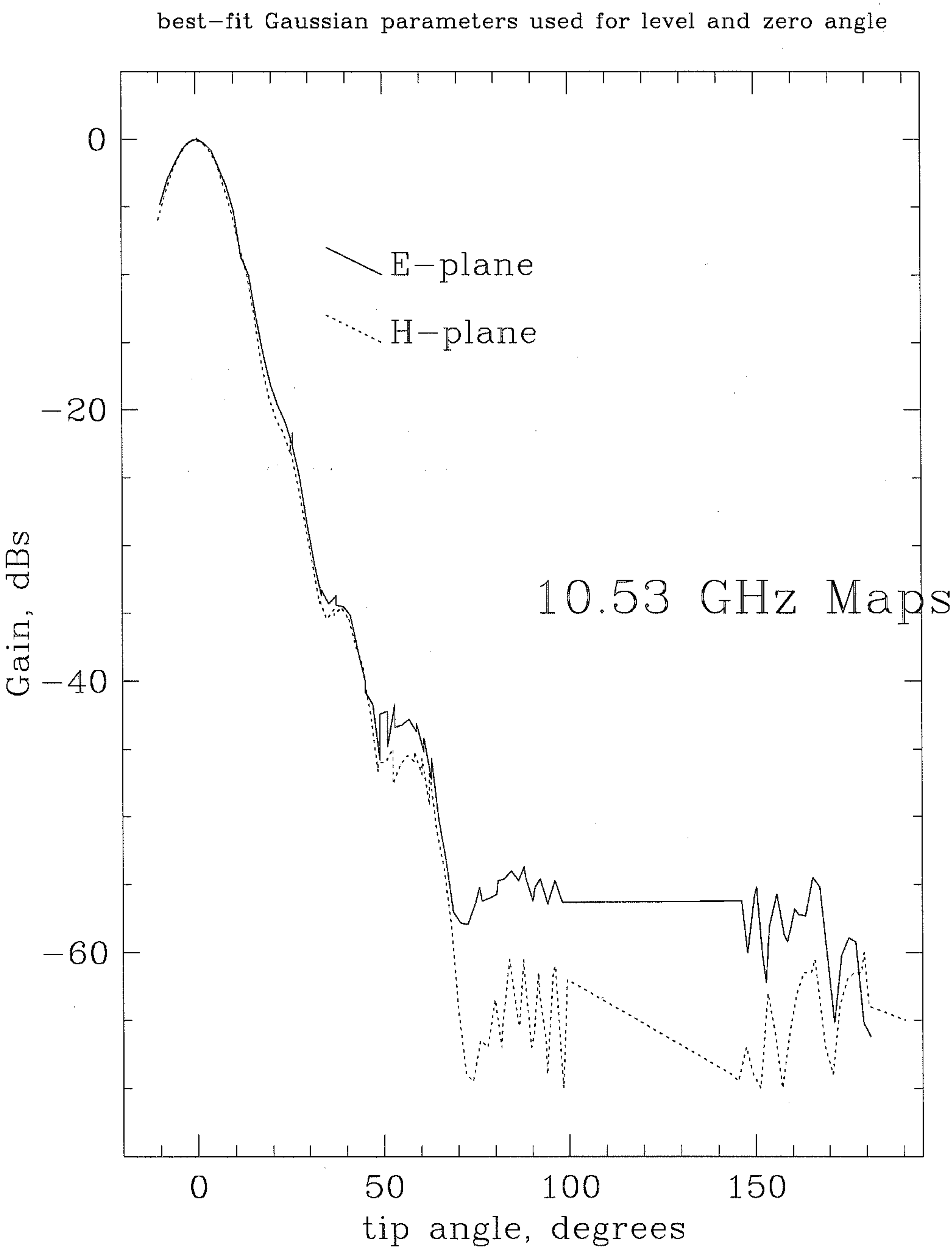


best-fit Gaussian parameters used for level and zero angle

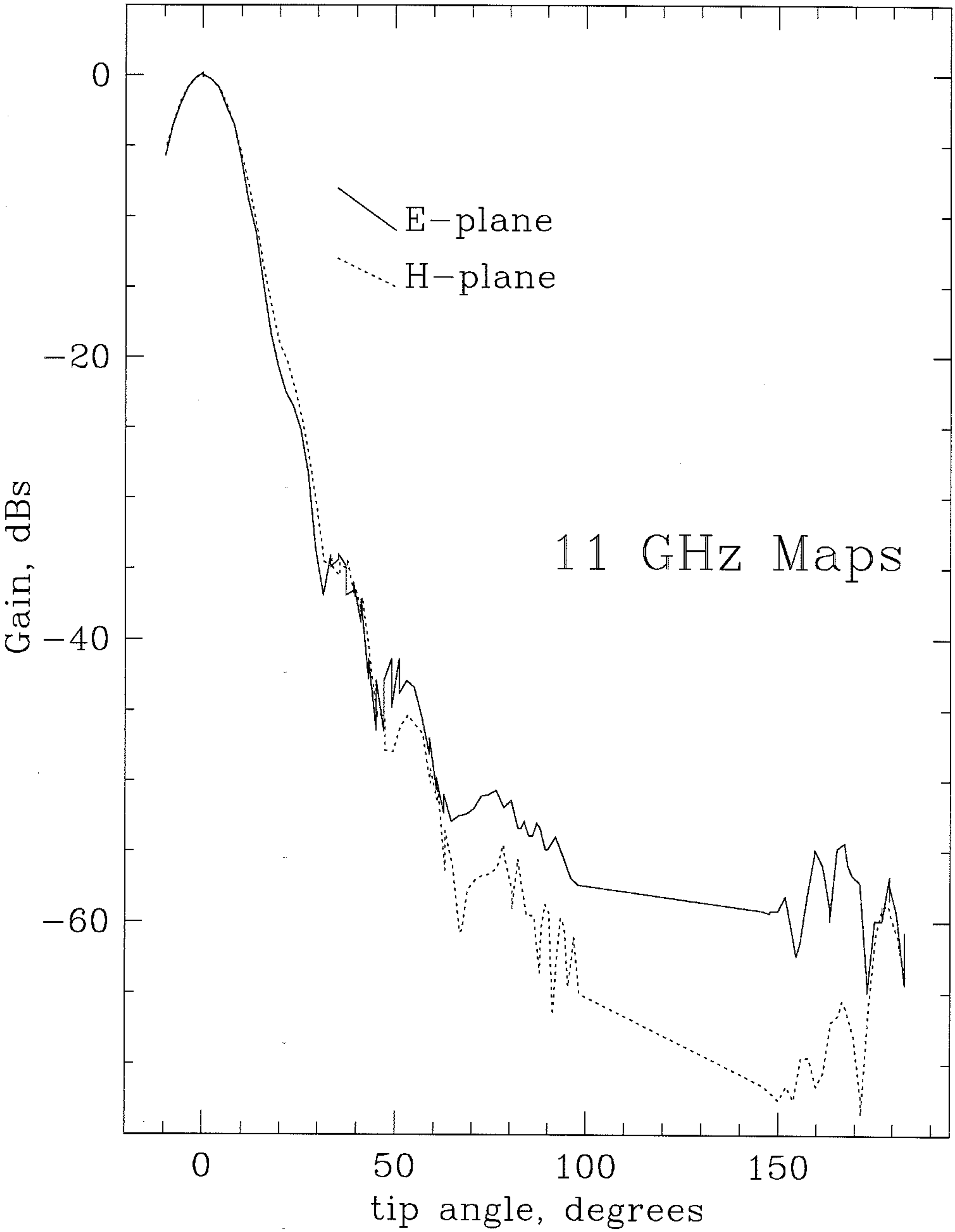


