

Predicted Antenna Patterns for the
D18_CX-001
Tx/Rx X Band Reflector Antenna

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1 Introduction

This report contains the predicted antenna patterns for the new Optim Microwave center-fed 18" reflector antenna for Tx/Rx applications at X Band. The receive band is 7.25-7.75 GHz. The transmit band is 7.90-8.40 GHz. The feed port is a 1.070" diameter circular waveguide.

2 Predicted Antenna Performance

2.1 Predicted Reflections, Gains, Beamwidths and First Sidelobe Levels

Table 1 contains the predicted reflection coefficients, gains, beamwidths and first sidelobe levels for the antenna. An exaggerated loss of 0.1 dB has been assumed in the gain calculations.

Frequency (GHz)	Predicted Reflection Coefficient	Estimated Gain (dBi)	E Plane 3 dB Beamwidth (degrees)	E Plane 1st Sidelobe (dBp)	H Plane 3 dB Beamwidth (degrees)	H Plane 1st Sidelobe (dBp)
7.240	0.026	29.18	5.54	-17.63	5.58	-13.01
7.370	0.019	29.46	5.47	-17.18	5.56	-13.31
7.500	0.019	29.71	5.39	-16.52	5.56	-13.76
7.630	0.023	29.91	5.35	-16.13	5.54	-14.21
7.760	0.030	30.07	5.37	-16.03	5.47	-14.45
7.890	0.030	30.22	5.39	-15.99	5.37	-14.58
8.020	0.030	30.33	5.43	-16.16	5.30	-14.90
8.150	0.028	30.38	5.46	-15.48	5.22	-15.77
8.280	0.030	30.41	5.45	-14.99	5.14	-16.20
8.410	0.032	30.49	5.36	-14.69	5.09	-16.41

Table 1: Predicted Performance Parameters

2.2 Predicted E and H Plane Patterns

Example predicted patterns are shown in Figures 1 to 20. On each plot is shown a reference curve corresponding to:

$$\text{Gain} = \max(-10, 32 - 25 \log_{10}(\theta)) \text{ dBi} \quad (\theta \text{ in degrees})(1)$$

In plotting this curve, it is assumed that there are no losses in the antenna. If radome and waveguide losses are included, the antenna patterns will move down relative to this reference curve.