best-fit Gaussian parameters used for level and zero angle

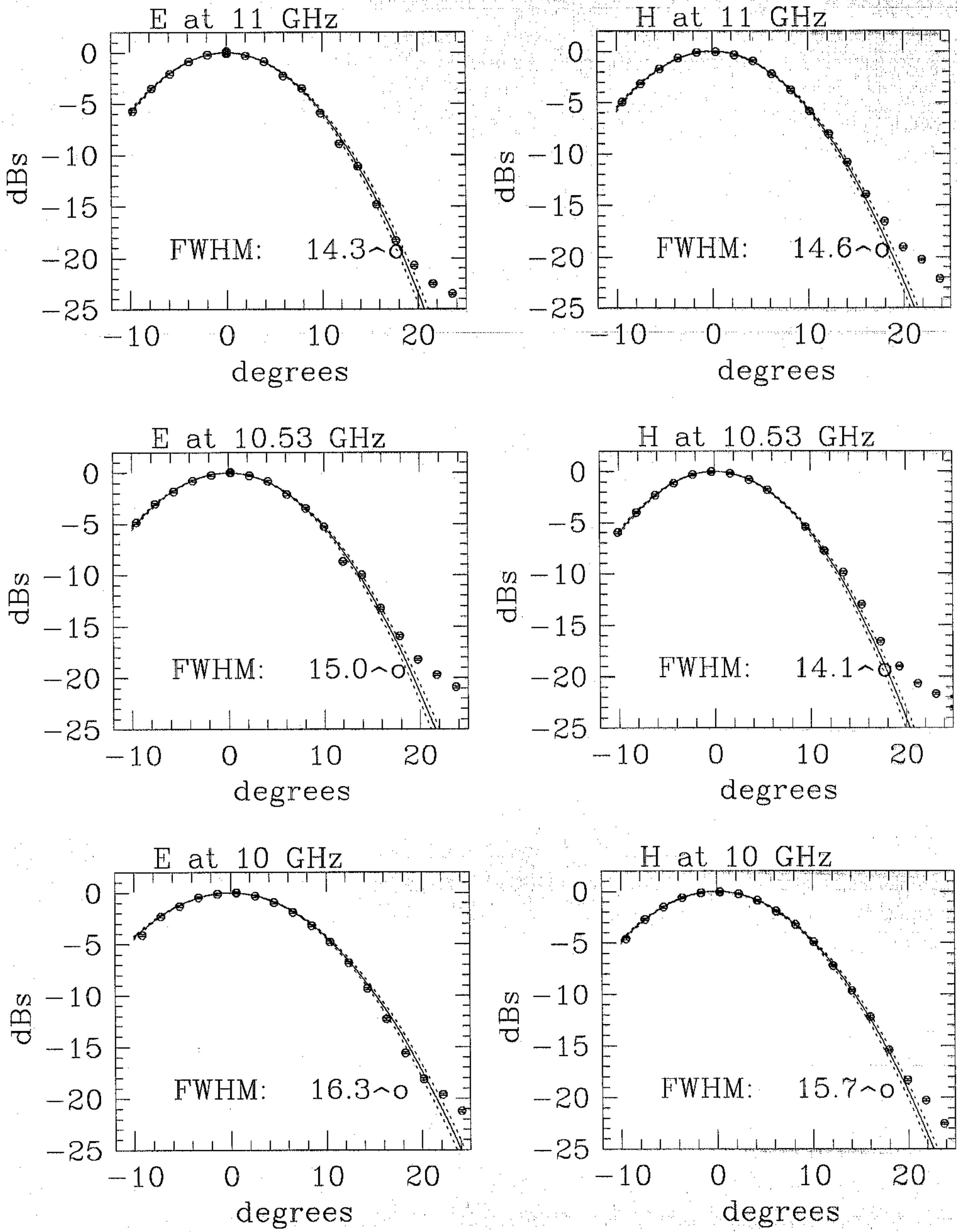


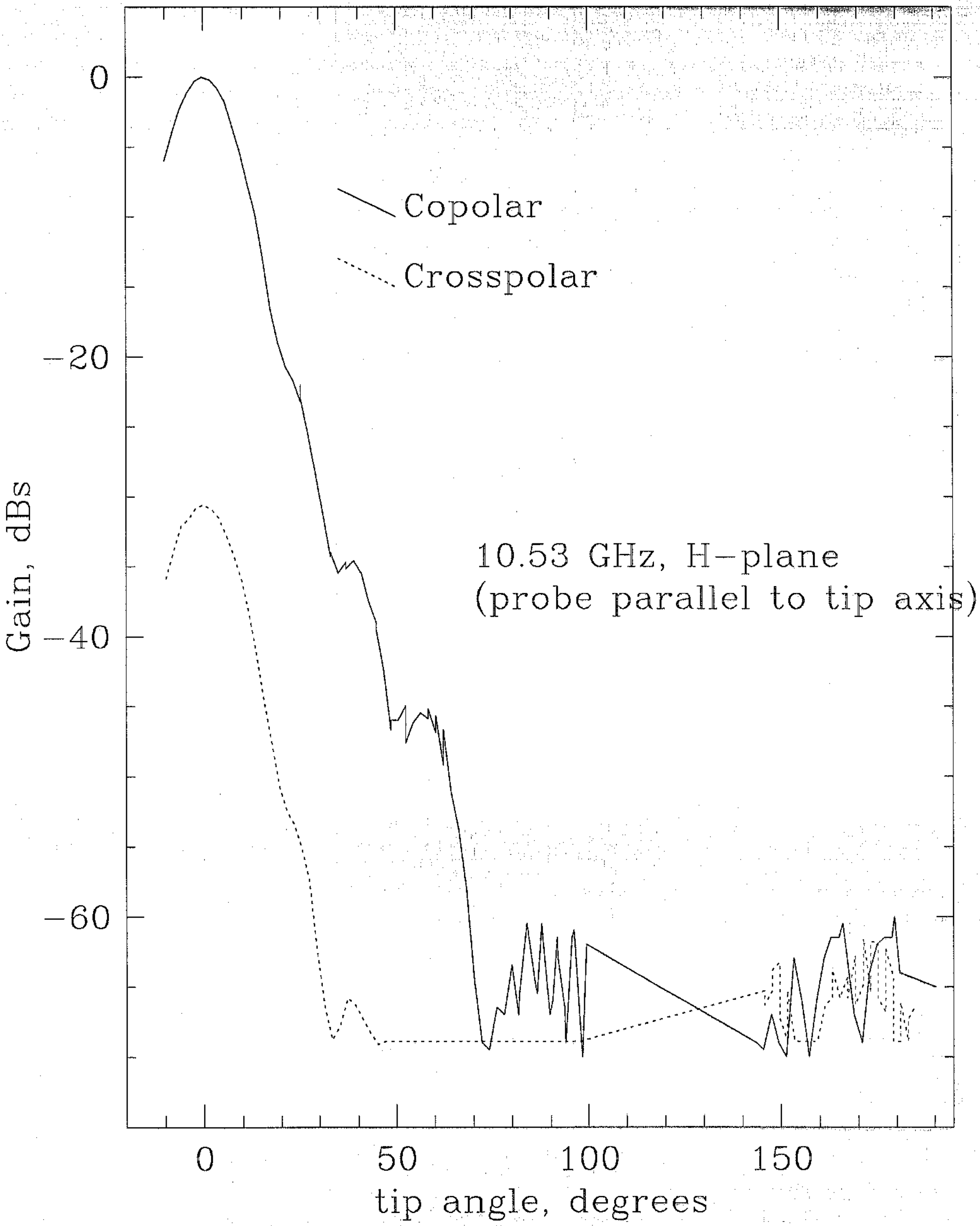

best-fit Gaussian parameters used for level and zero angle
E-plane
H-plane
10.53 GHz Maps
Gain, dBs
0
-20
-40
-60
tip angle, degrees
0
50
100
150

best−fit Gaussian parameters used for level and zero angle



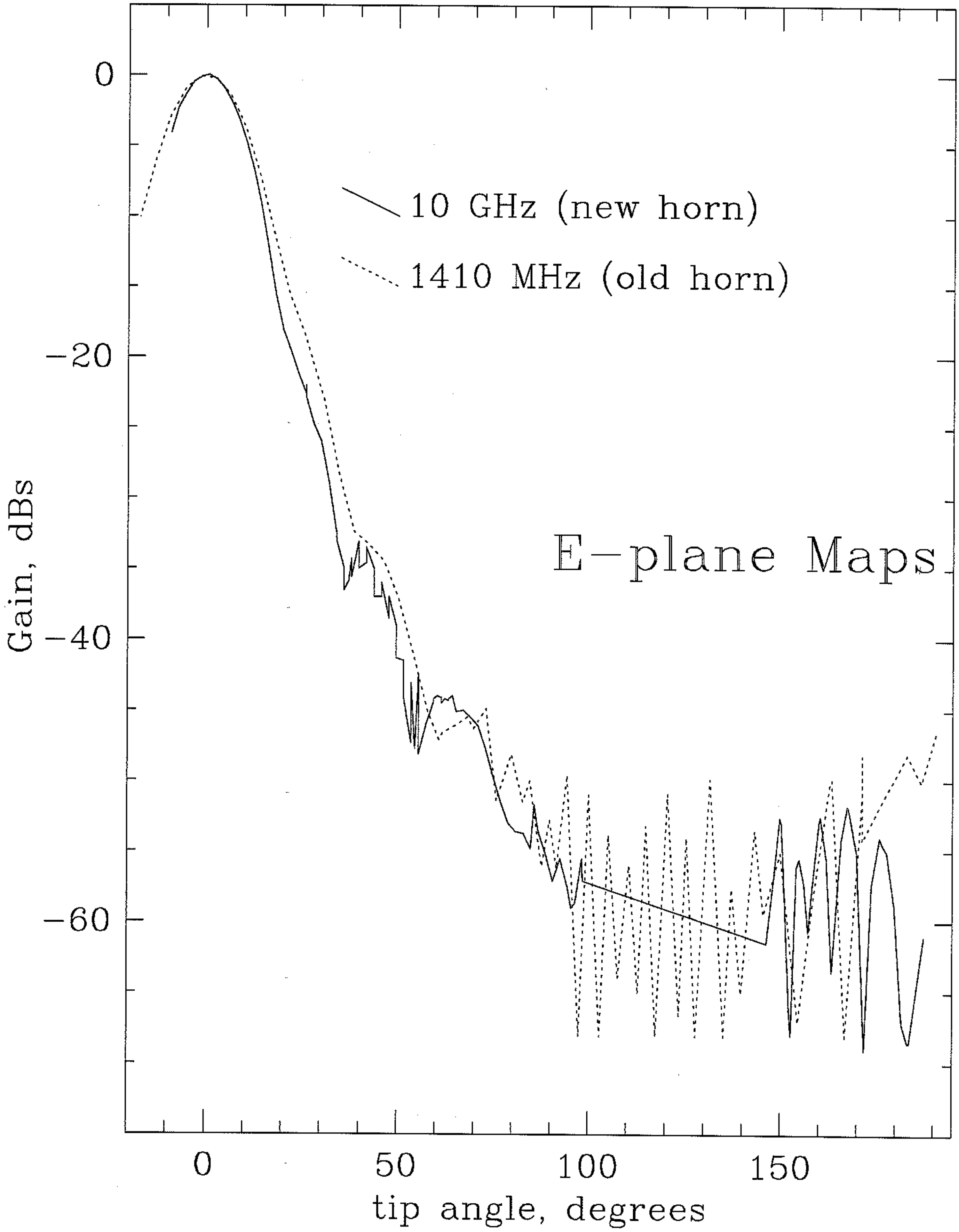
(Dotted Lines: m 0.3~o)