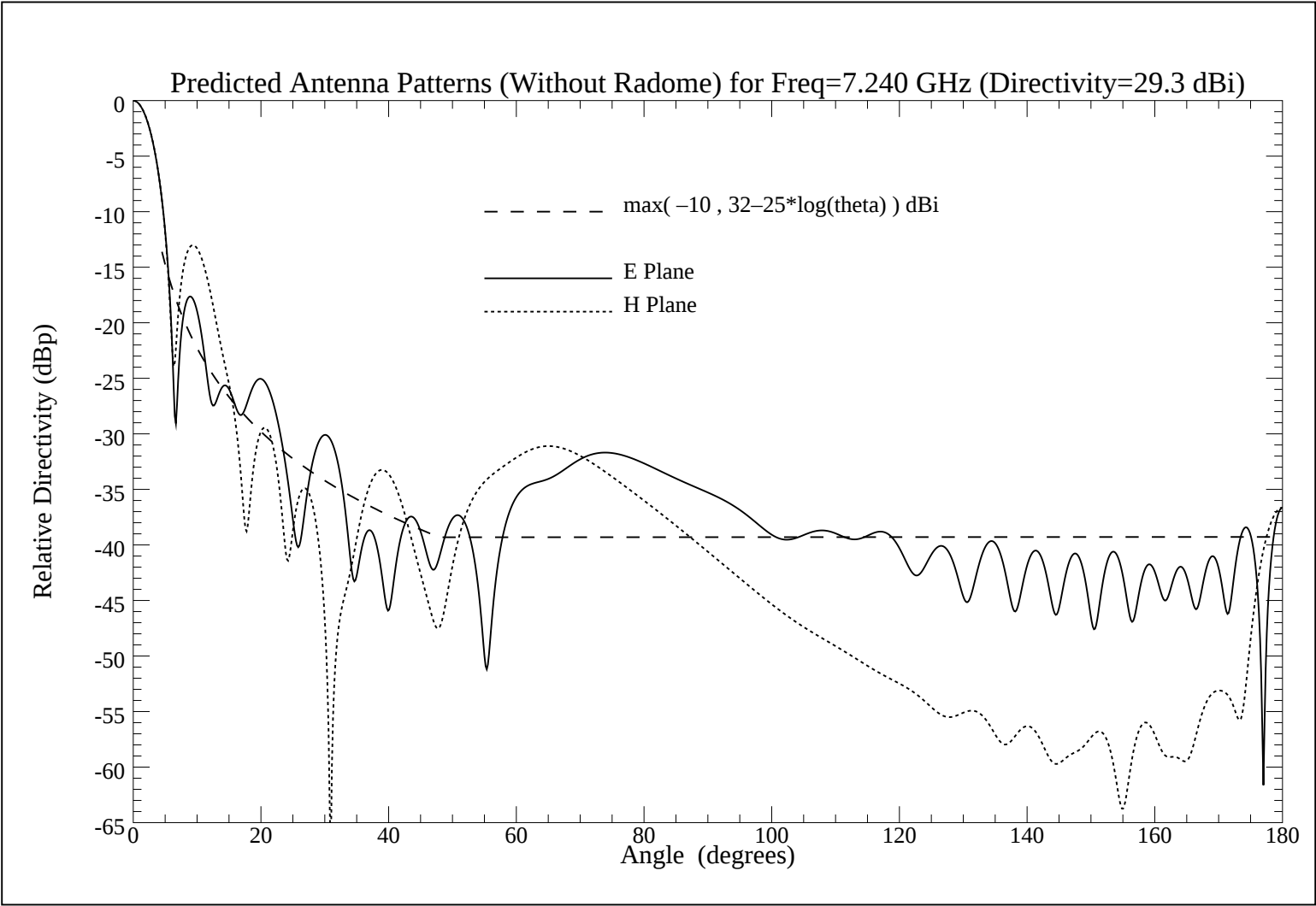


Figure 1: Antenna Patterns for 7.240 GHz

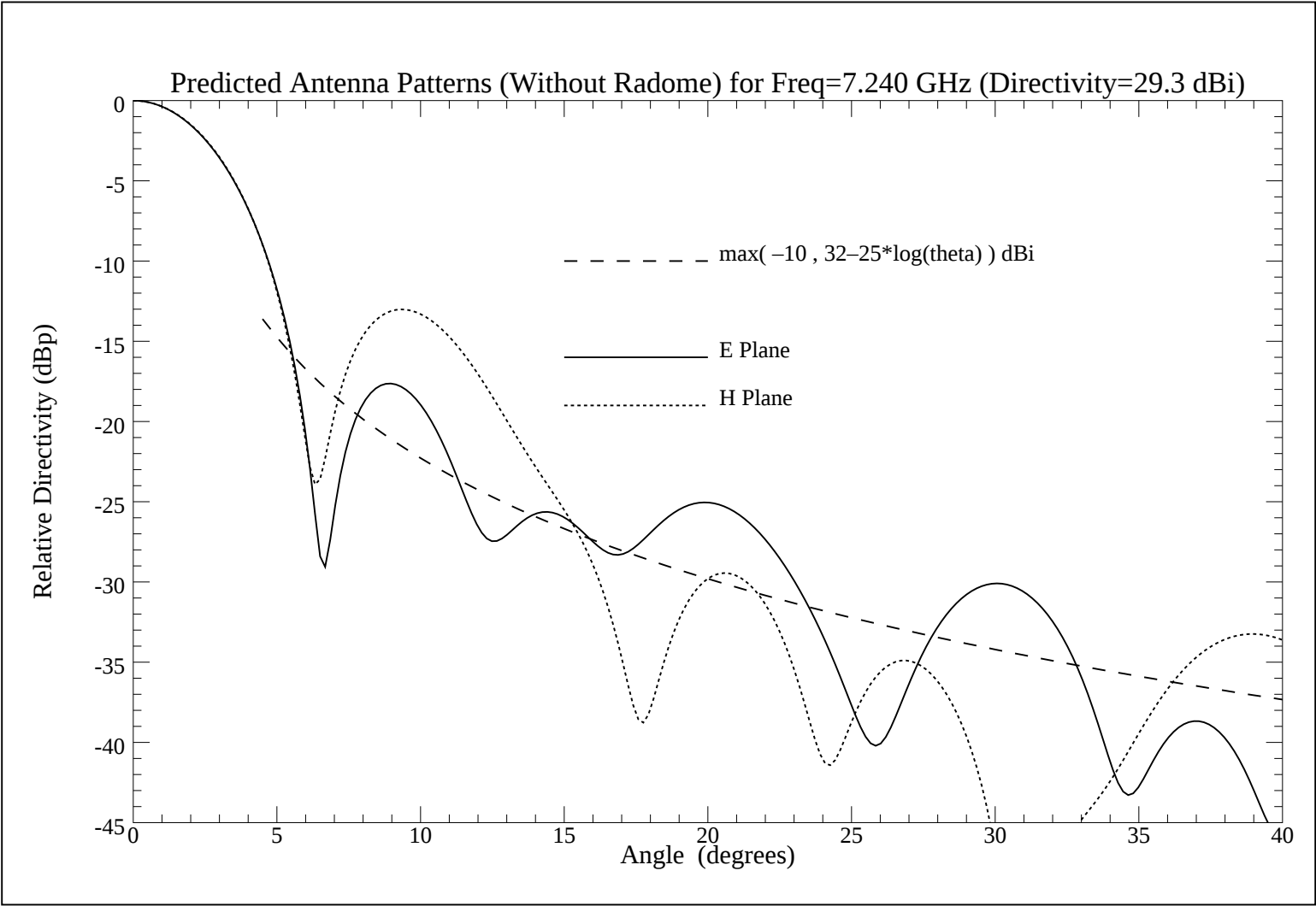


Figure 2: Antenna Patterns for 7.240 GHz

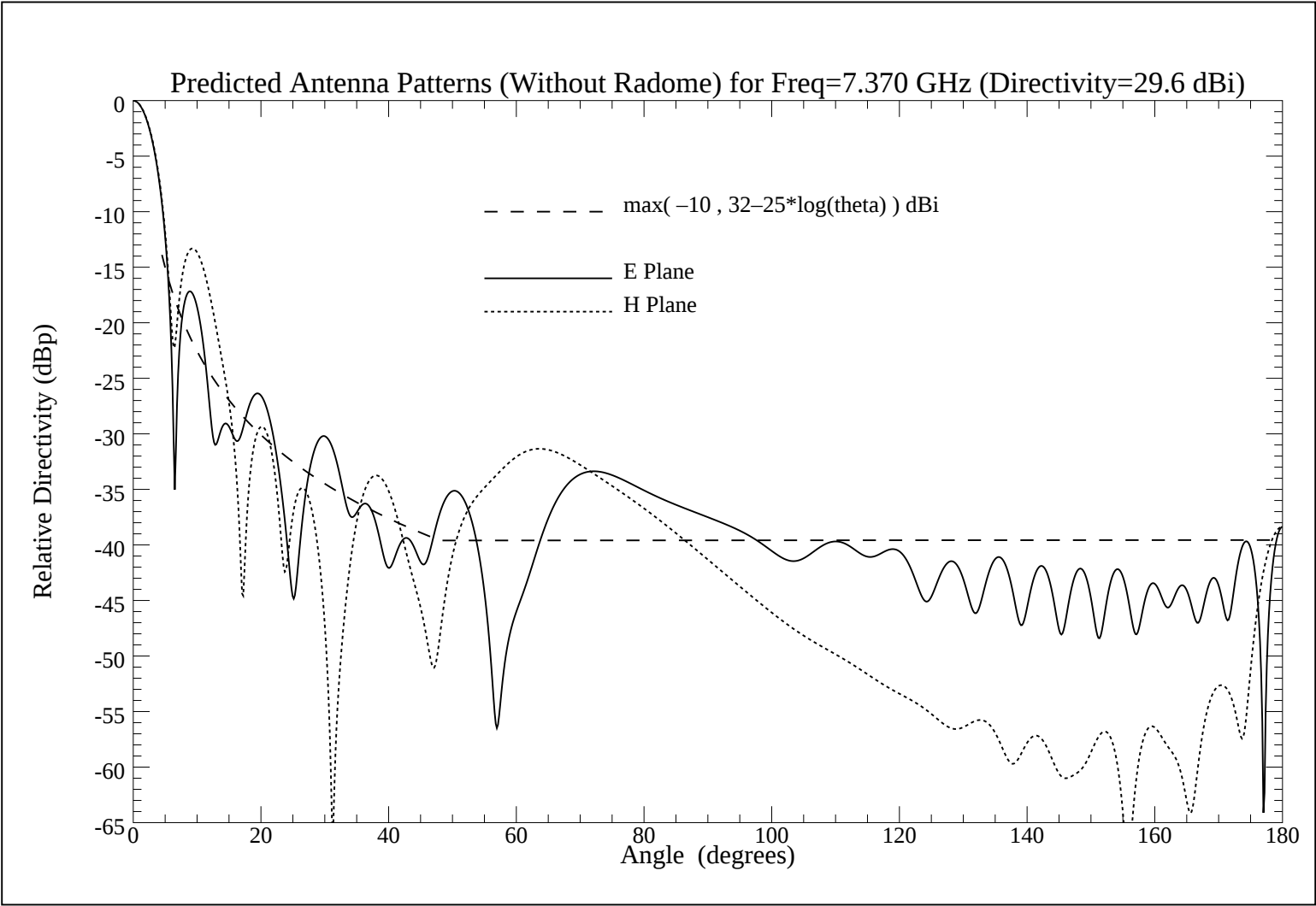


Figure 3: Antenna Patterns for 7.370 GHz

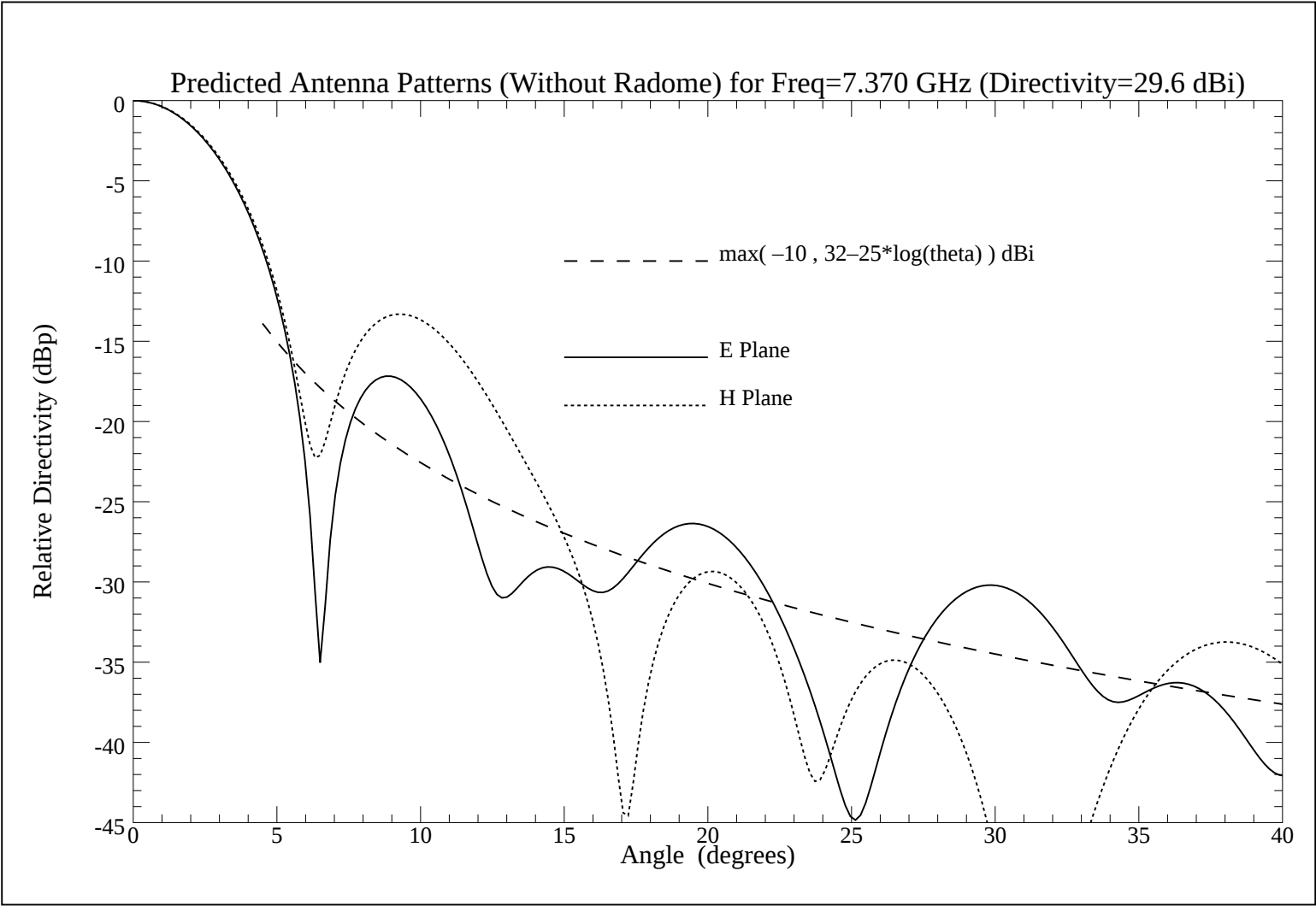


Figure 4: Antenna Patterns for 7.370 GHz

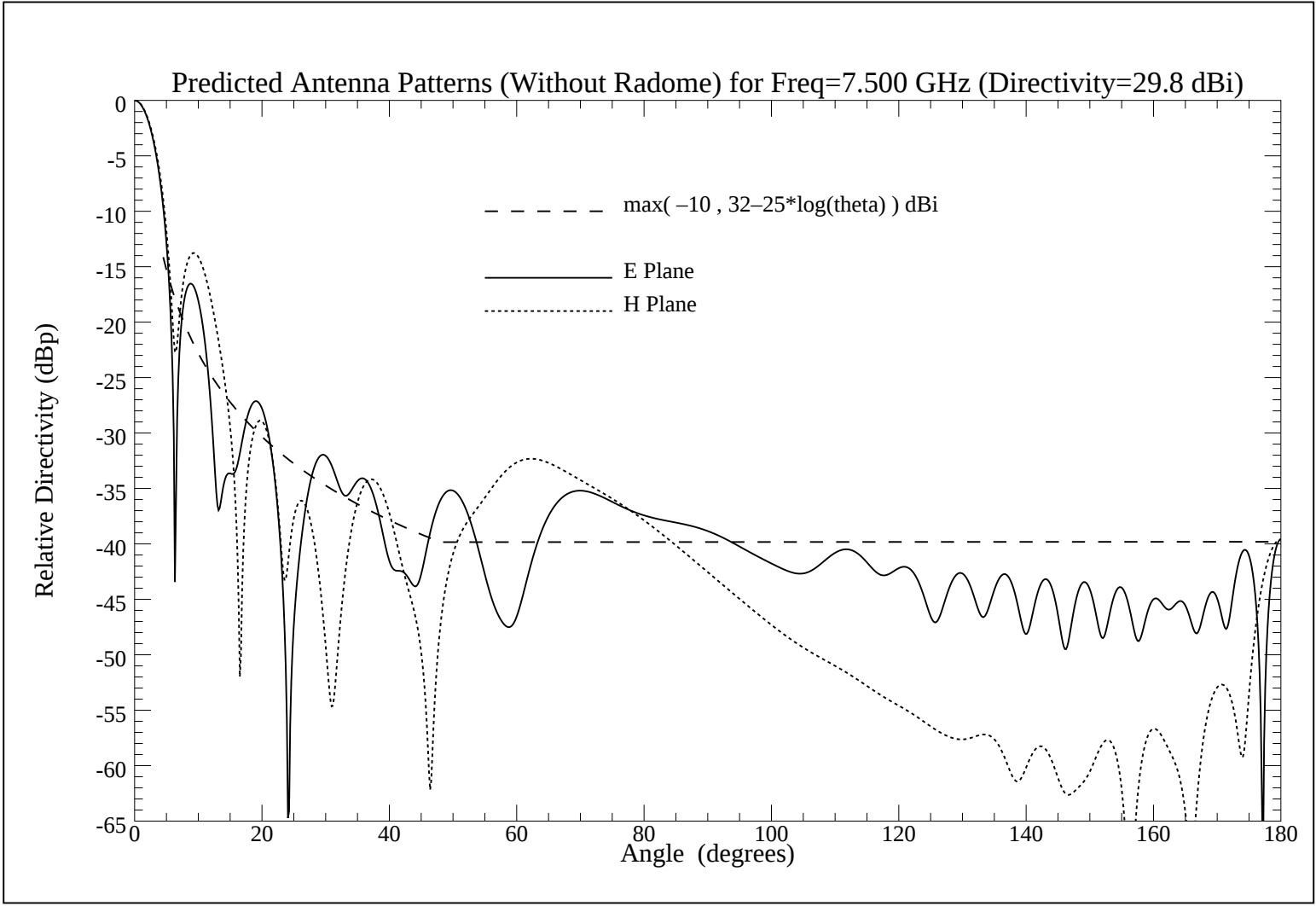


Figure 5: Antenna Patterns for 7.500 GHz

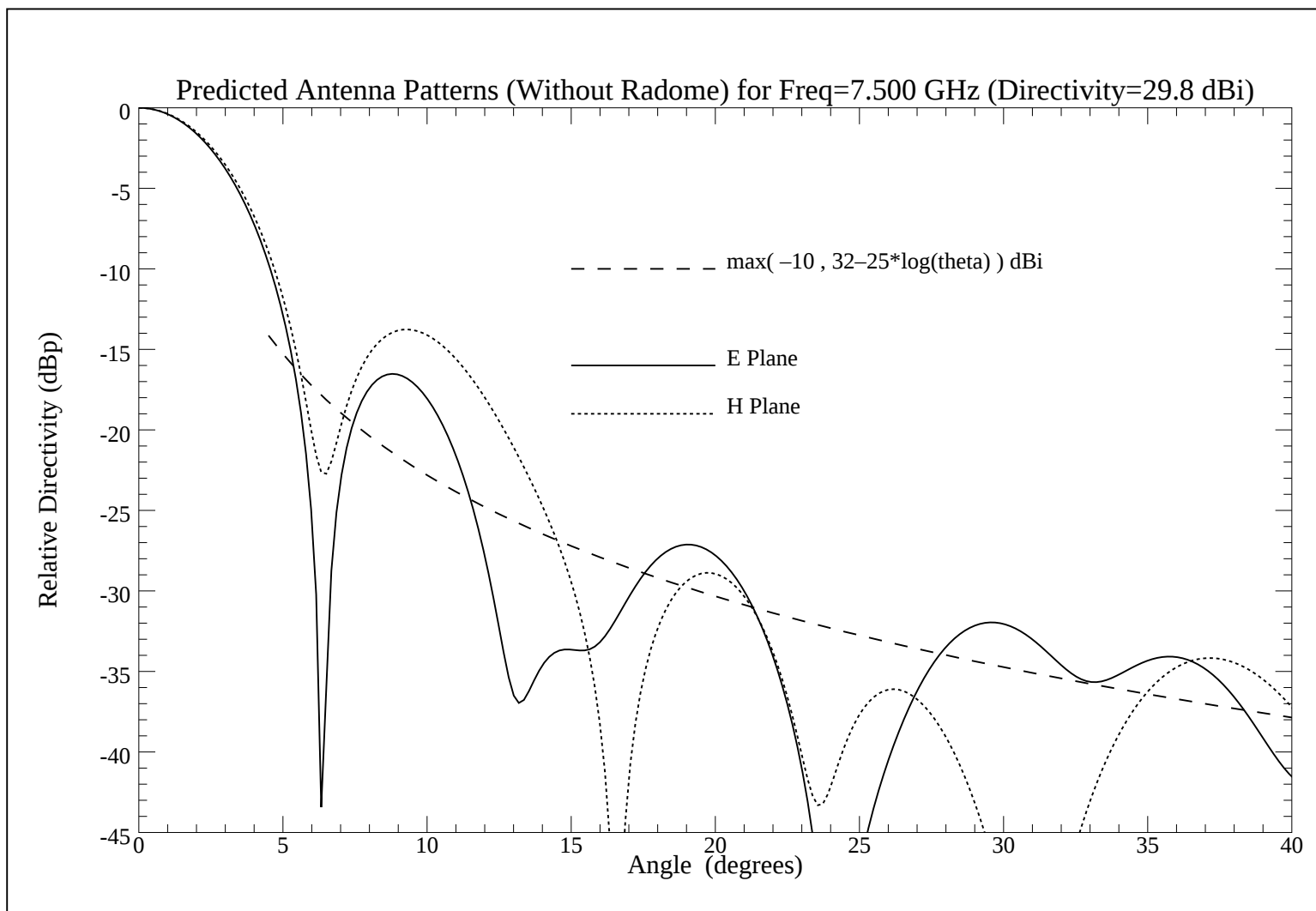


Figure 6: Antenna Patterns for 7.500 GHz

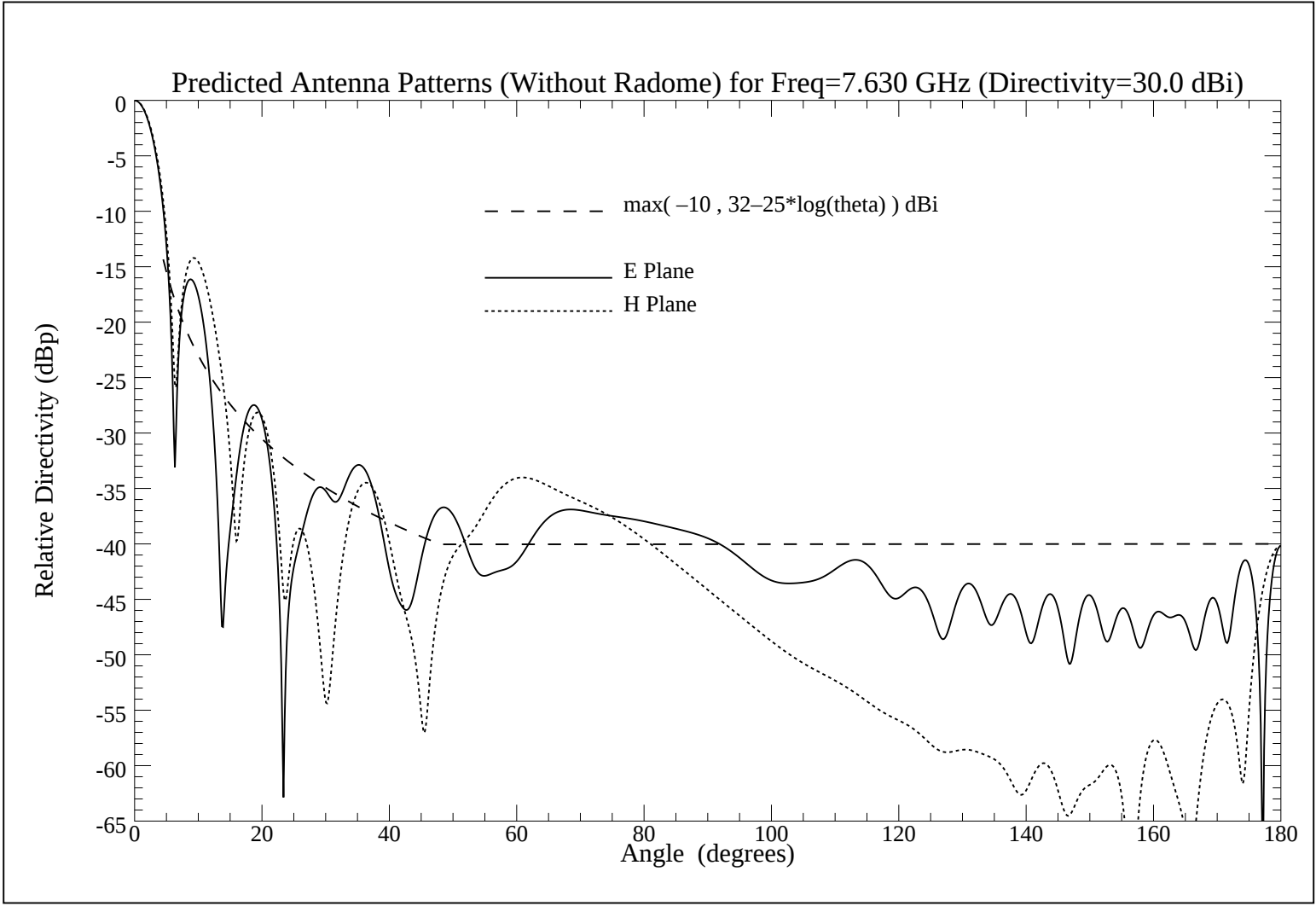