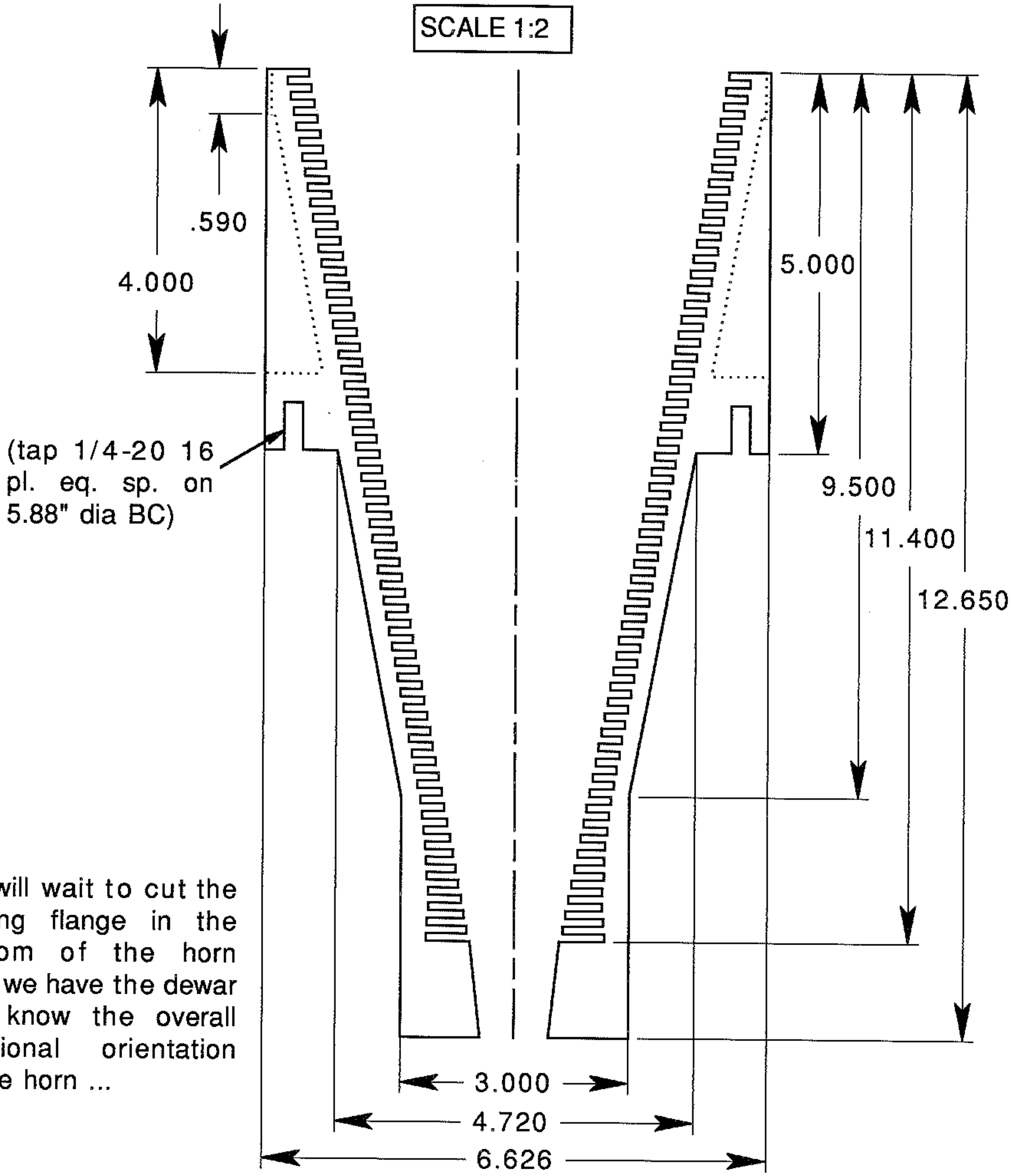




0
−20
−40
−60
Gain, dBs
Copolar
Crosspolar
10.53 GHz, H−plane
(probe parallel to tip axis)
0
50
100
150
tip angle, degrees

best-fit Gaussian parameters used for level and zero angle





We will wait to cut the mating flange in the bottom of the horn until we have the dewar and know the overall rotational orientation of the horn ...

Dotted lines indicate where the horn will be cut down in order to lighten it and allow room for choke grooves later.

Mass of the horn as shown is about 11.5 lbs.
Mass of the lightened horn is about 8.8 lbs.

6.4	3.088
6.5	3.64
6.6	3.012
6.7	3.564
6.8	2.935
6.9	3.487
7	2.859
7.1	3.411
7.2	2.783
7.3	3.335
7.4	2.706
7.5	3.258
7.6	2.63
7.7	3.182
7.8	2.554
7.9	3.106
8	2.477
8.1	3.029
8.2	2.401
8.3	2.953
8.4	2.325
8.5	2.877
8.6	2.249
8.7	2.801
8.8	2.172
8.9	2.727
9	2.096
9.1	2.653
9.2	2.02
9.3	2.579
9.4	1.943
9.5	2.505
9.6	1.867
9.7	2.443
9.8	1.791
9.9	2.406
10	1.714
10.1	2.361
10.2	1.638
10.3	2.332
10.4	1.562
10.5	2.326
10.6	1.486
10.7	2.283
10.8	1.409
10.9	2.278
11	1.333
11.1	2.315
11.2	1.257
11.3	2.34
11.4	1.18

clearly different for the two waveguides, so a good match can be achieved at only one frequency. The design aim is to ensure that the matched frequency is chosen to give acceptable impedance values over the operating band. If low VSWR is an important specification then Fig. 5.35, in conjunction with eqn. 5.12, tells us that the frequency for perfect match should be nearer the lower end of the frequency band because the rate of change of guide wavelength is greater at lower frequencies. This will mean that the slots will be greater than half a wavelength deep at the upper frequency, an undesirable situation but one which cannot be avoided in a wide band, low VSWR corrugated horn.

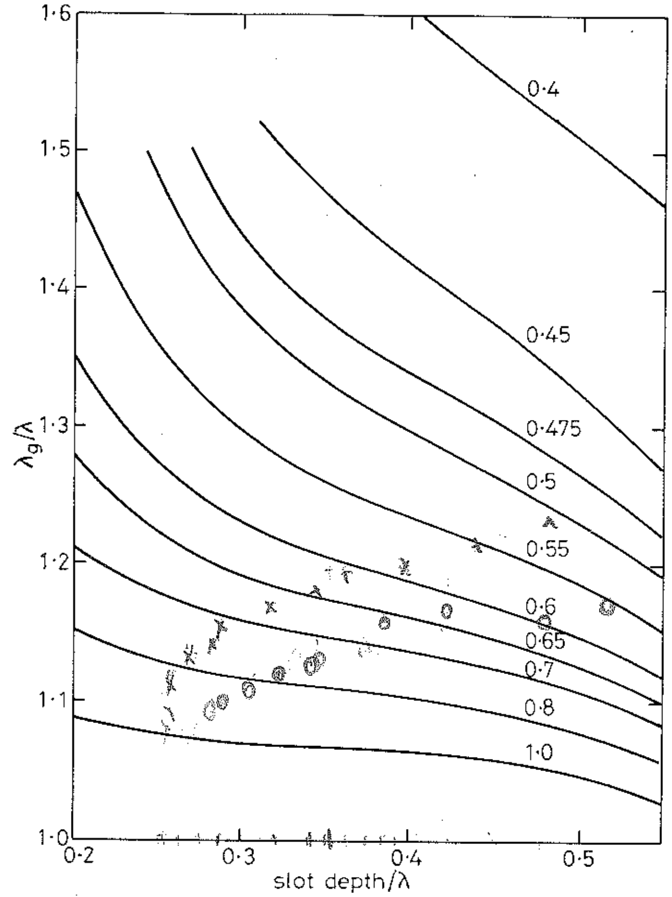


Fig. 5.36 *Normalised guide wavelength against normalised slot depth for corrugated waveguide. Parameter r_1/λ*

The above discussion referred to the junction between two waveguides, whereas in reality we have the junction between one waveguide and a conical corrugated section. This situation can be simulated by approximating the horn as a series of constant diameter corrugated waveguides. The guide wavelength in each corrugated waveguide section can be computed and plotted on a composite graph to give an