Figure 7: Antenna Patterns for 7.630 GHz

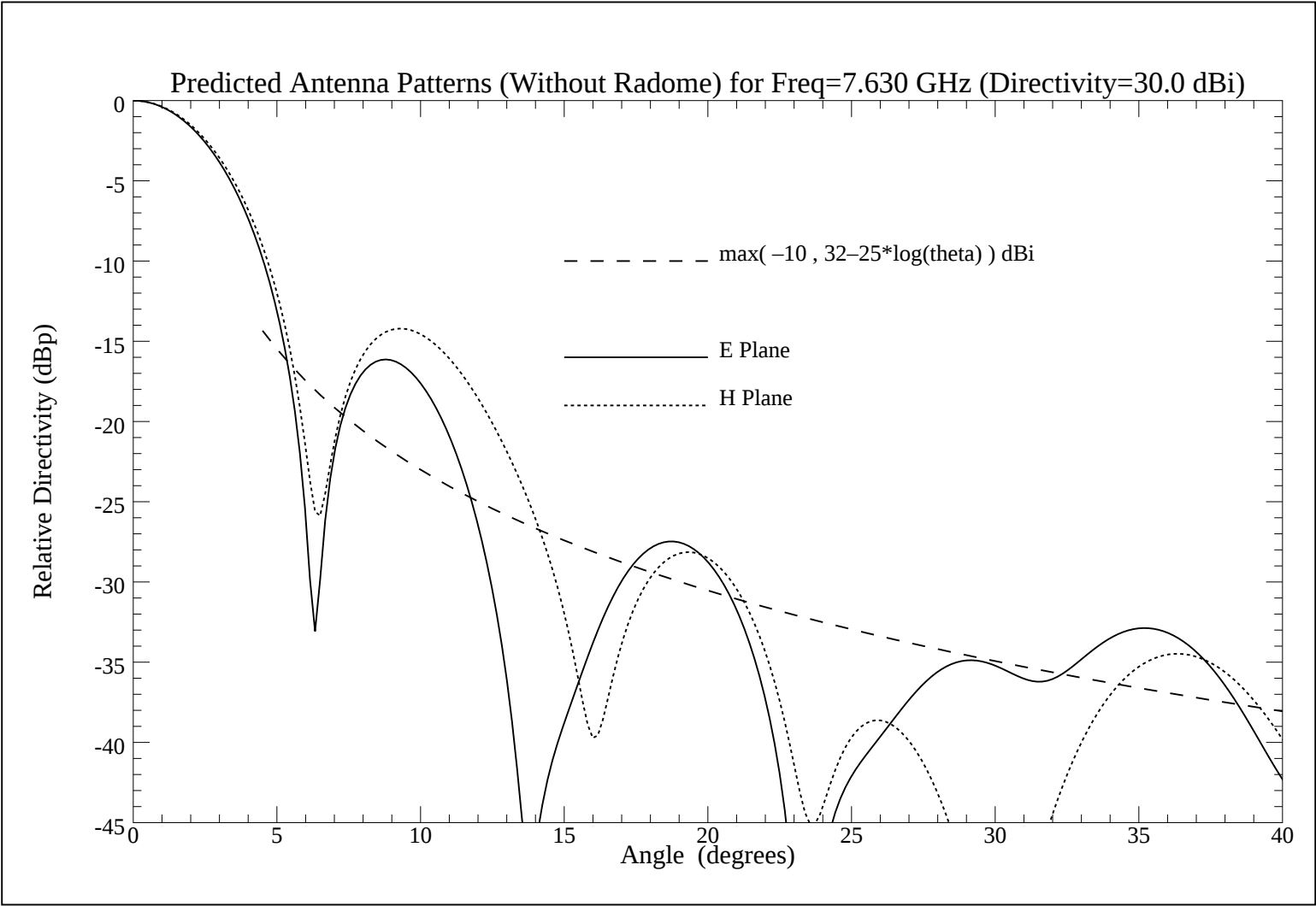


Figure 8: Antenna Patterns for 7.630 GHz

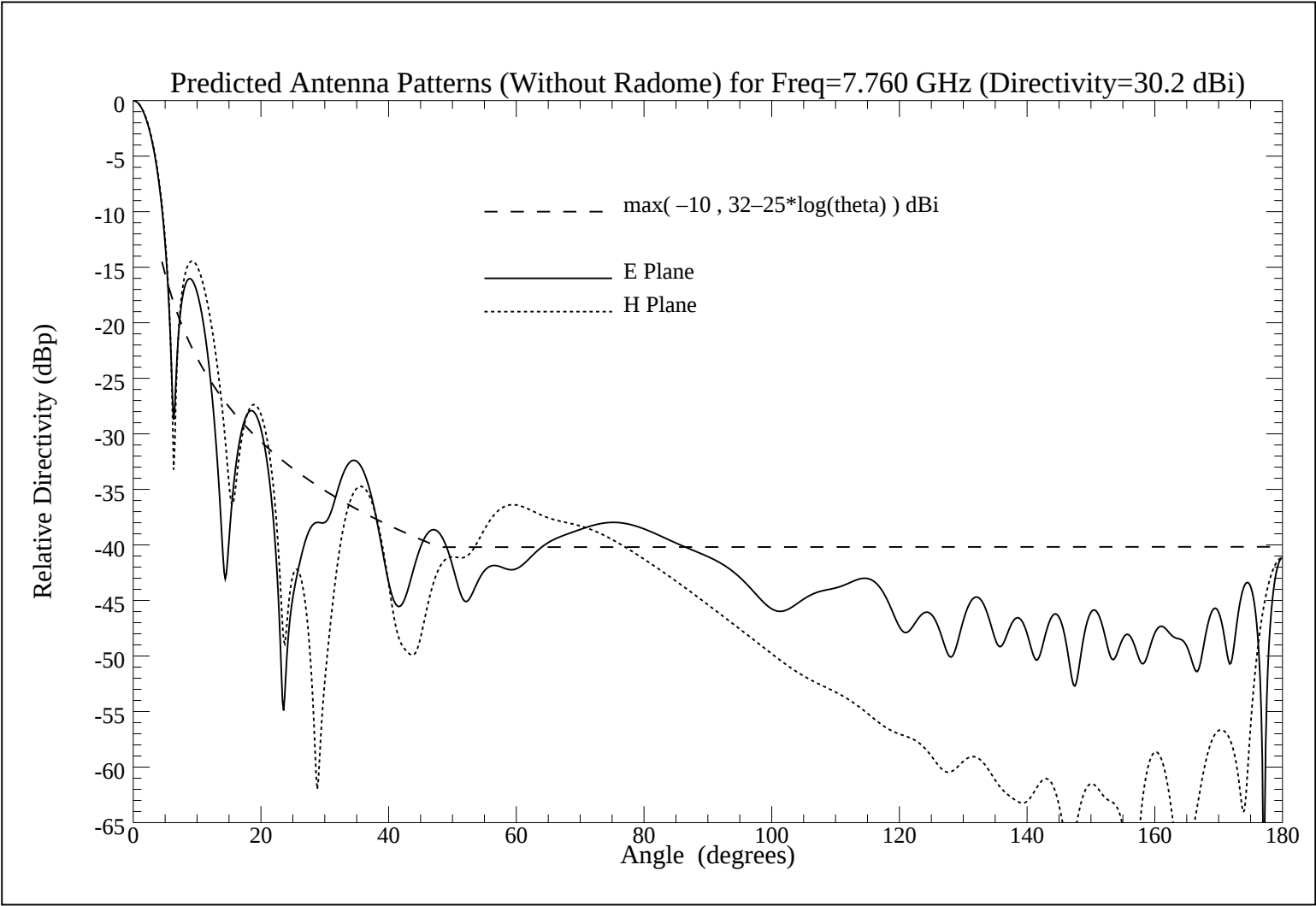


Figure 9: Antenna Patterns for 7.760 GHz

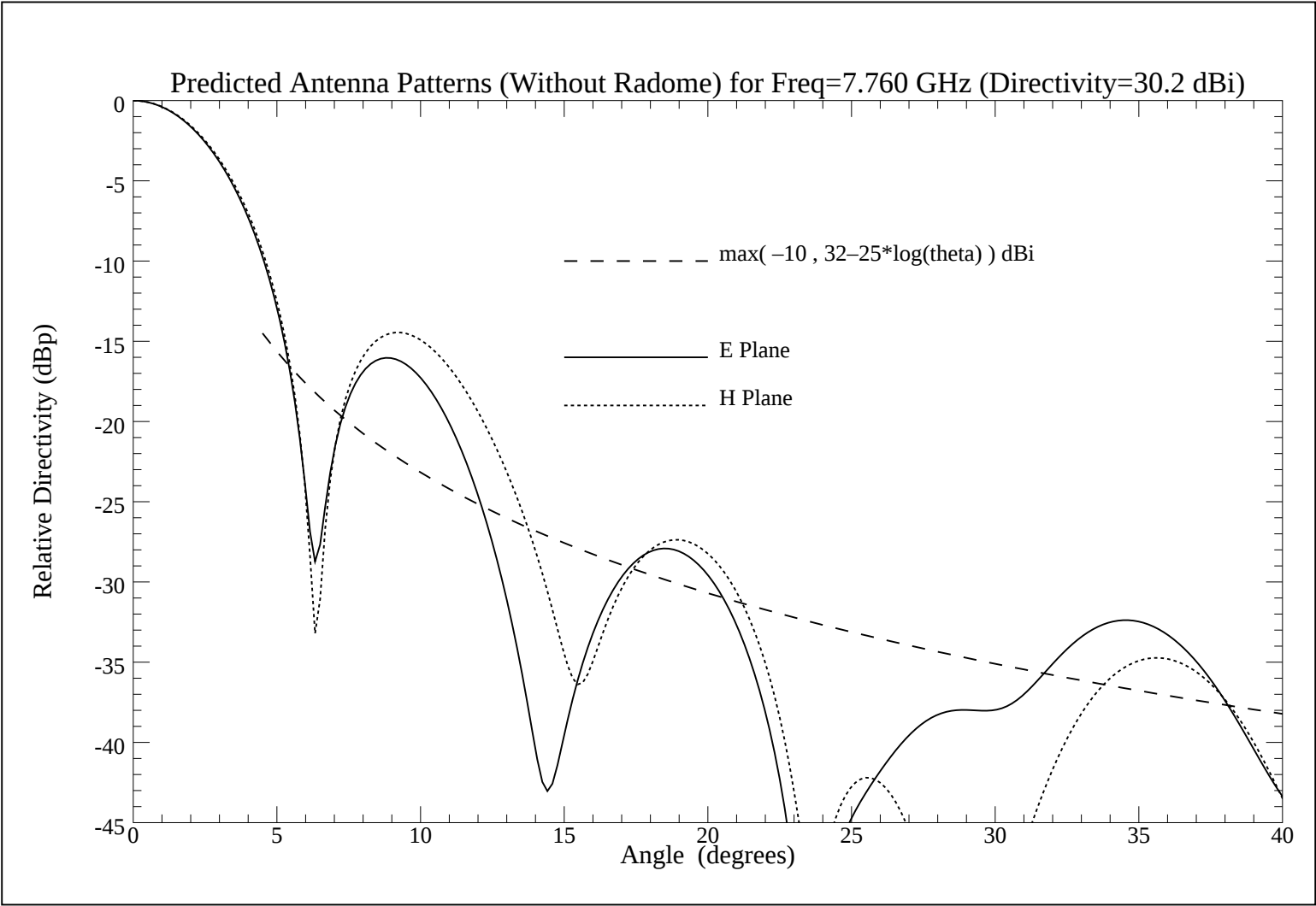


Figure 10: Antenna Patterns for 7.760 GHz

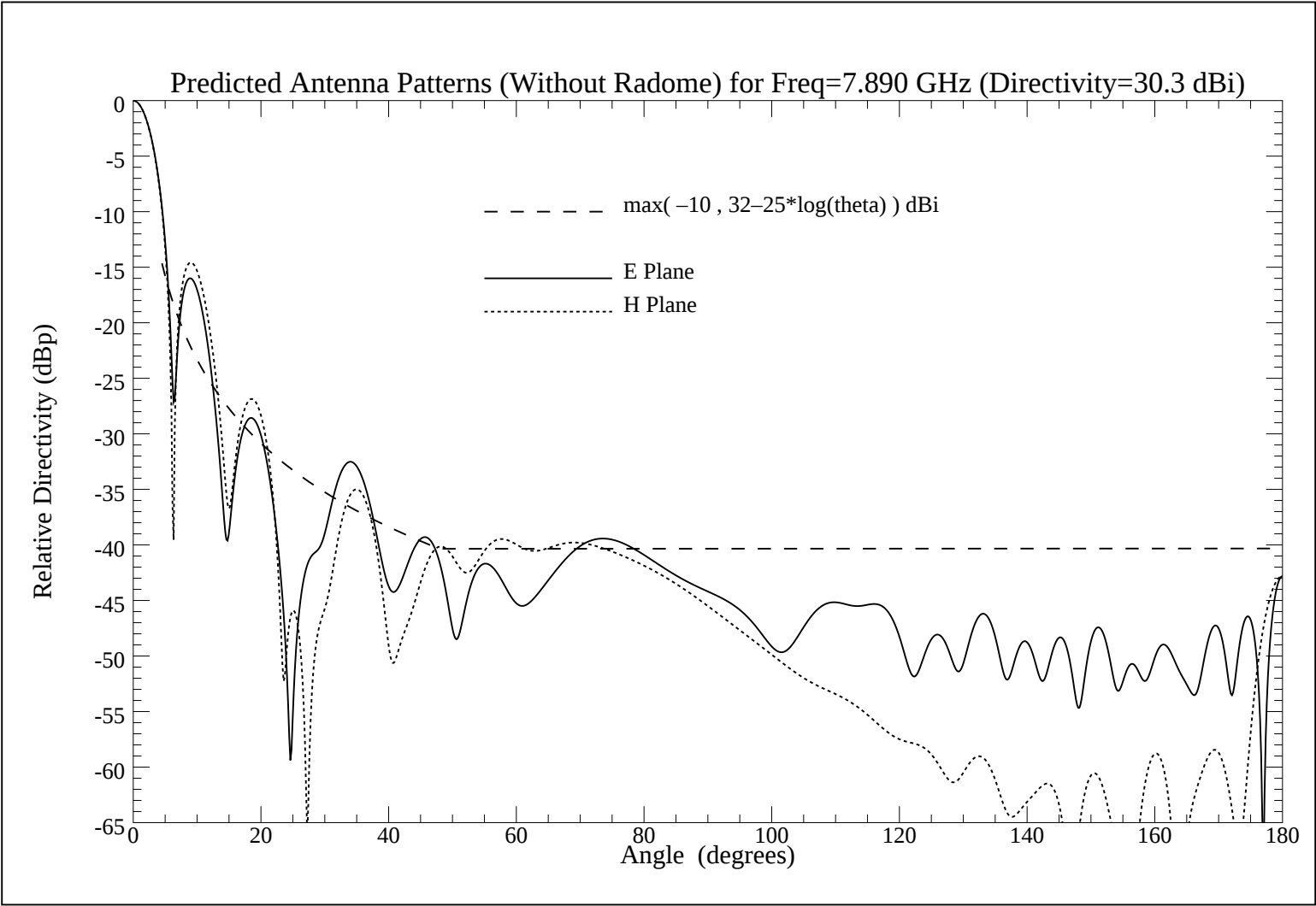


Figure 11: Antenna Patterns for 7.890 GHz

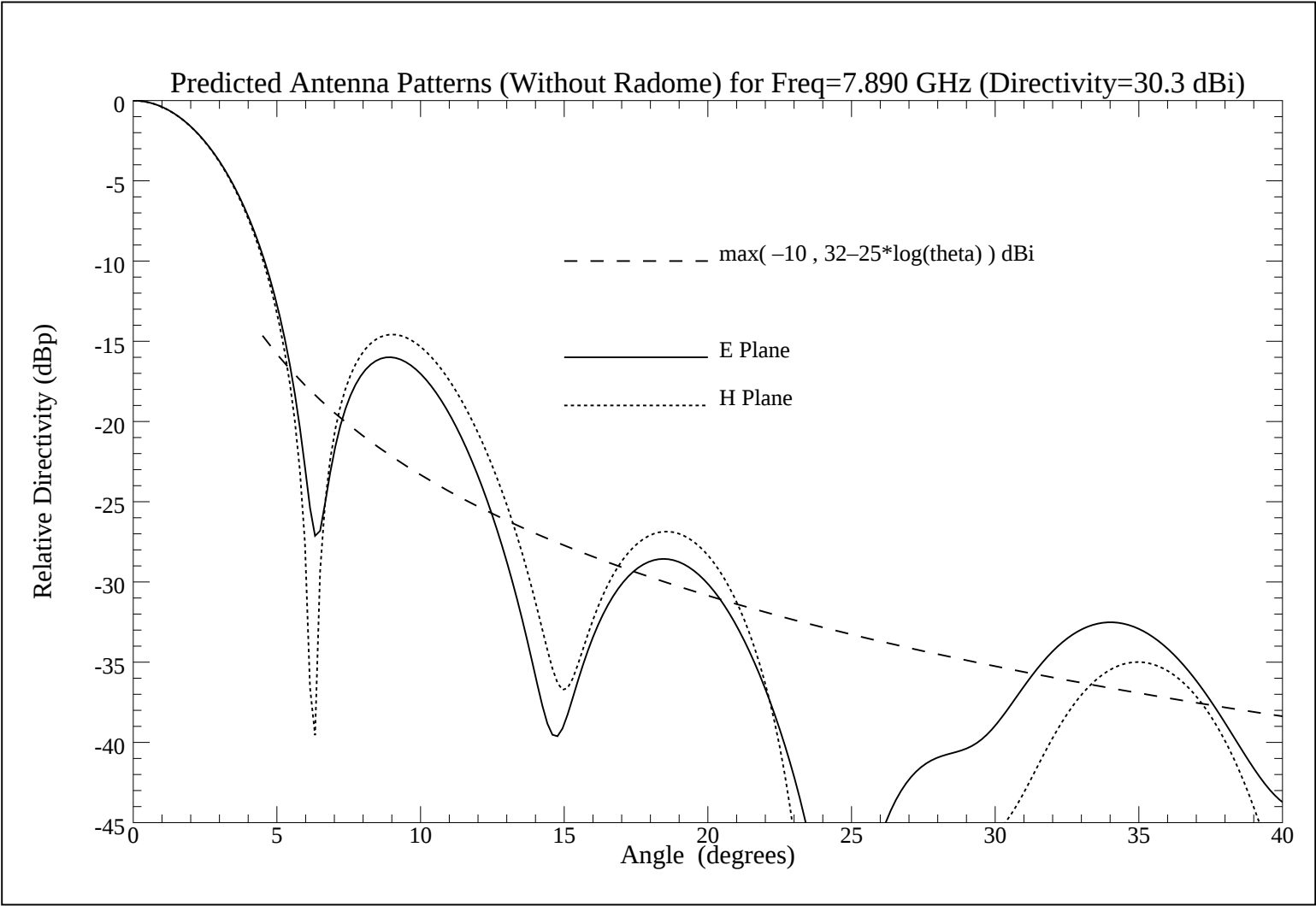


Figure 12: Antenna Patterns for 7.890 GHz

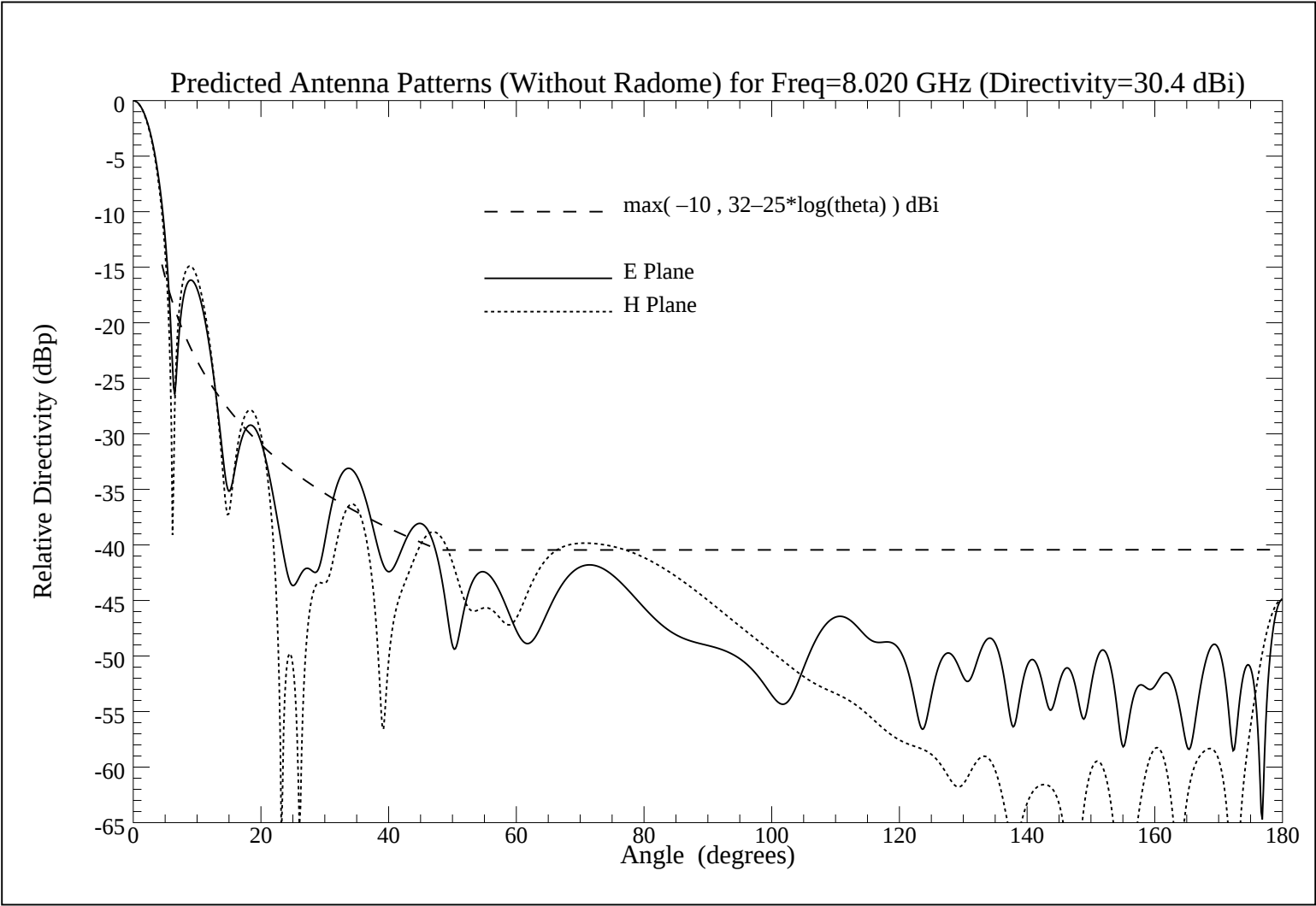


Figure 13: Antenna Patterns for 8.020 GHz

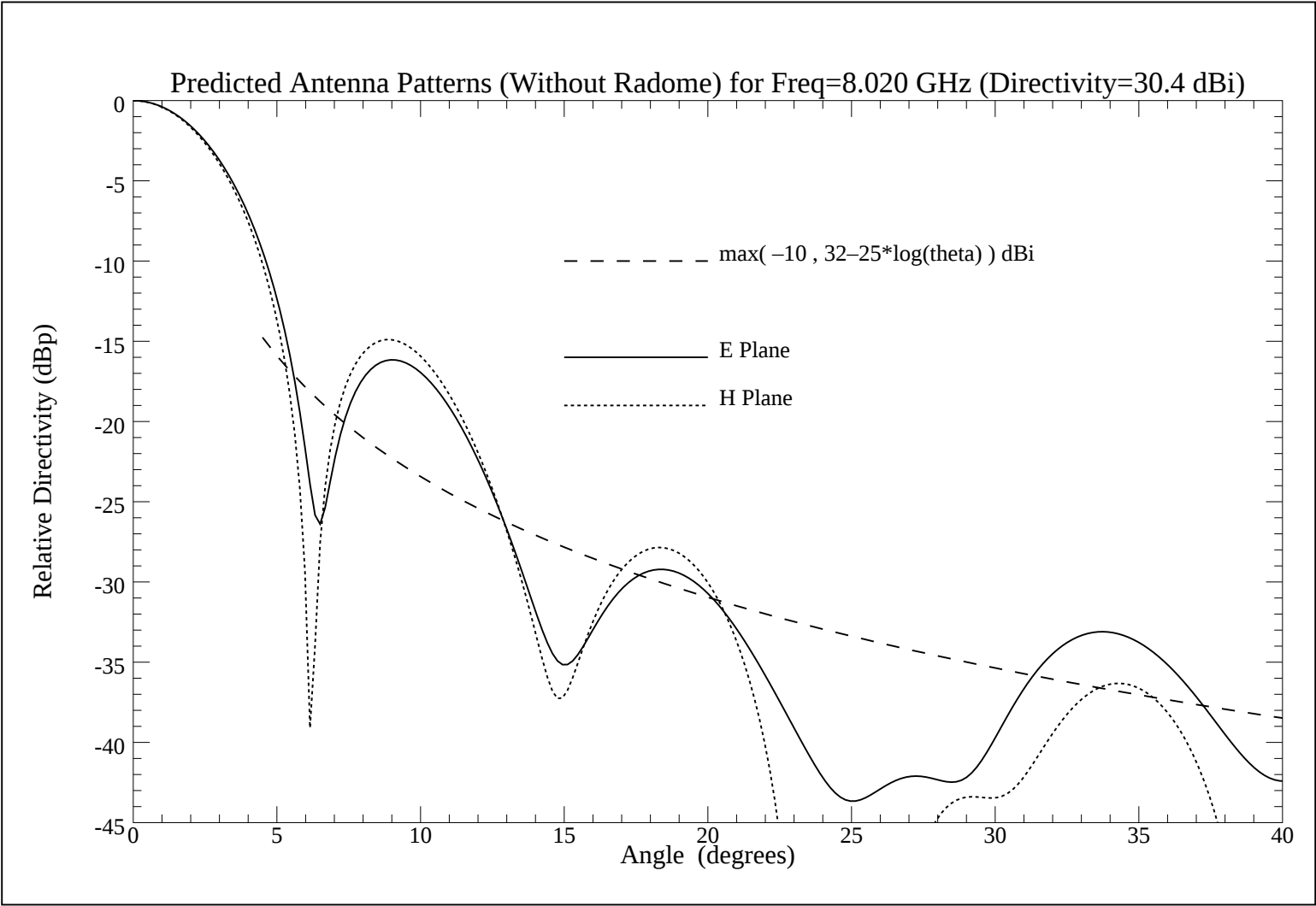


Figure 14: Antenna Patterns for 8.020 GHz

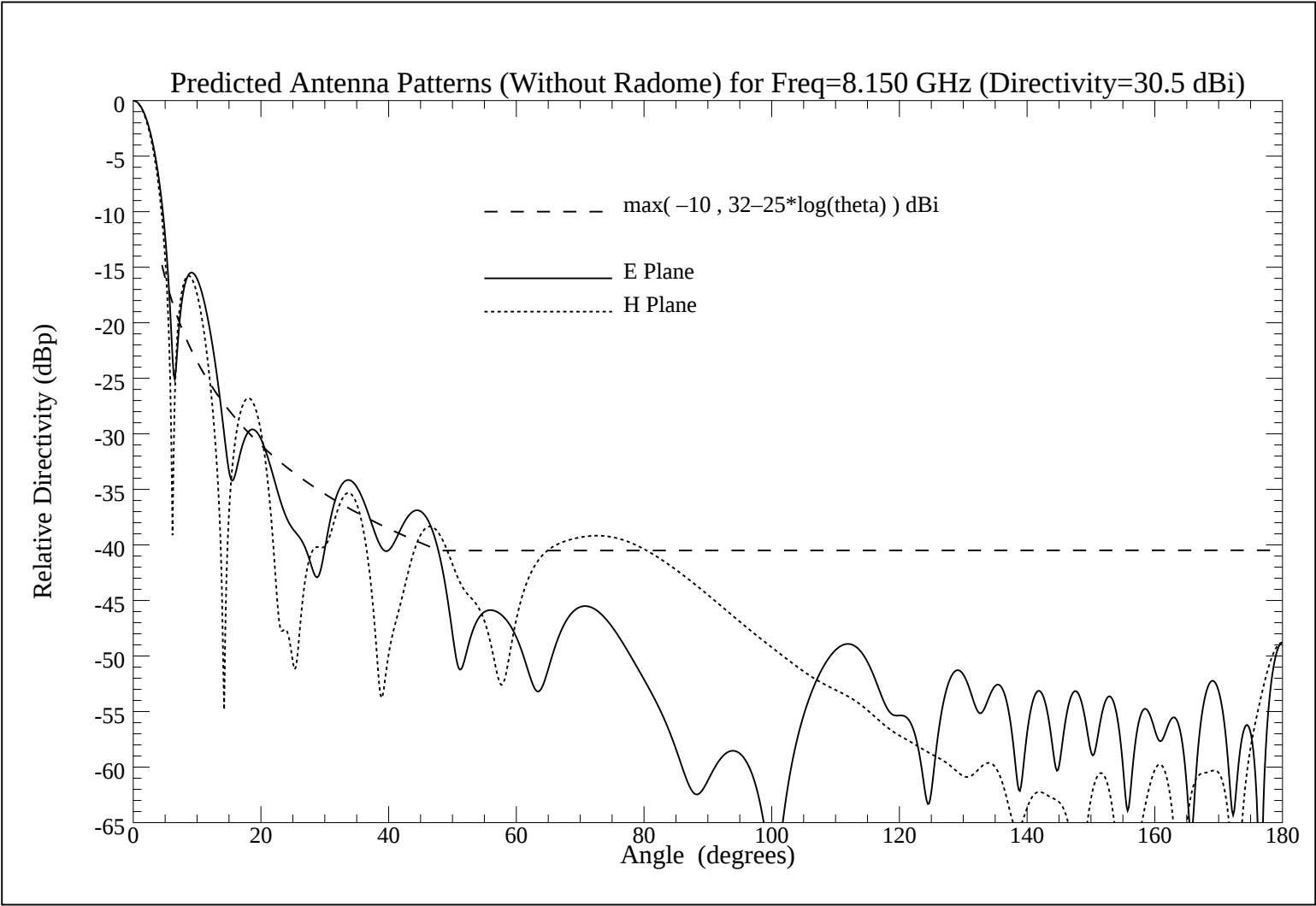


Figure 15: Antenna Patterns for 8.150 GHz

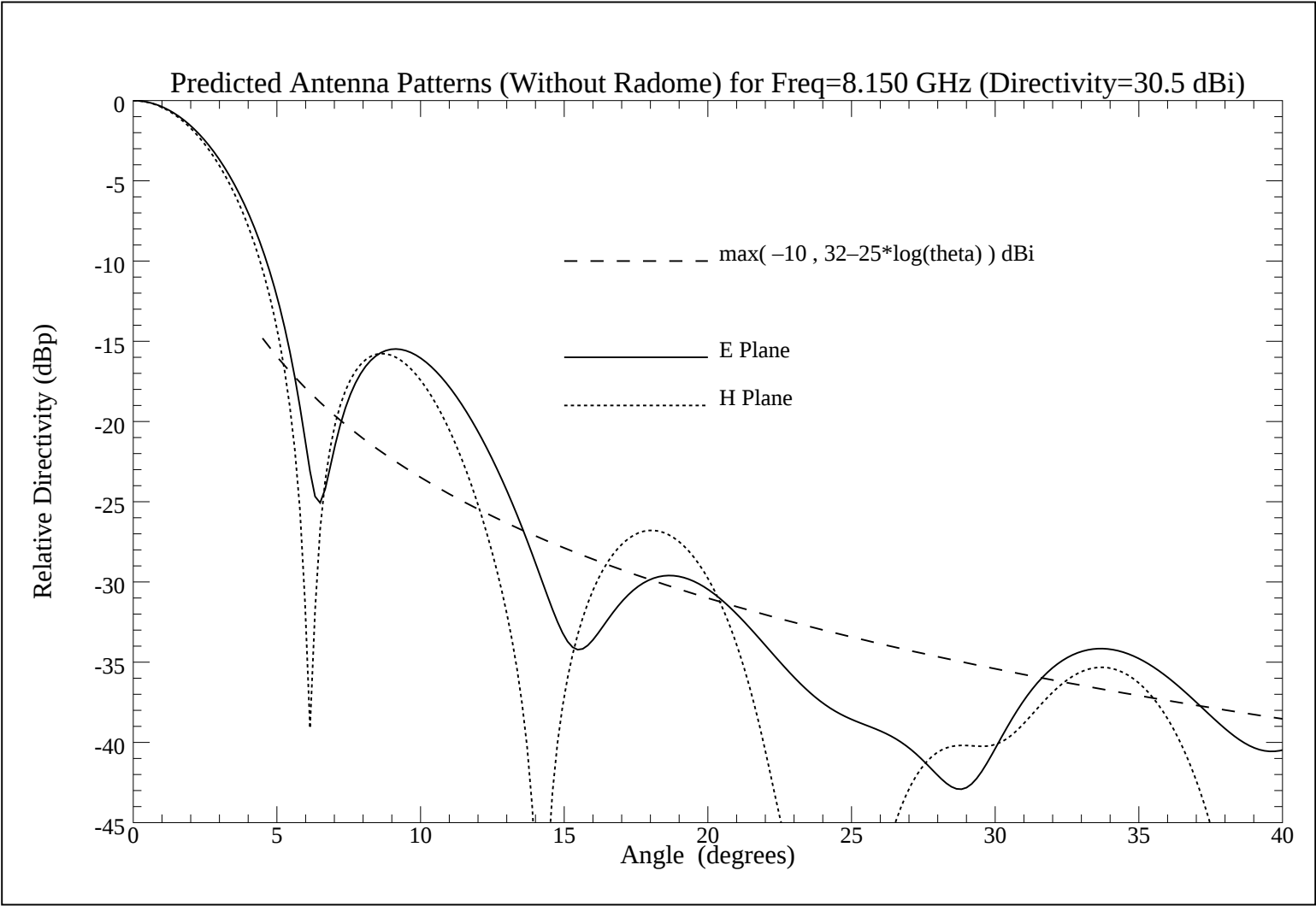


Figure 16: Antenna Patterns for 8.150 GHz

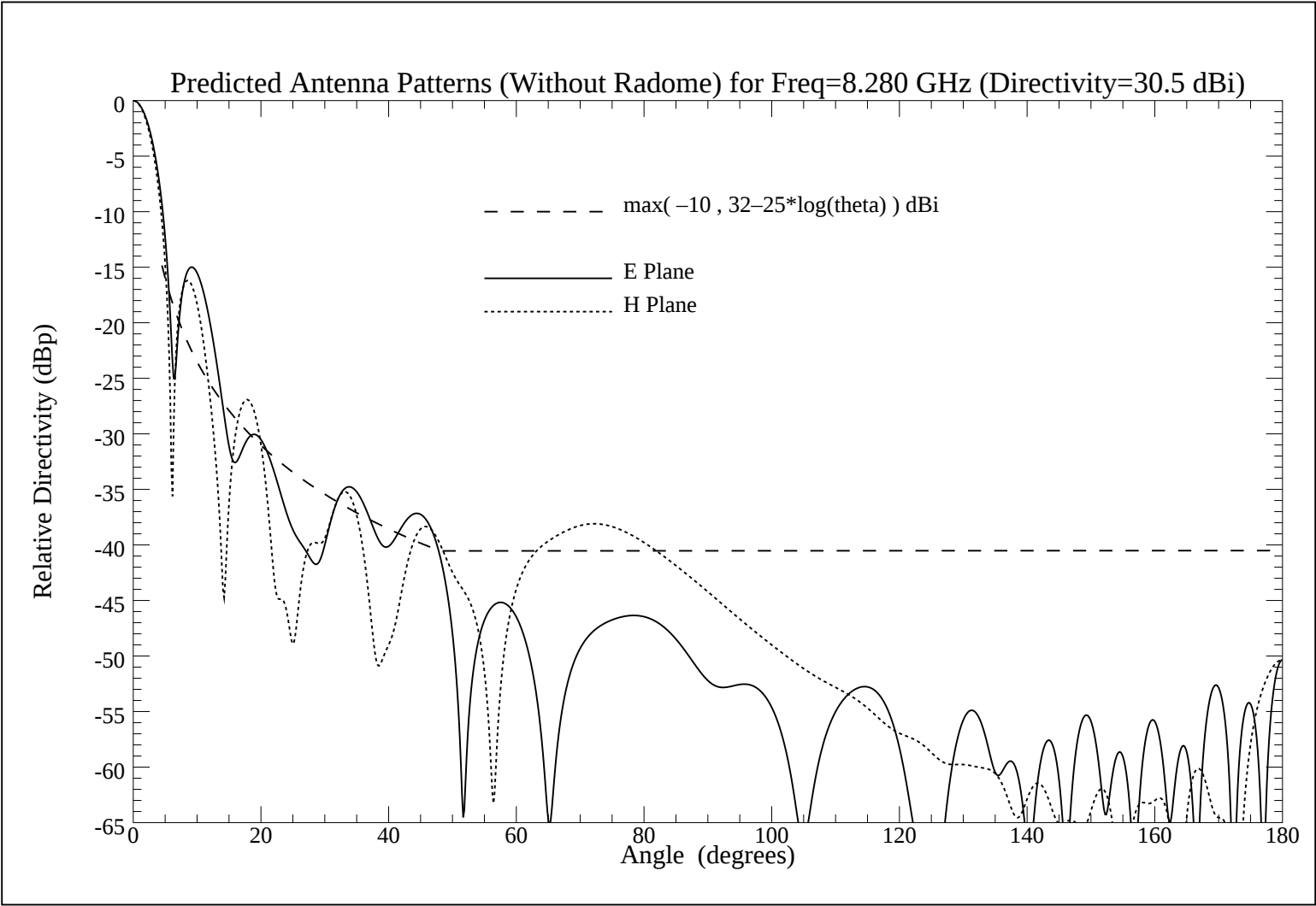


Figure 17: Antenna Patterns for 8.280 GHz

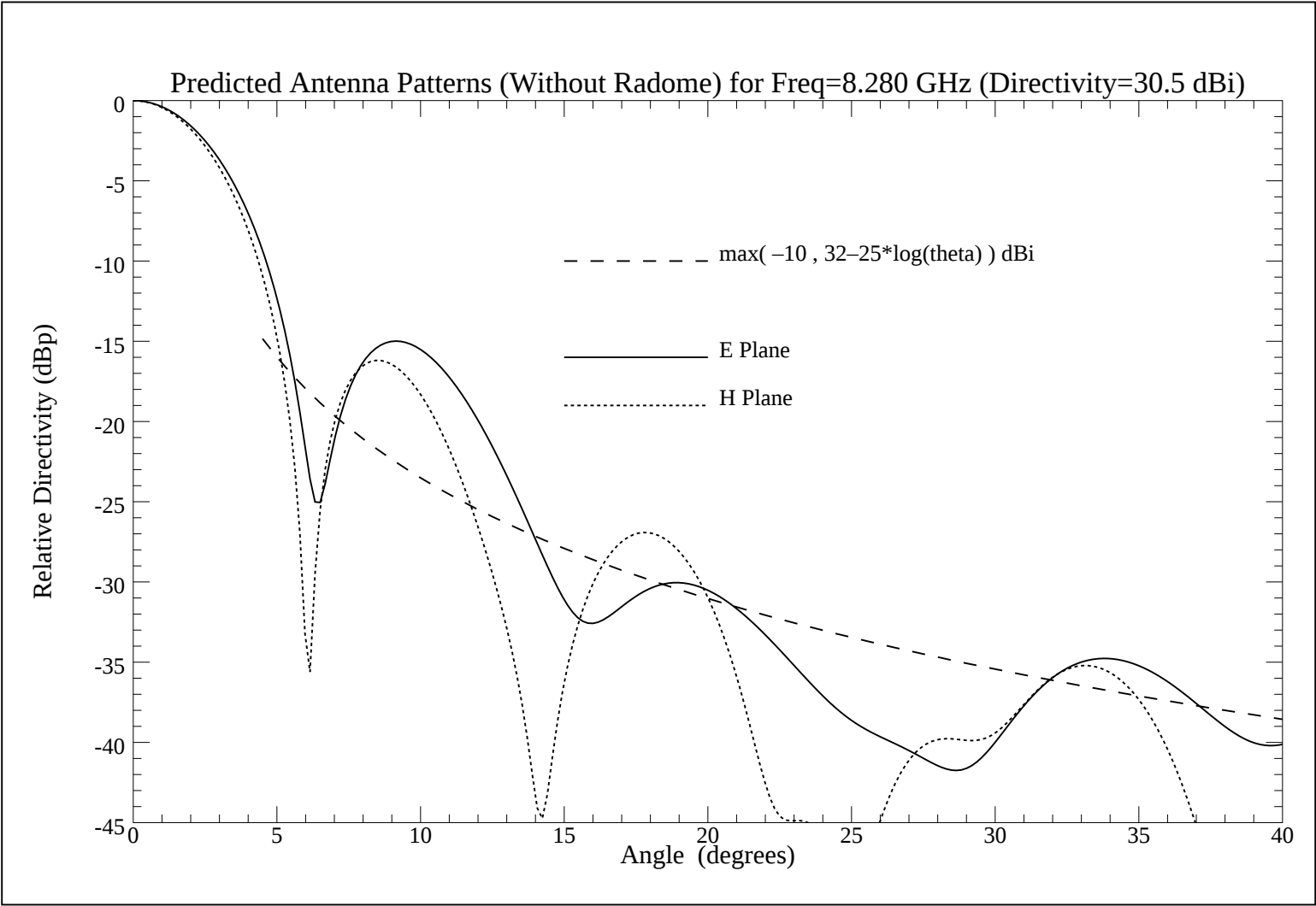


Figure 18: Antenna Patterns for 8.280 GHz

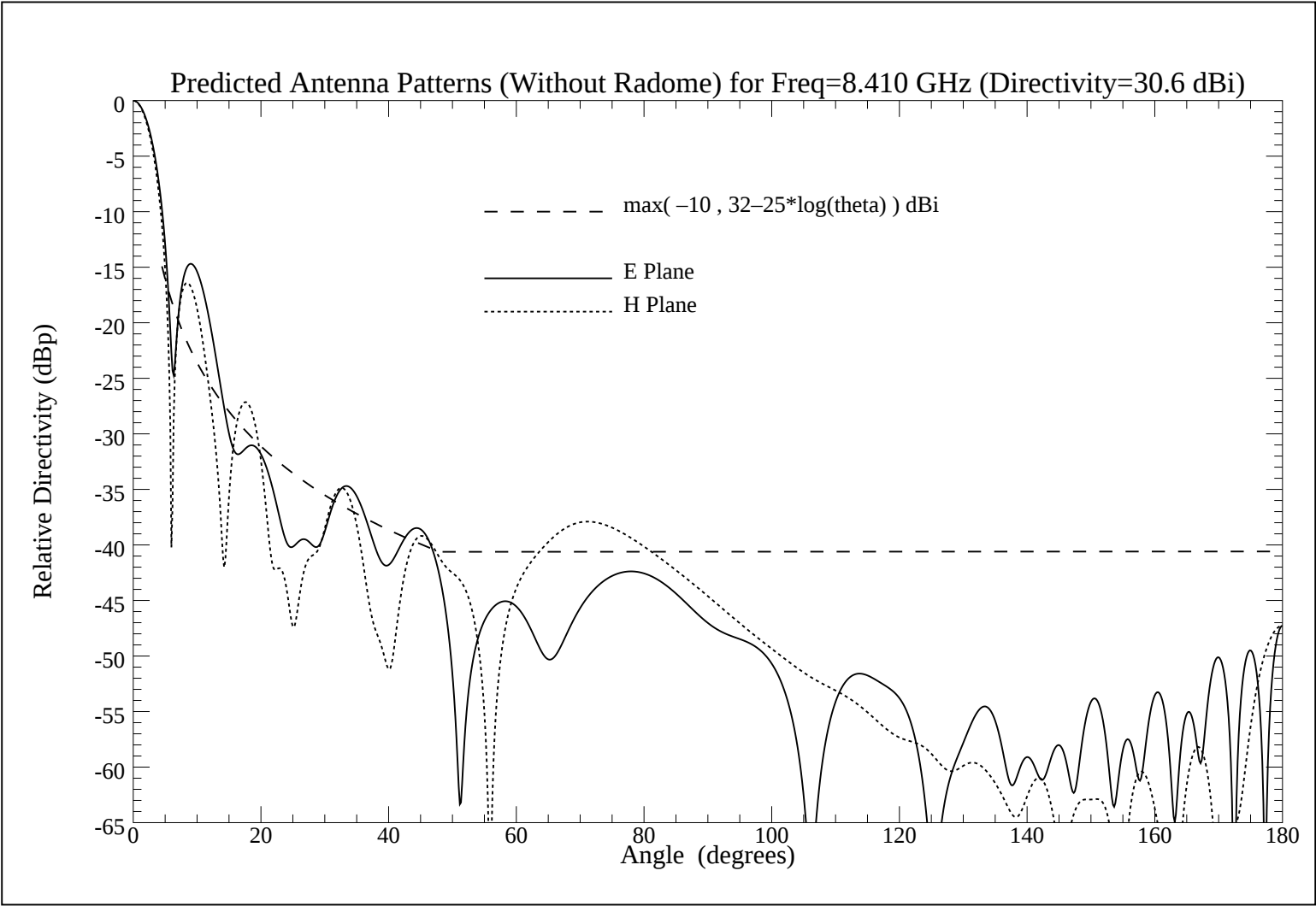


Figure 19: Antenna Patterns for 8.410 GHz