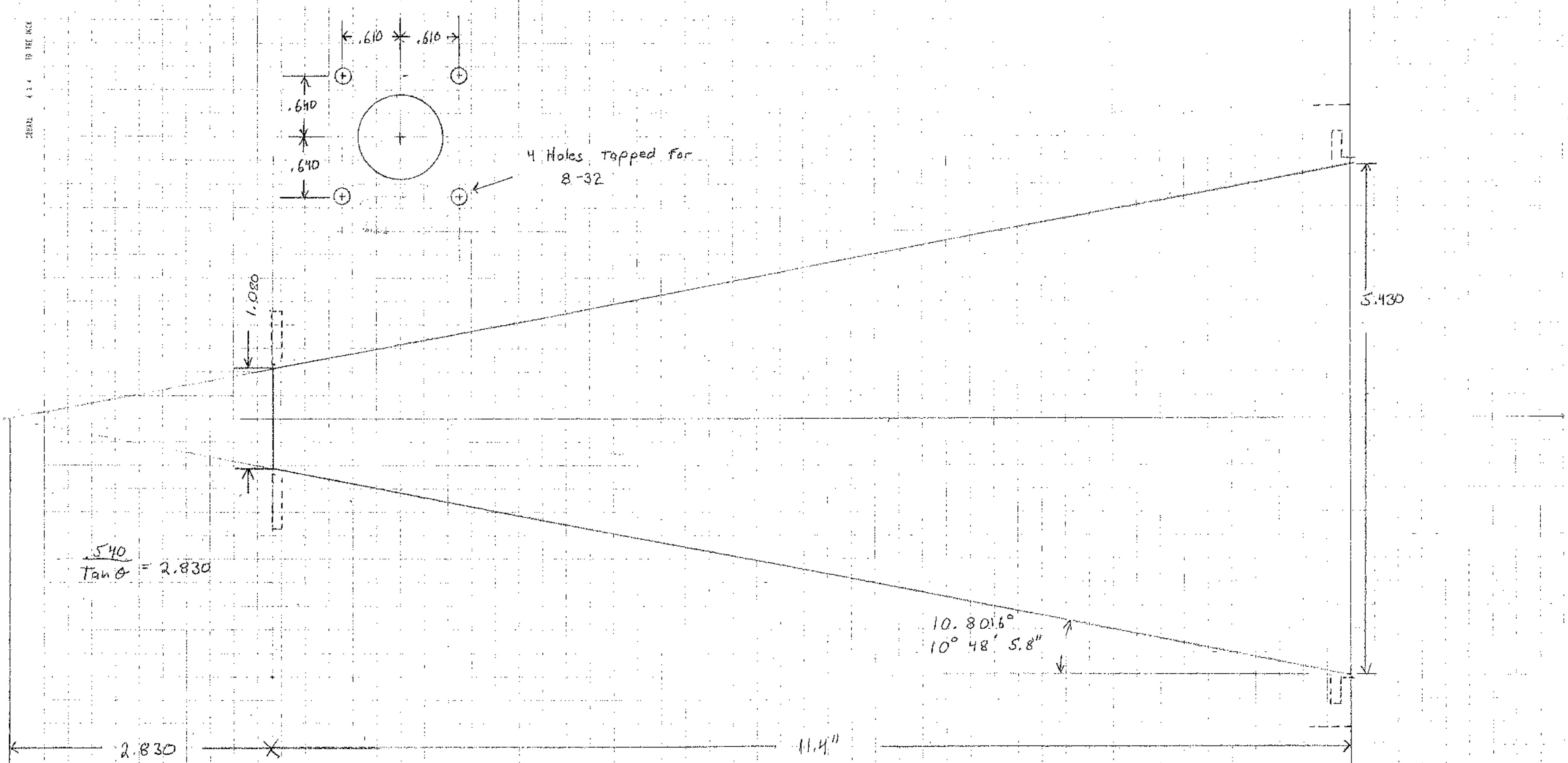
10GHz λ_0 = 10 ...

λ = 3cm = 1.181"

slot #	(r_i) mean r_{inner}	slot depth	r_i/λ	d/λ	11GHz r_i/b	d/b
11.3	.609	.561	.516	.475	.567	.523
11.1	.647	.509	.548	.431	.603	.474
10.9	.685	.453	.580	.384	.638	.422
10.7	.724	.418	.613	.354	.674	.390
10.5	.762	.401	.645	.340	.710	.374
10.3	.800	.366	.677	.310	.746	.341
10.1	.838	.342	.709	.289	.781	.319
9.9	.876	.327	.742	.277	.816	.305
9.7	.915	.307	.775	.260	.853	.286
9.5	.953	.2995	.807	.253	.888	.279
9.3	.991	.298	.839	.252	.924	.277
9.1	1.029	.297	.87	.251	.958	.277

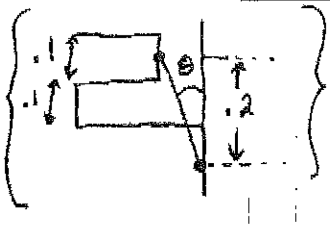
BY________DATE______ SUBJECT________________ SHEET NO.______OF______