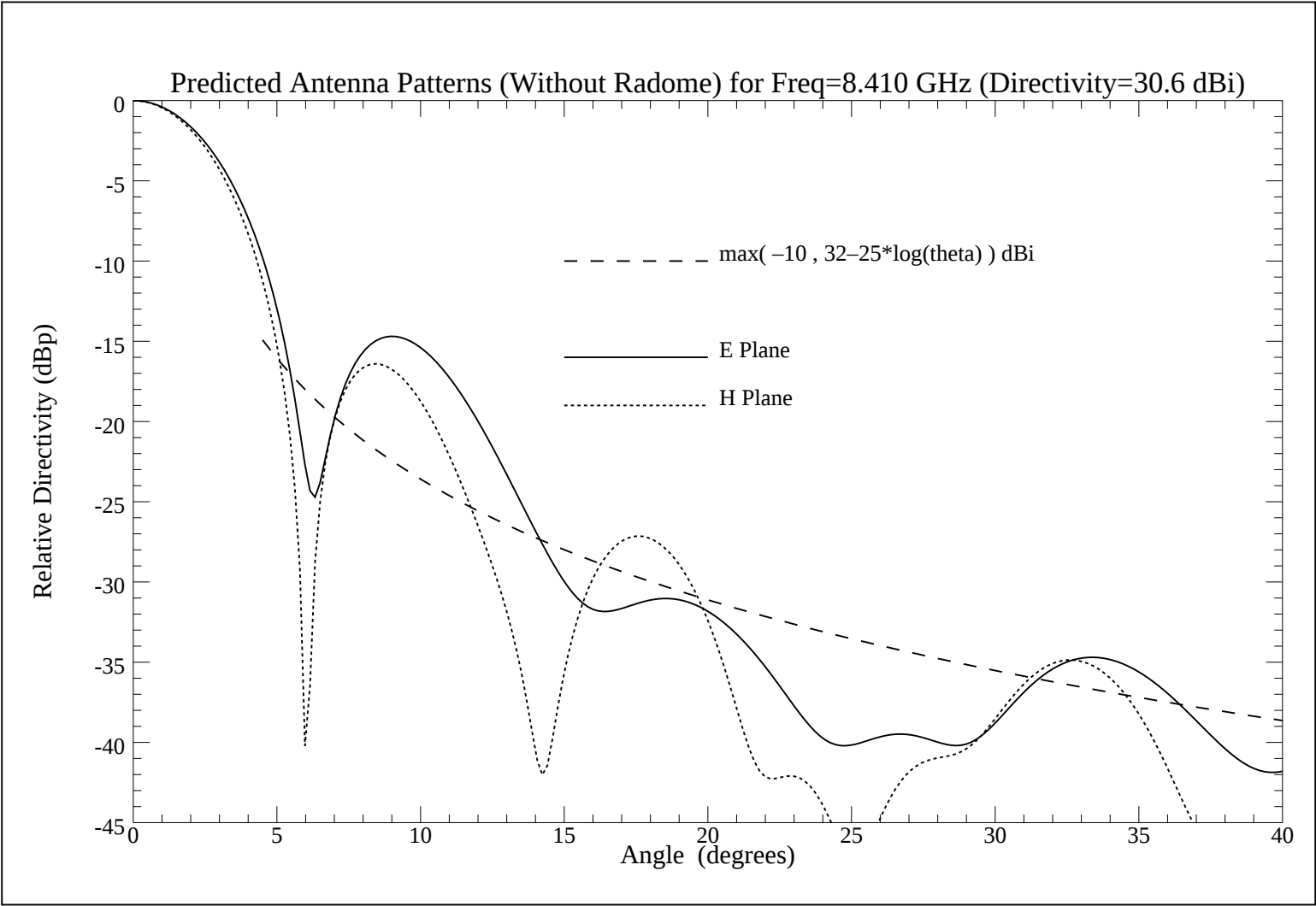


Figure 20: Antenna Patterns for 8.410 GHz

2.3 Predicted CP Patterns and Linear Patterns on the 45° Plane

Example predicted patterns are shown in Figures 21 to 40. On each plot is shown a reference curve corresponding to:

$$\text{Gain} = \max(-10, 32 - 25 \log_{10}(\theta)) \text{ dBi} \quad (\theta \text{ in degrees})(2)$$

In plotting this curve, it is assumed that there are no losses in the antenna. If radome and waveguide losses are included, the antenna patterns will move down relative to this reference curve.