CHKD. BY______DATE______ JOB NO.__________



002

Assume semiflare angle = 10.8°



$\Rightarrow \Delta r = .2'' \tan(10.8°)$

Assume $r_{bottom} = \frac{\lambda_{10}}{2} = 1.5\,cm$

$\Rightarrow \Delta r = .097\,cm$

FOR NORM JAROSIK from Staggs

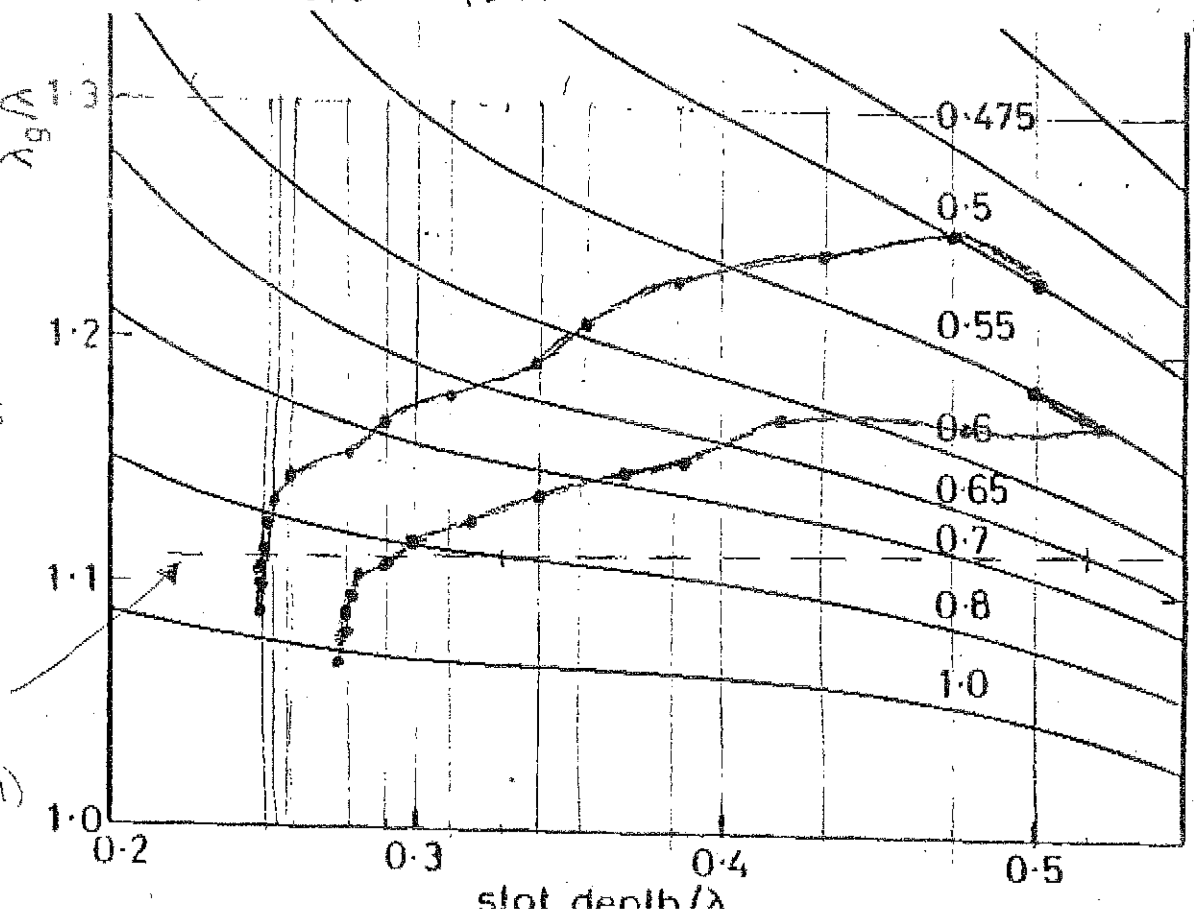
RADIUS (cm)	λ_{10}	λ_{11}	DEPTH λ_{10}	λ_{11}
1.5	.5	.55	.475	.523
1.597	.532	.586	.432	.470
1.694	.565	.621	.384	.42
1.791	.597	.657	.354	.39
1.888	.629	.692	.34	.37
1.985	.662	.728	.31	.34
2.081	.694	.763	.29	.32
2.178	.726	.799	.277	.30
2.275	.758	.834	.26	.29
2.372	.791	.870	.254	.28
2.469	.823	.905	.253	.278
2.566	.855	.941	.252	.277
2.663	.888	.976	.251	.276
2.760	.920	1.012	.250	.275
2.857	.952	1.047	.250	.275

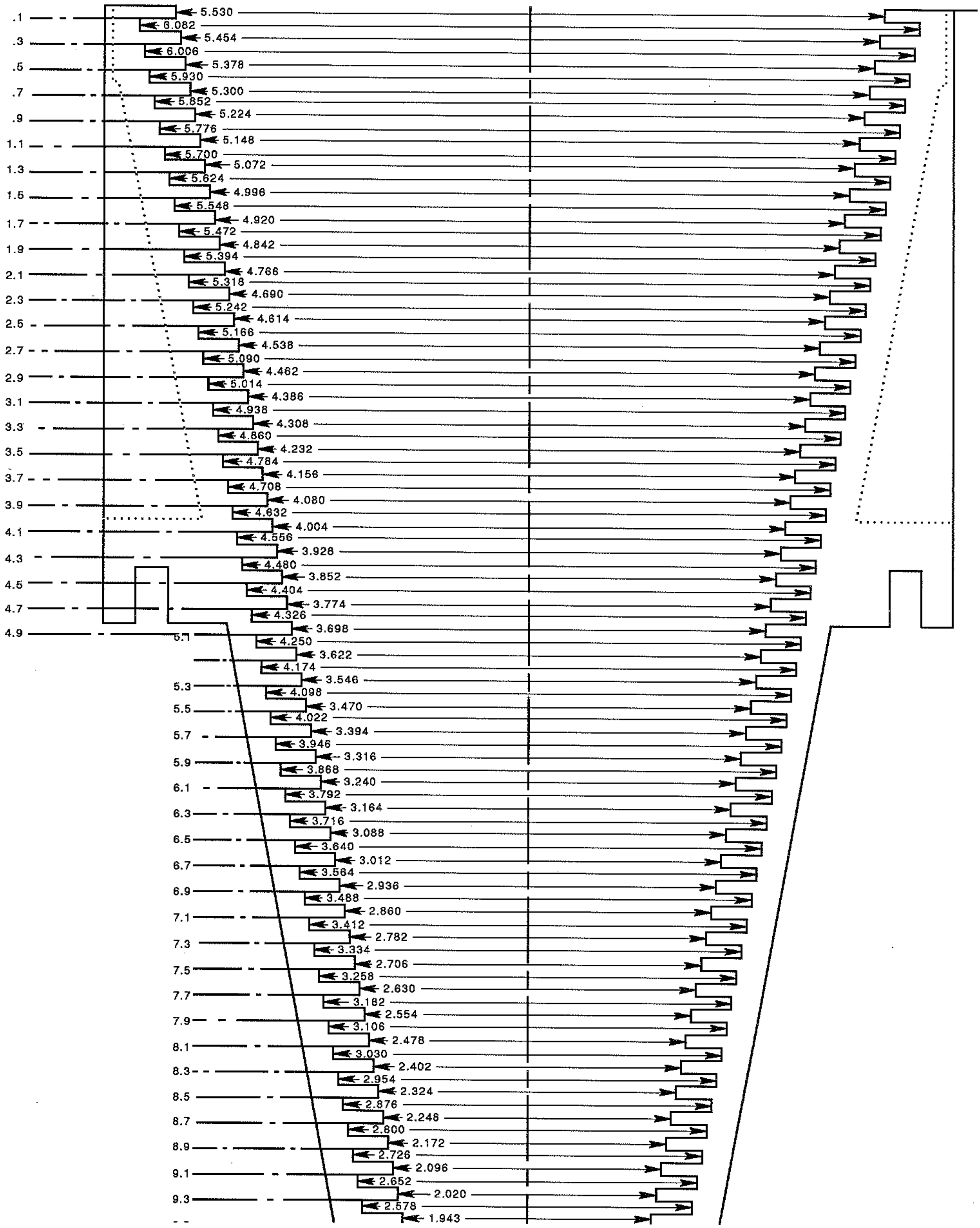
eyeballed values for smooth curves w/ small $\Delta\lambda_g$ b/w points.....

10 GHz trajectory in pencil (on top)
11 GHz trajectory in red (on bottom)

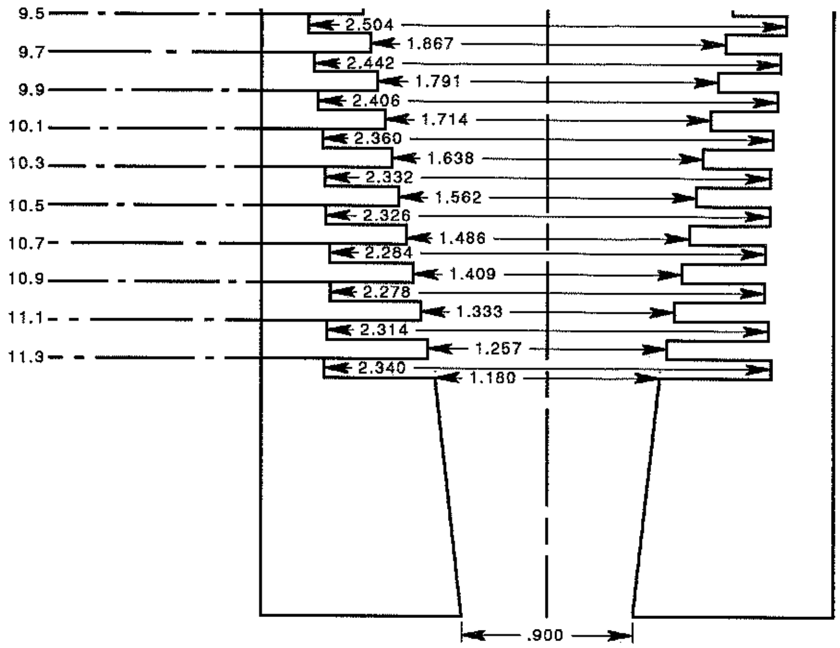
fig 5.36 Clarricoats & Olver p130

HE$_{12}$ cutoff (page 131)





.1
.3
.5
.7
.9
1.1
1.3
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
5.3
5.5
5.7
5.9
6.1
6.3
6.5
6.7
6.9
7.1
7.3
7.5
7.7
7.9
8.1
8.3
8.5
8.7
8.9
9.1
9.3
5.530
6.082
5.454
6.006
5.378
5.930
5.300
5.852
5.224
5.776
5.148
5.700
5.072
5.624
4.996
5.548
4.920
5.472
4.842
5.394
4.766
5.318
4.690
5.242
4.614
5.166
4.538
5.090
4.462
5.014
4.386
4.938
4.308
4.860
4.232
4.784
4.156
4.708
4.080
4.632
4.004
4.556
3.928
4.480
3.852
4.404
3.774
4.326
3.698
4.250
3.622
4.174
3.546
4.098
3.470
4.022
3.394
3.946
3.316
3.868
3.240
3.792
3.164
3.716
3.088
3.640
3.012
3.564
2.936
3.488
2.860
3.412
2.782
3.334
2.706
3.258
2.630
3.182
2.554
3.106
2.478
3.030
2.402
2.954
2.324
2.876
2.248
2.800
2.172
2.726
2.096
2.652
2.020
2.578
1.943


9.5
9.7
9.9
10.1
10.3
10.5
10.7
10.9
11.1
11.3
2.504
1.867
2.442
1.791
2.406
1.714
2.360
1.638
2.332
1.562
2.326
1.486
2.284
1.409
2.278
1.333
2.314
1.257
2.340
1.180
.900

scale1:1