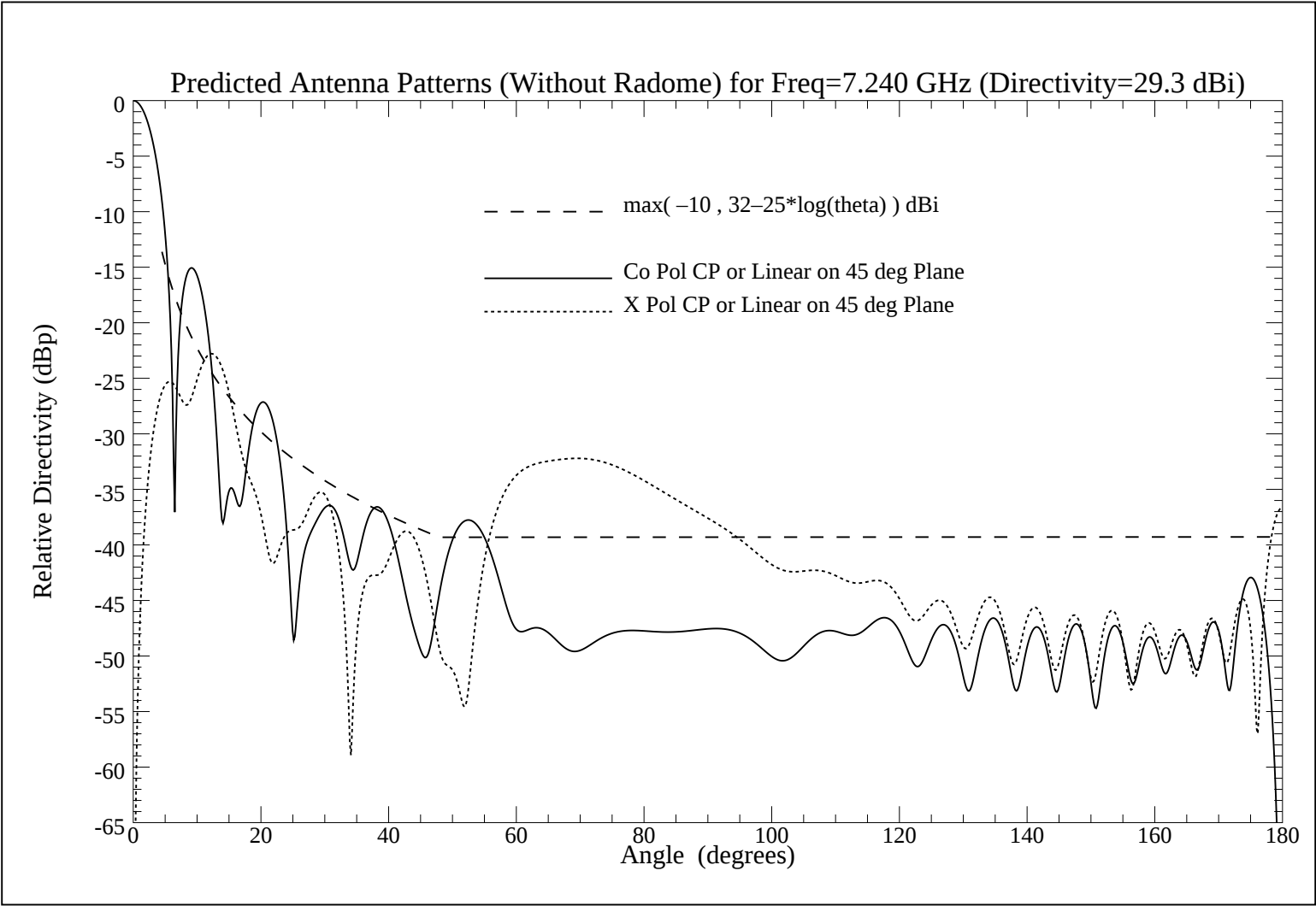


Figure 21: Antenna Patterns for 7.240 GHz

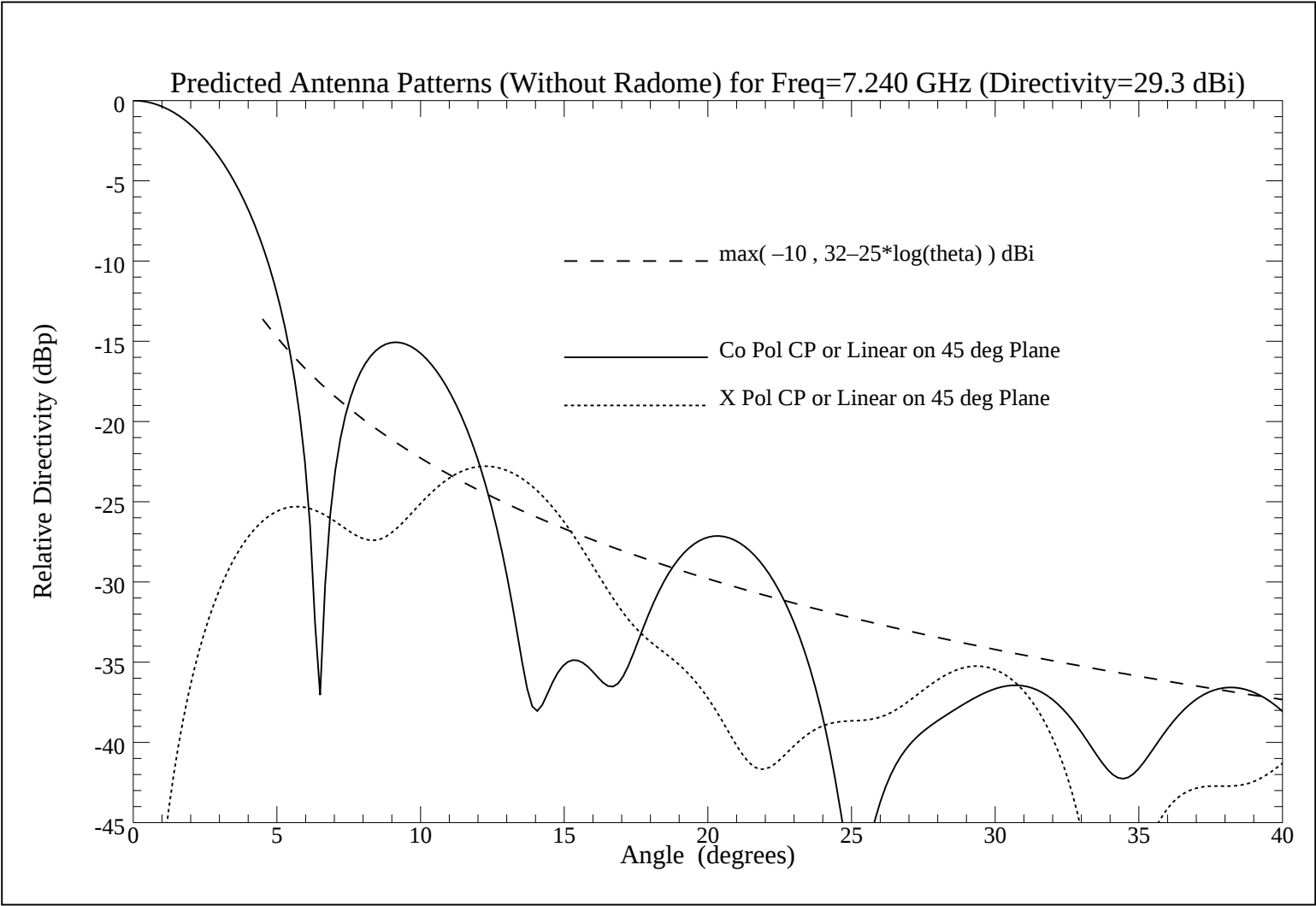


Figure 22: Antenna Patterns for 7.240 GHz

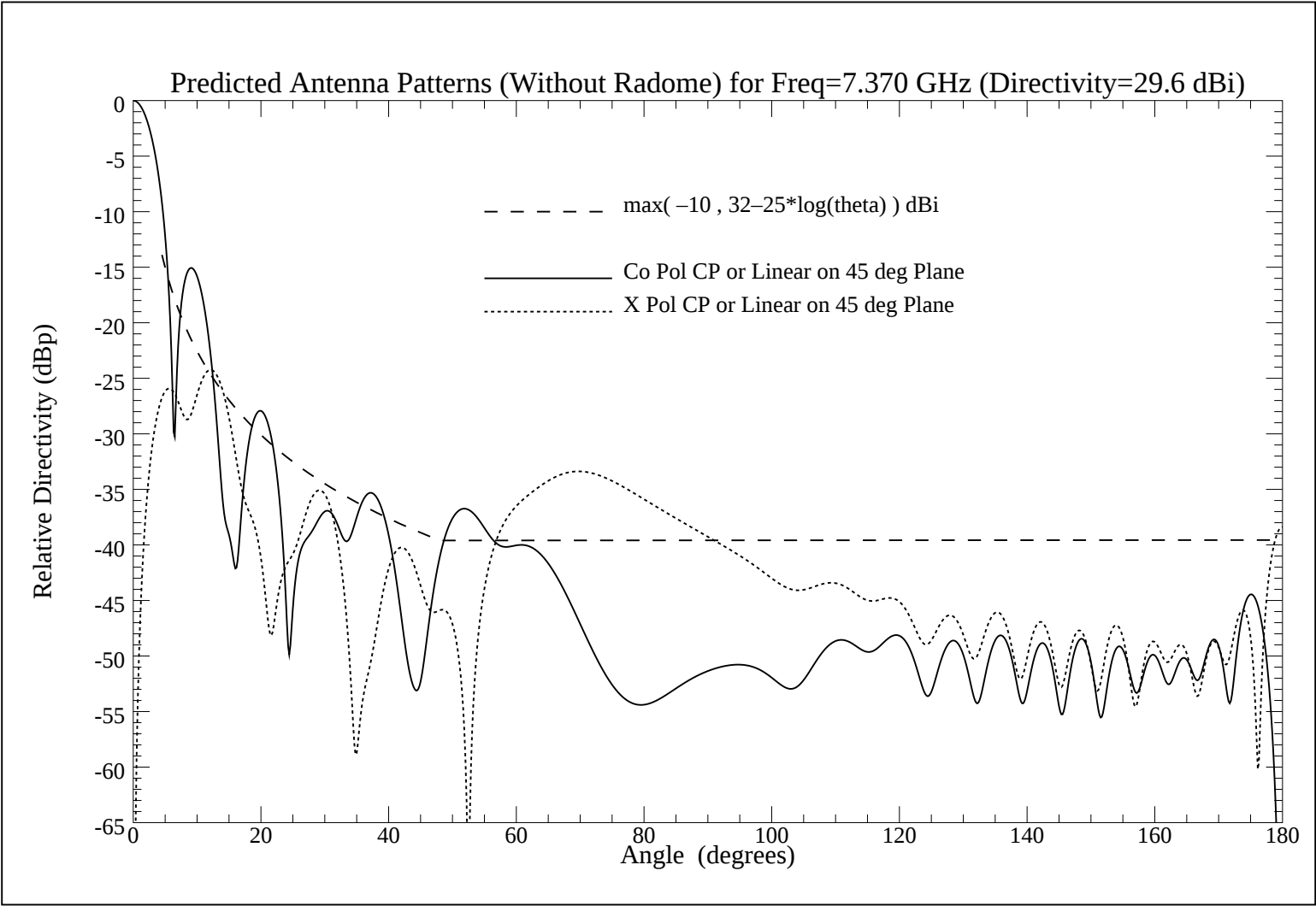


Figure 23: Antenna Patterns for 7.370 GHz

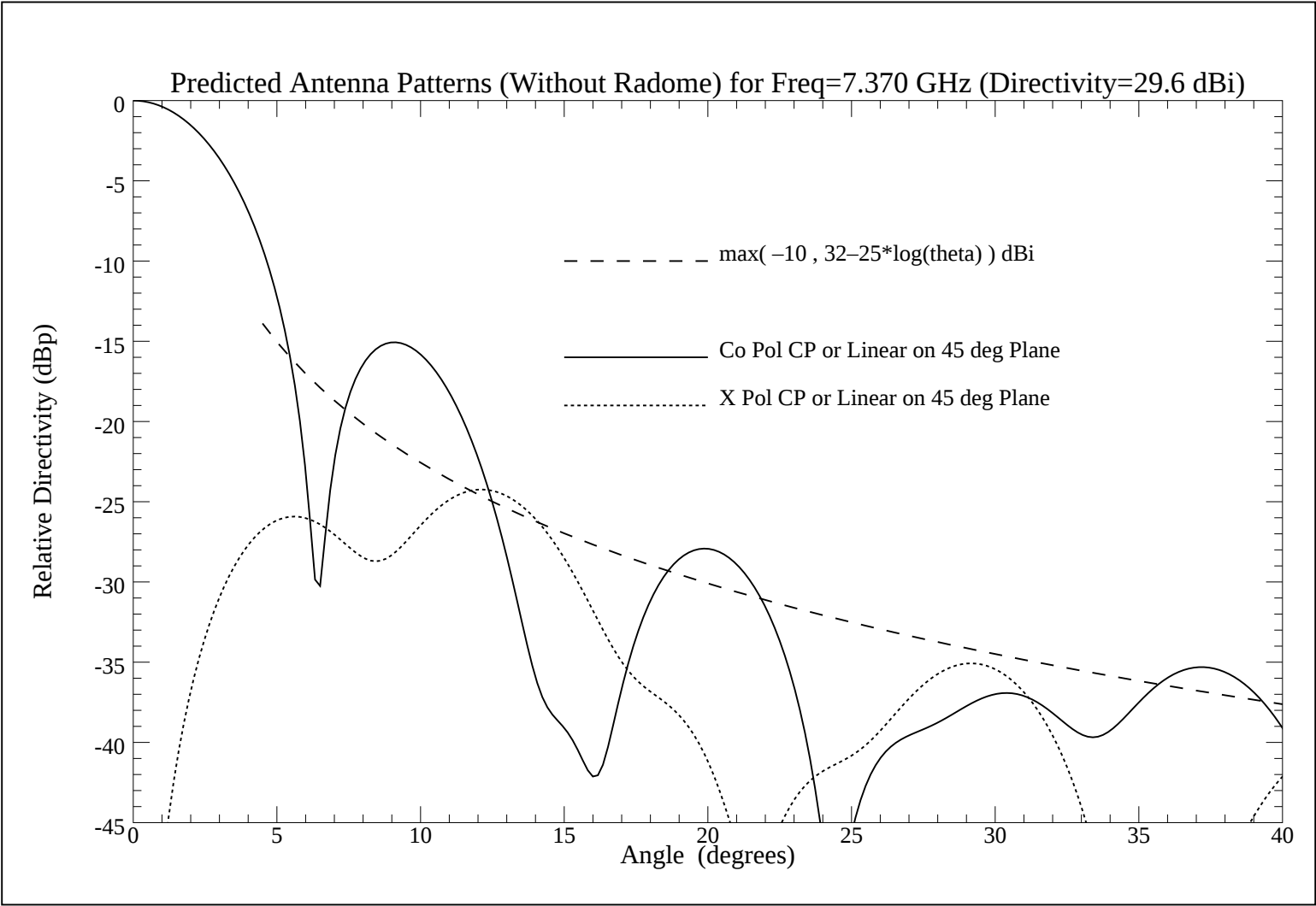


Figure 24: Antenna Patterns for 7.370 GHz

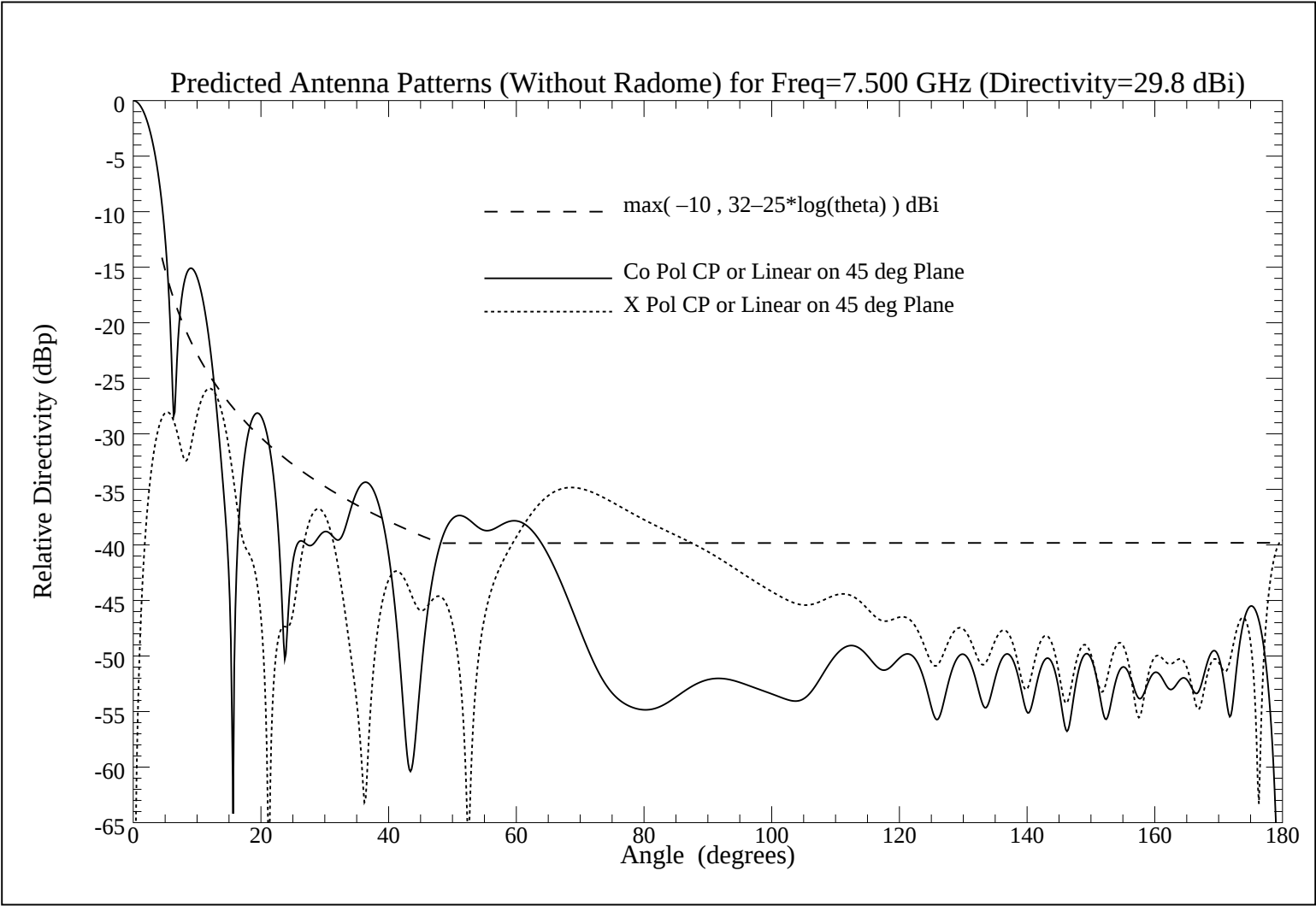


Figure 25: Antenna Patterns for 7.500 GHz

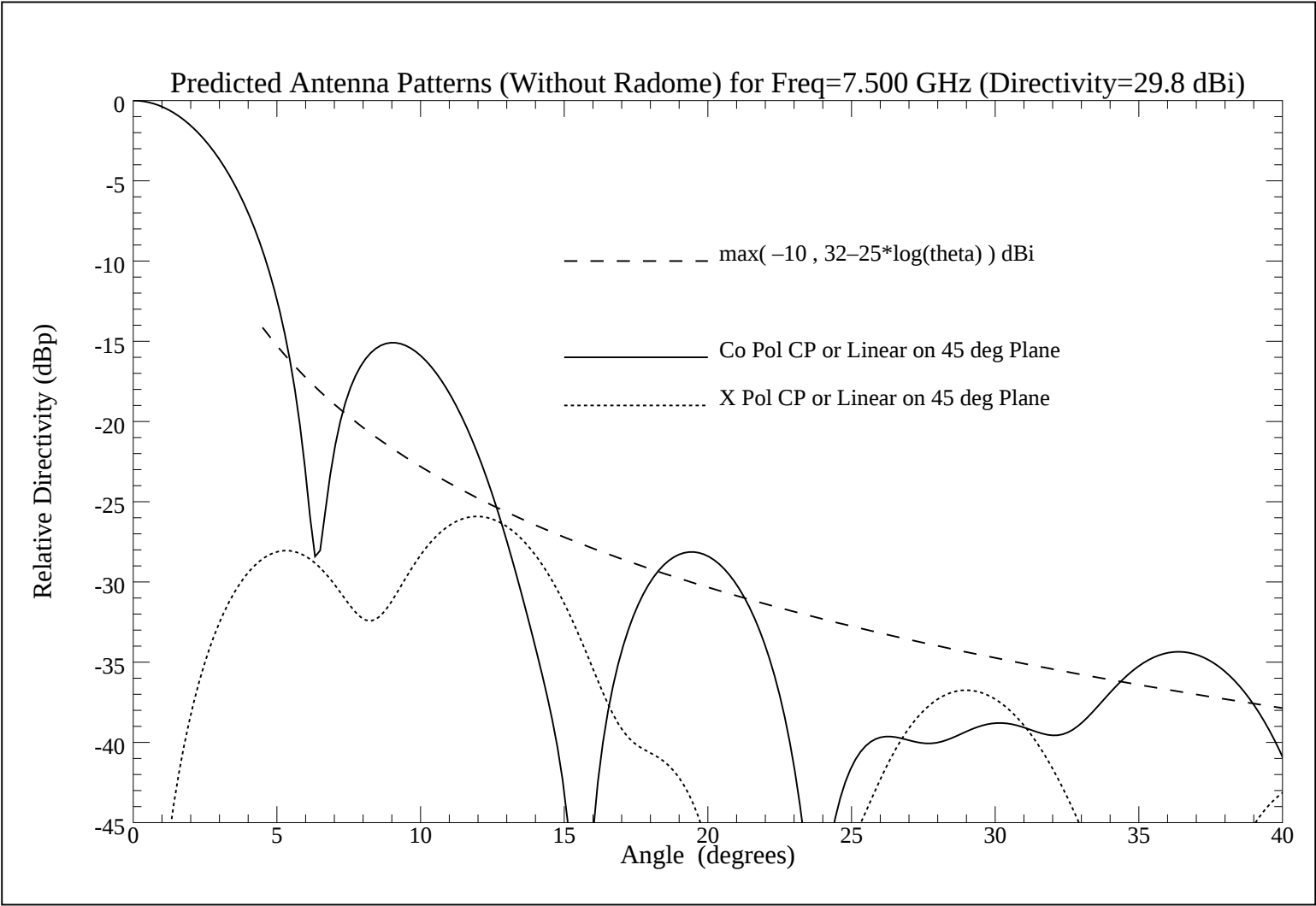


Figure 26: Antenna Patterns for 7.500 GHz

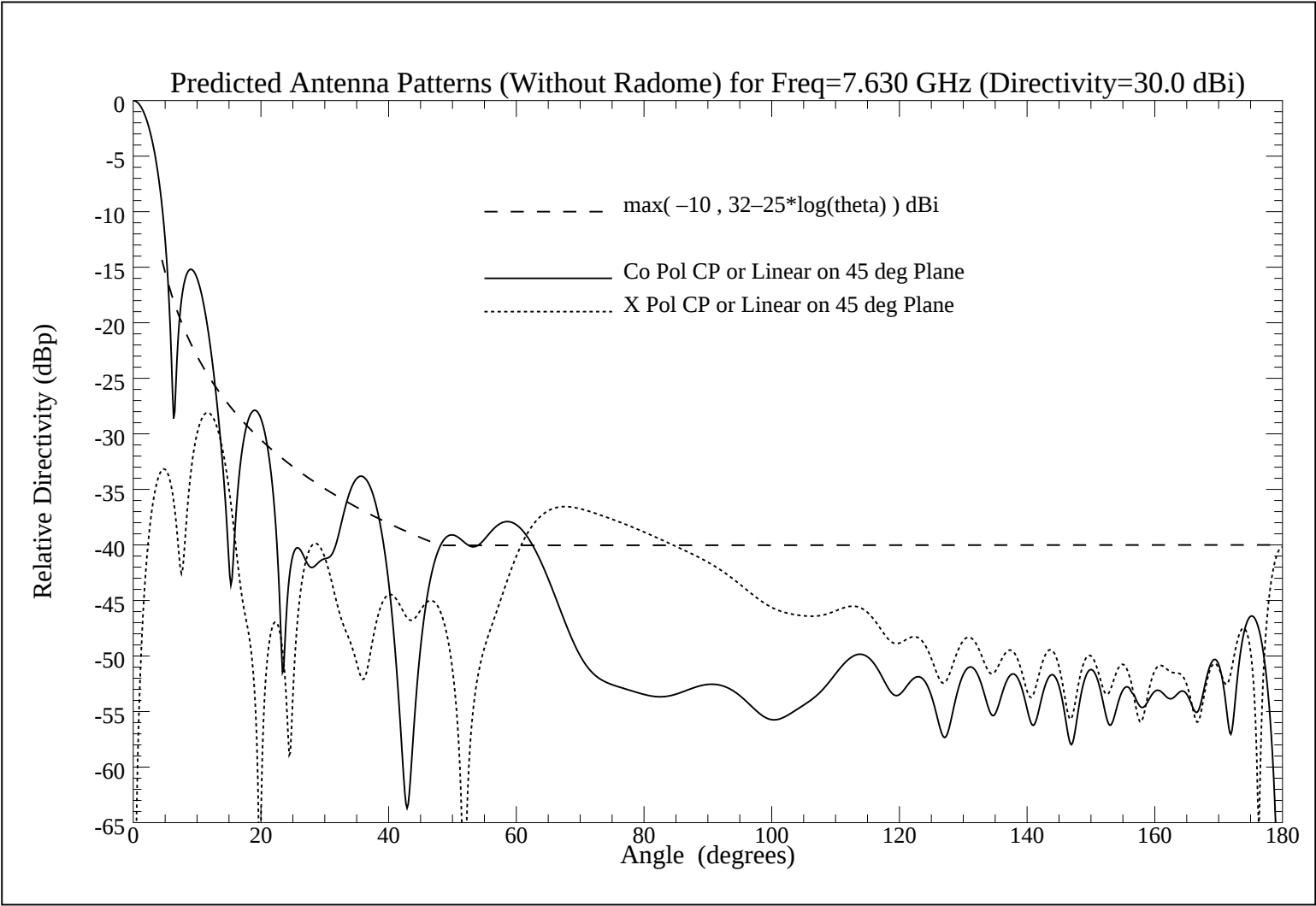


Figure 27: Antenna Patterns for 7.630 GHz

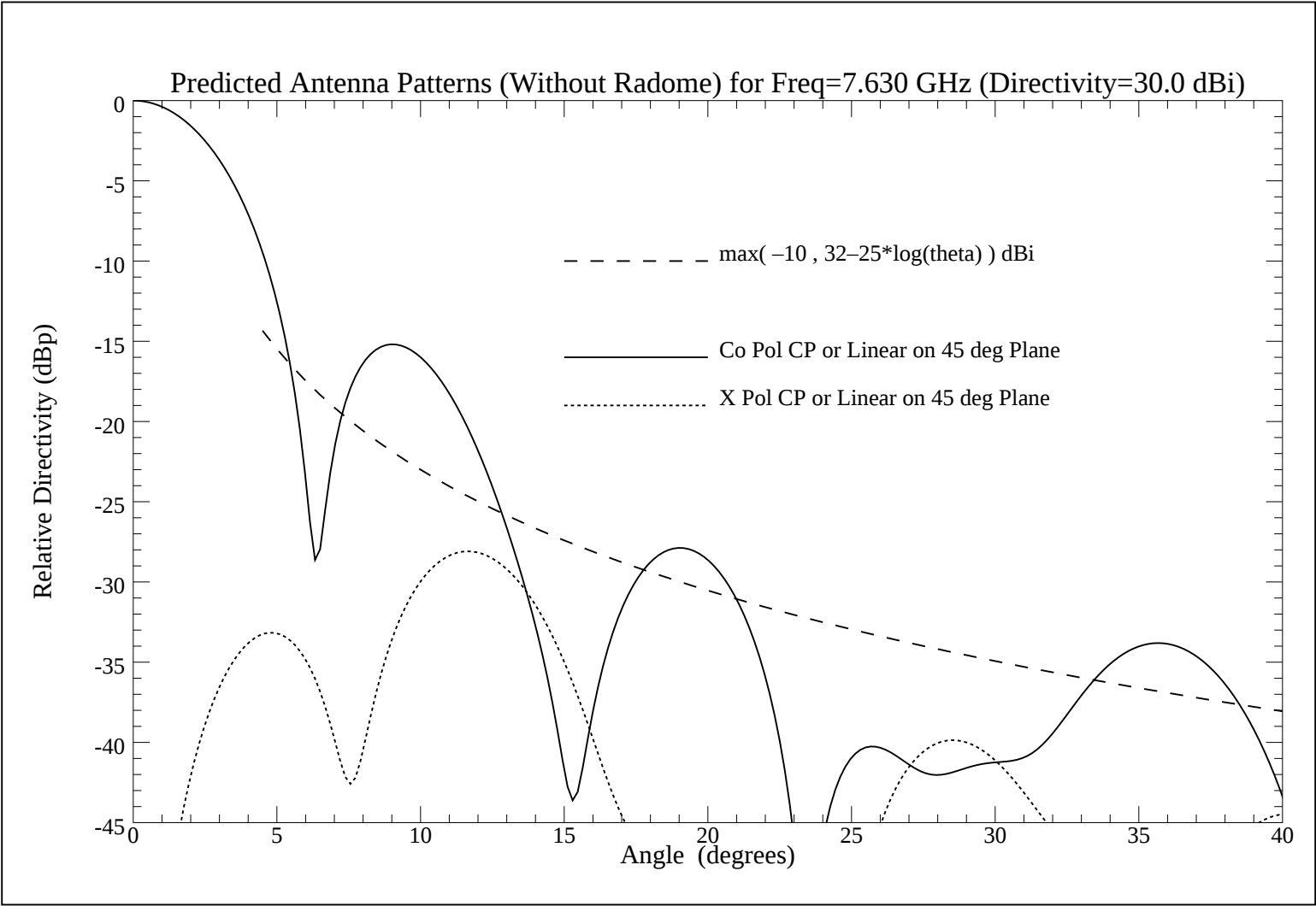


Figure 28: Antenna Patterns for 7.630 GHz

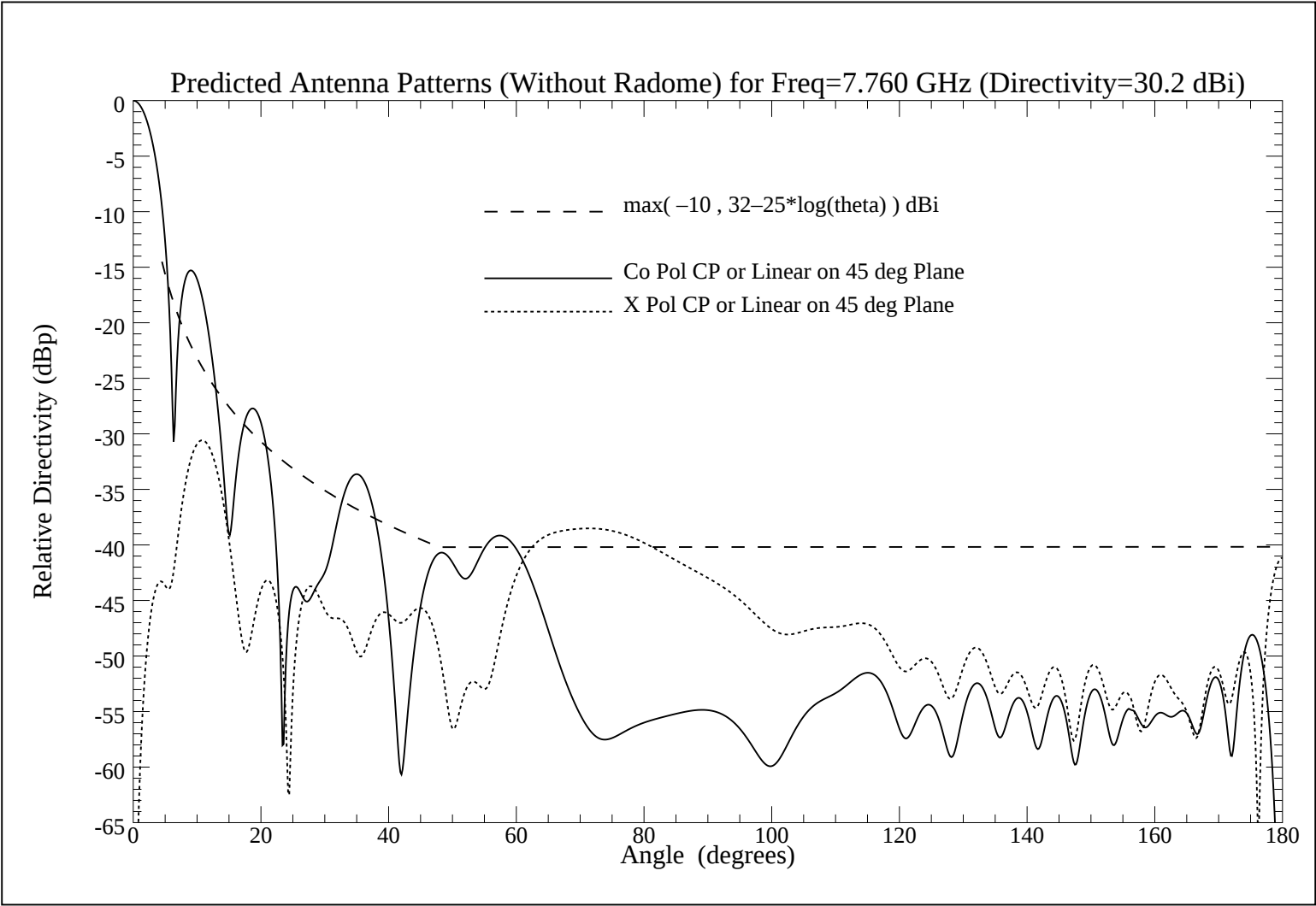


Figure 29: Antenna Patterns for 7.760 GHz

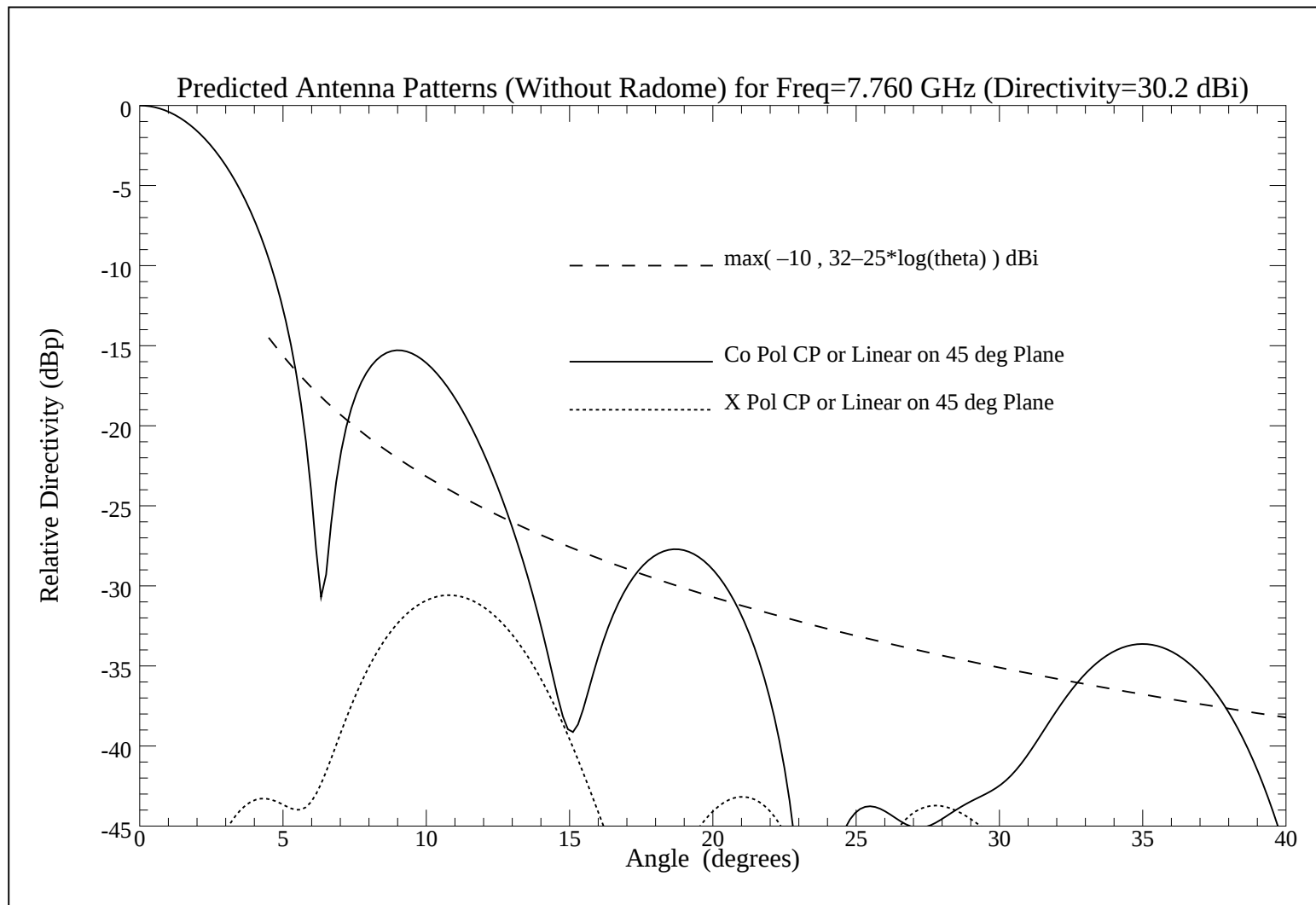


Figure 30: Antenna Patterns for 7.760 GHz

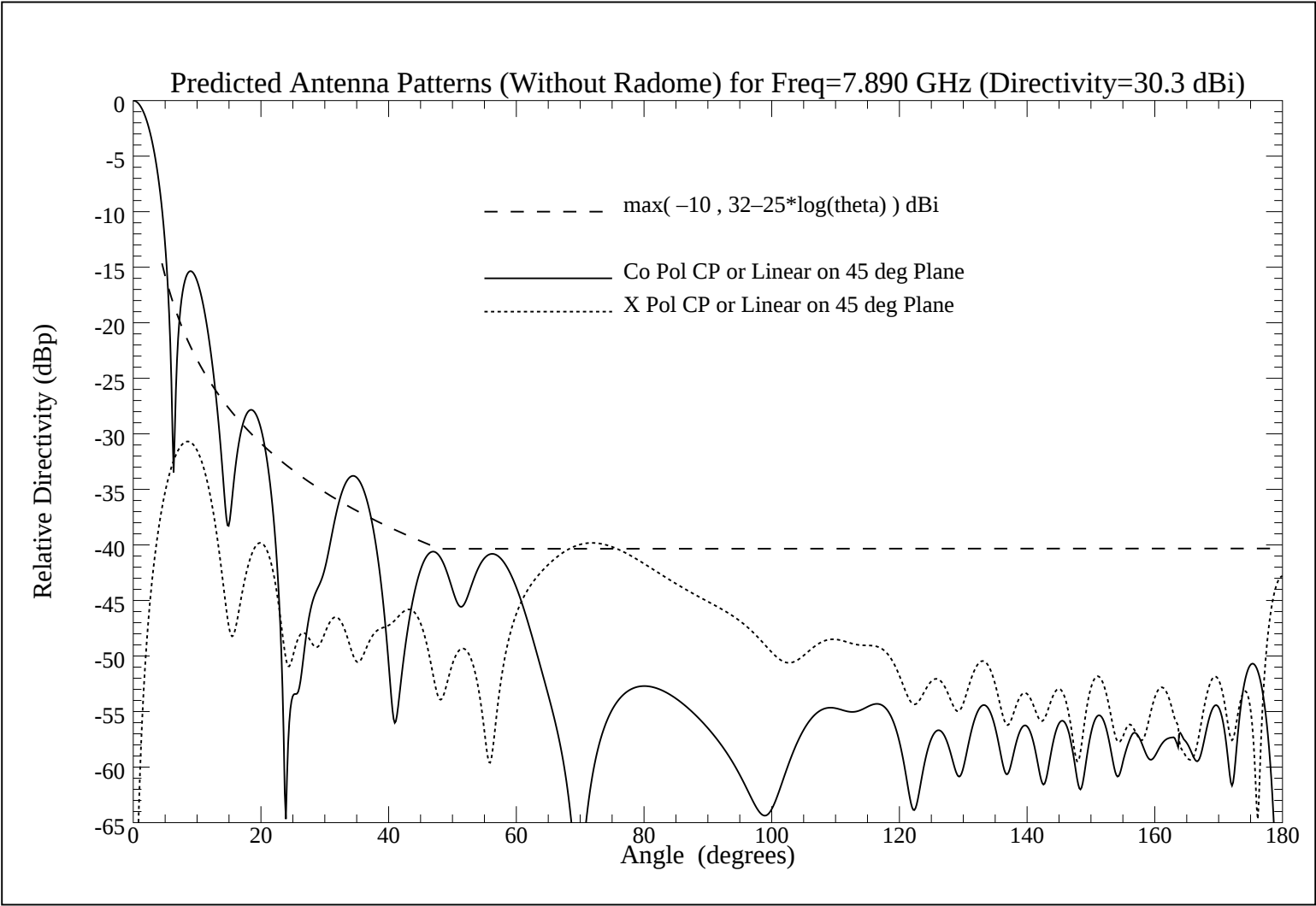
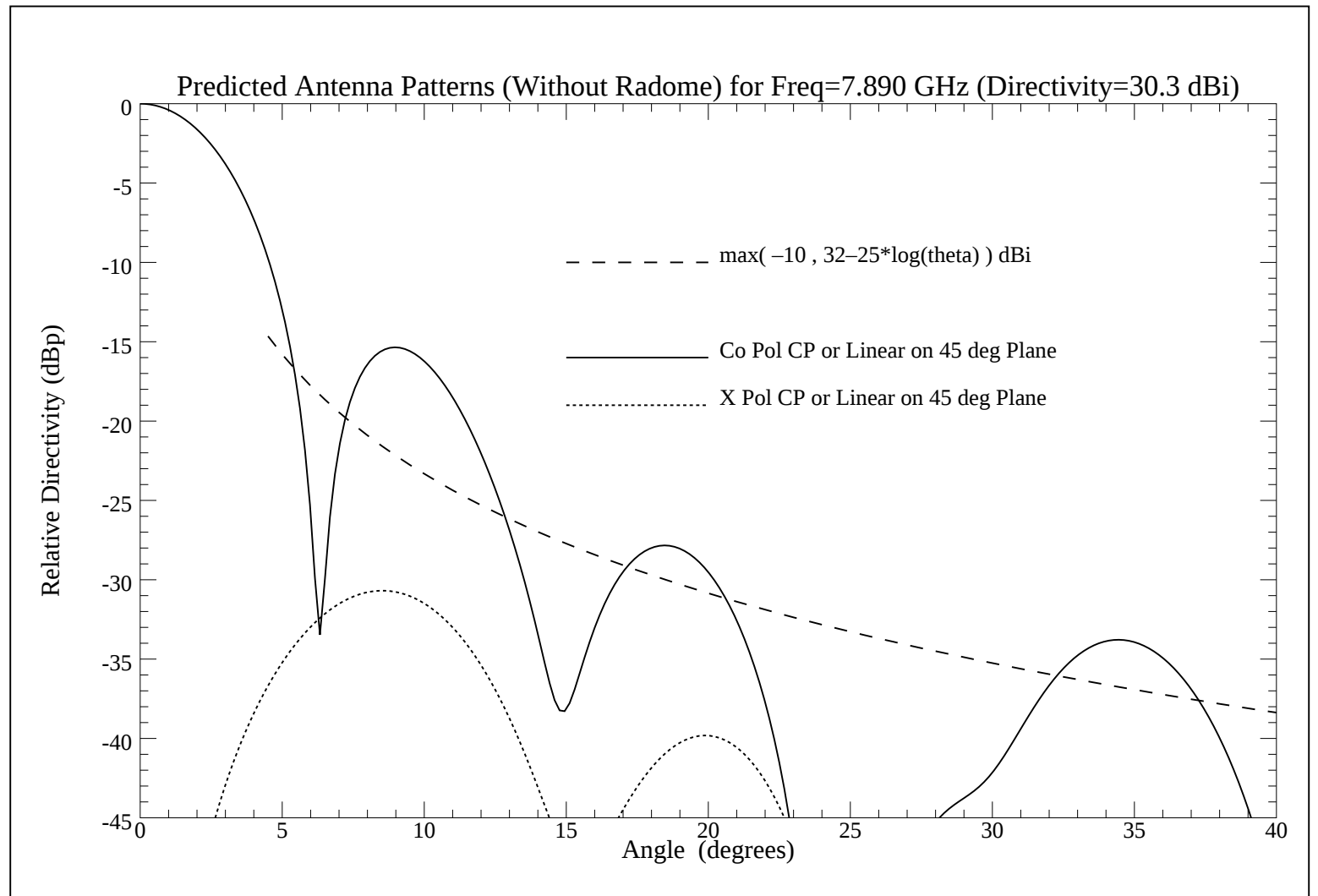


Figure 31: Antenna Patterns for 7.890 GHz

Figure 32: Antenna Patterns for 7.890 GHz



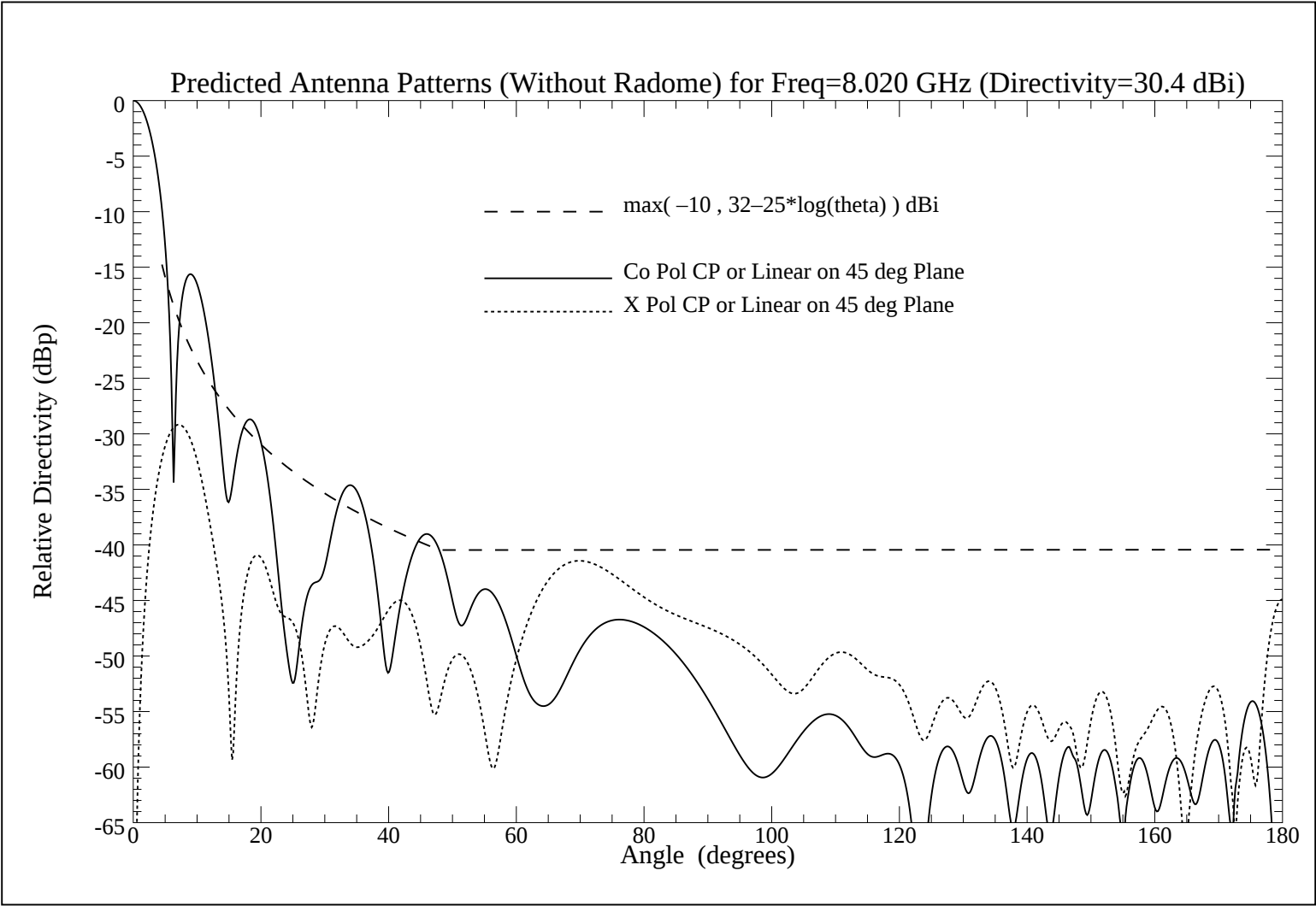


Figure 33: Antenna Patterns for 8.020 GHz

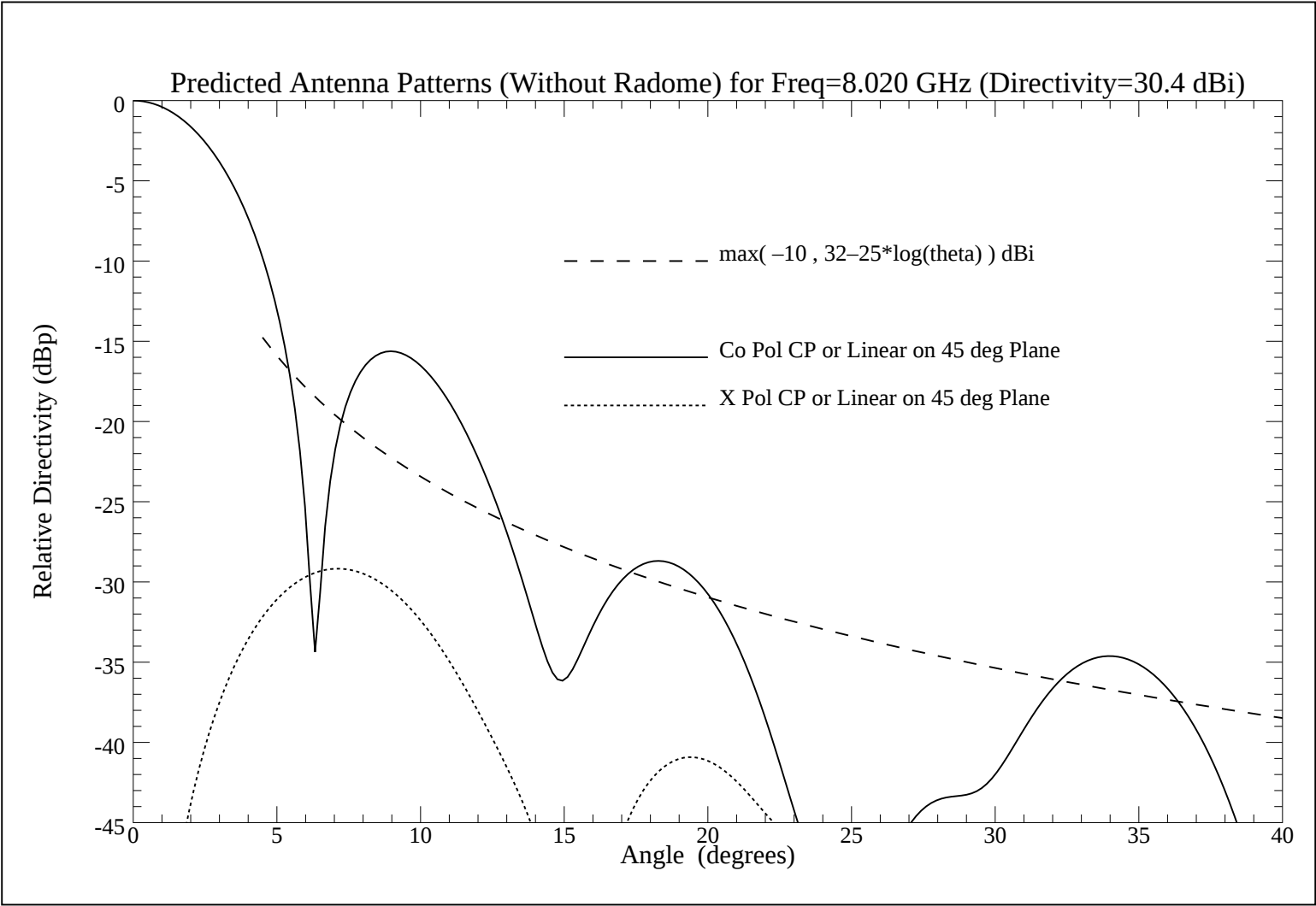


Figure 34: Antenna Patterns for 8.020 GHz

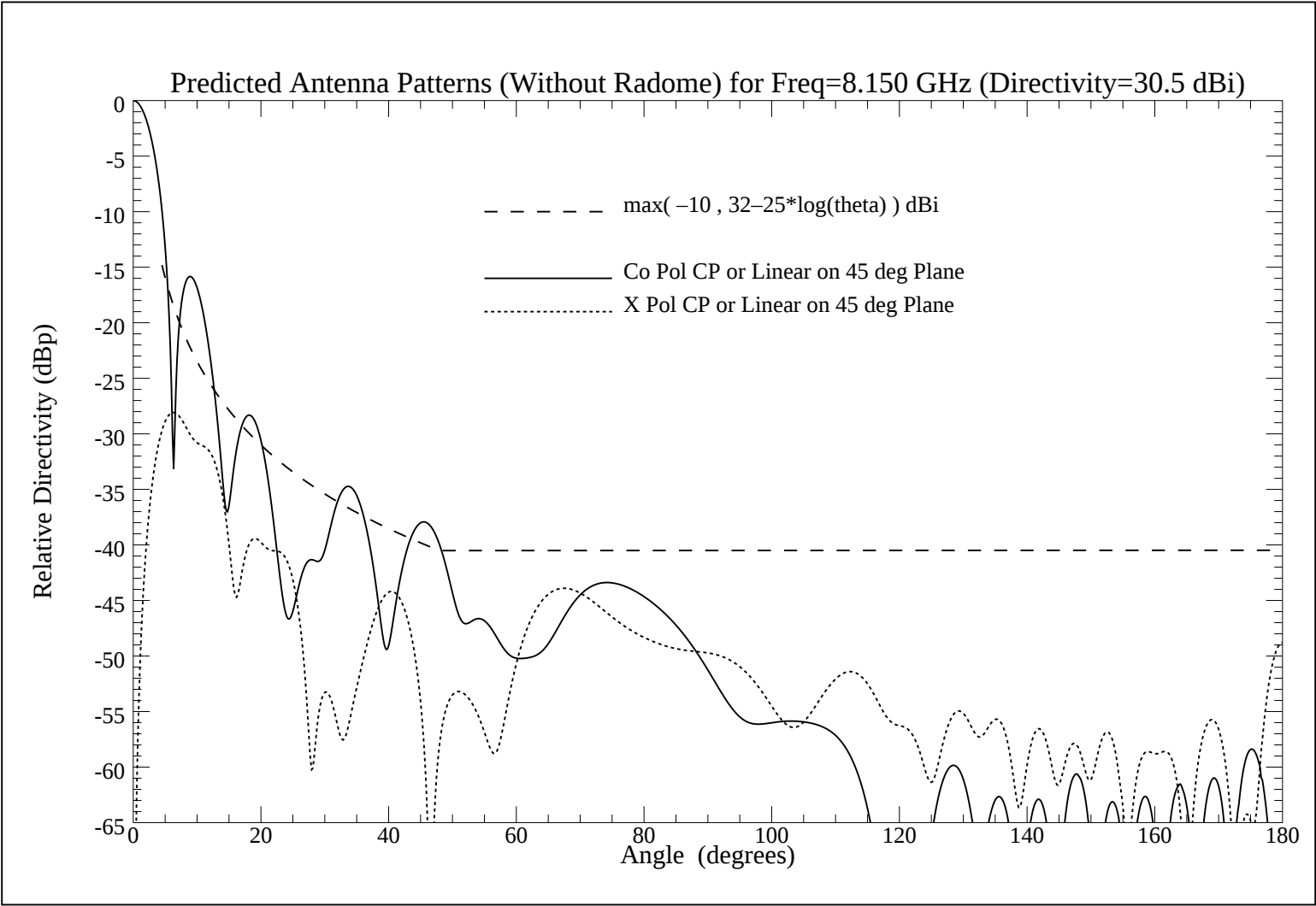


Figure 35: Antenna Patterns for 8.150 GHz

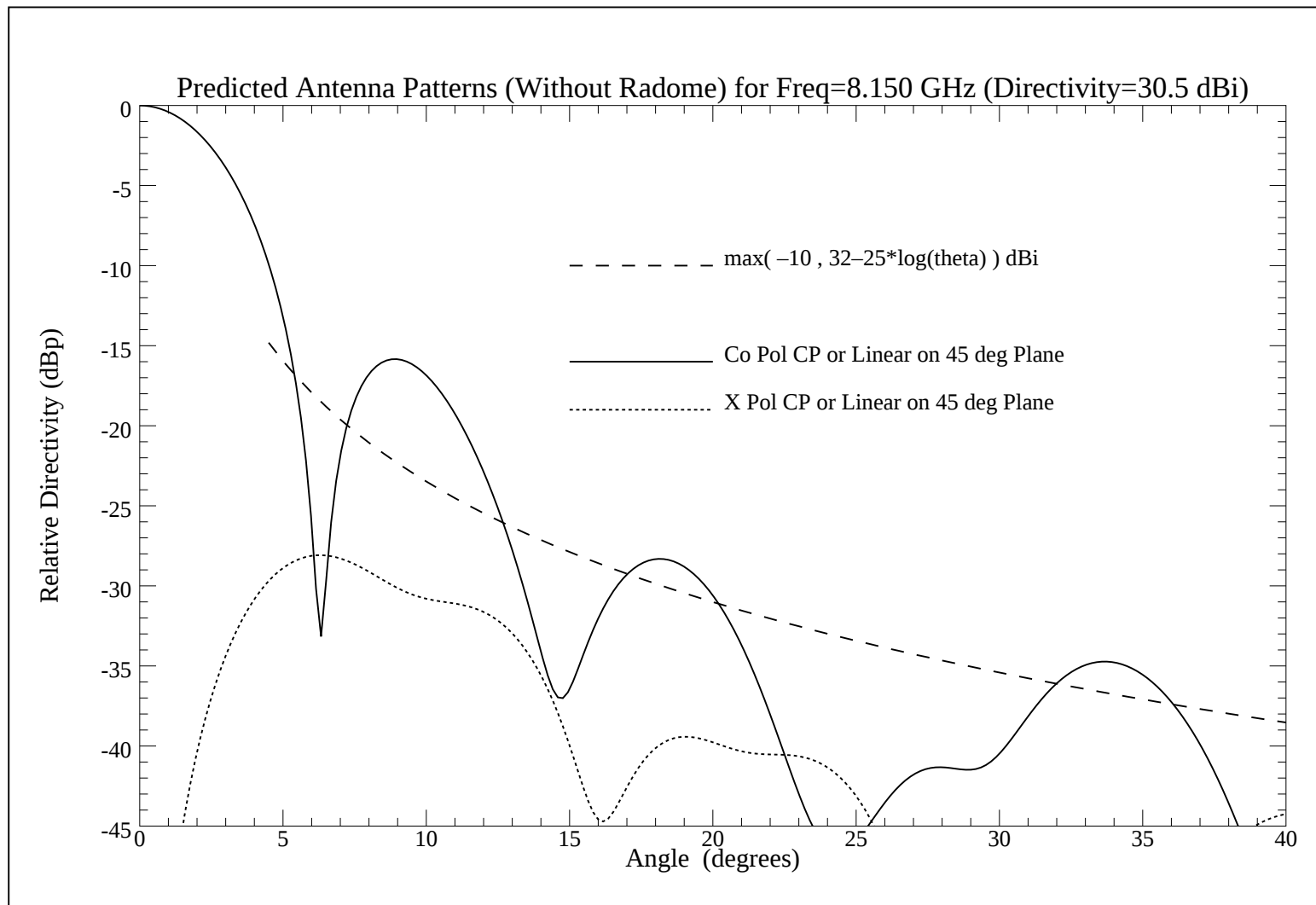


Figure 36: Antenna Patterns for 8.150 GHz

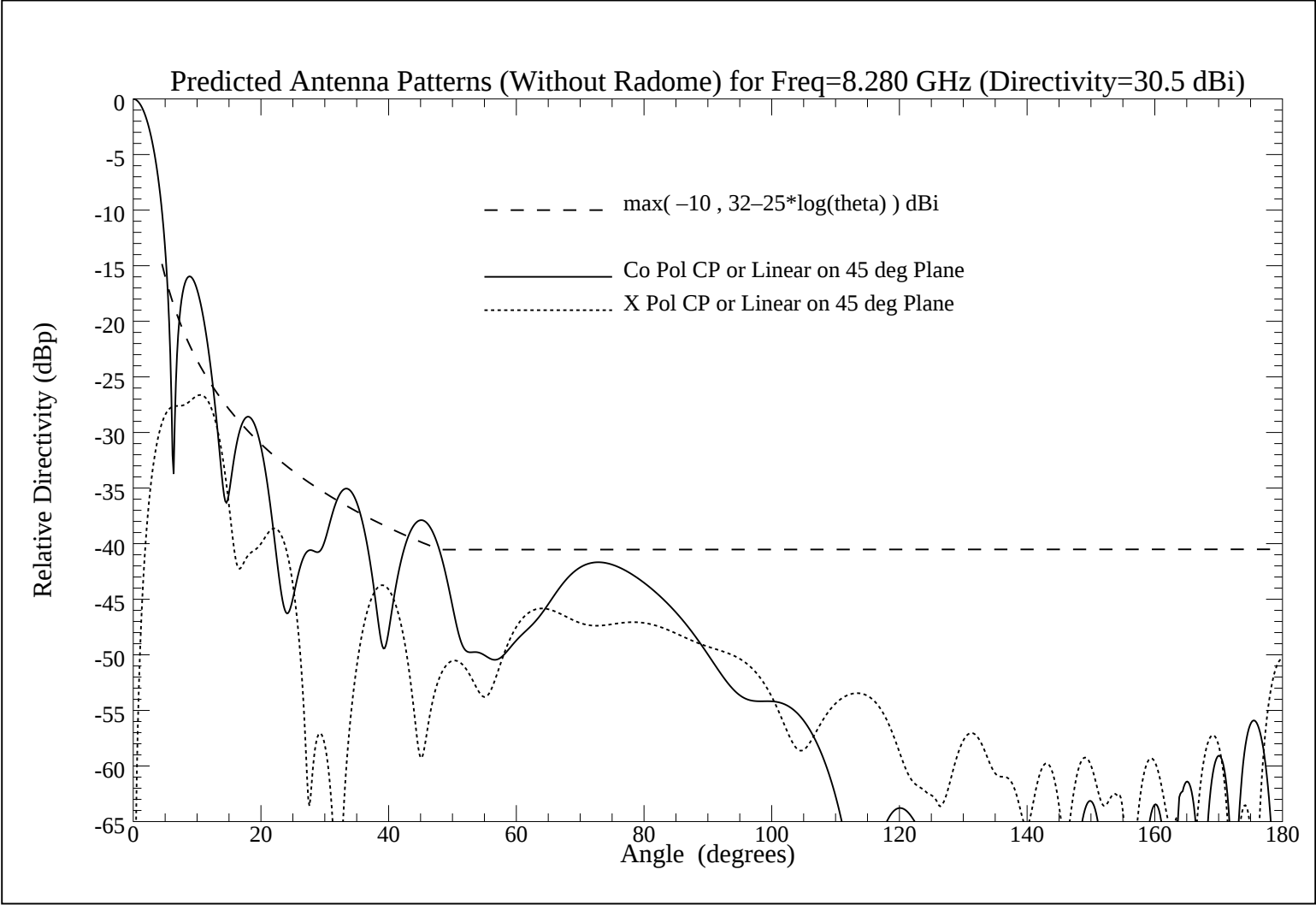


Figure 37: Antenna Patterns for 8.280 GHz

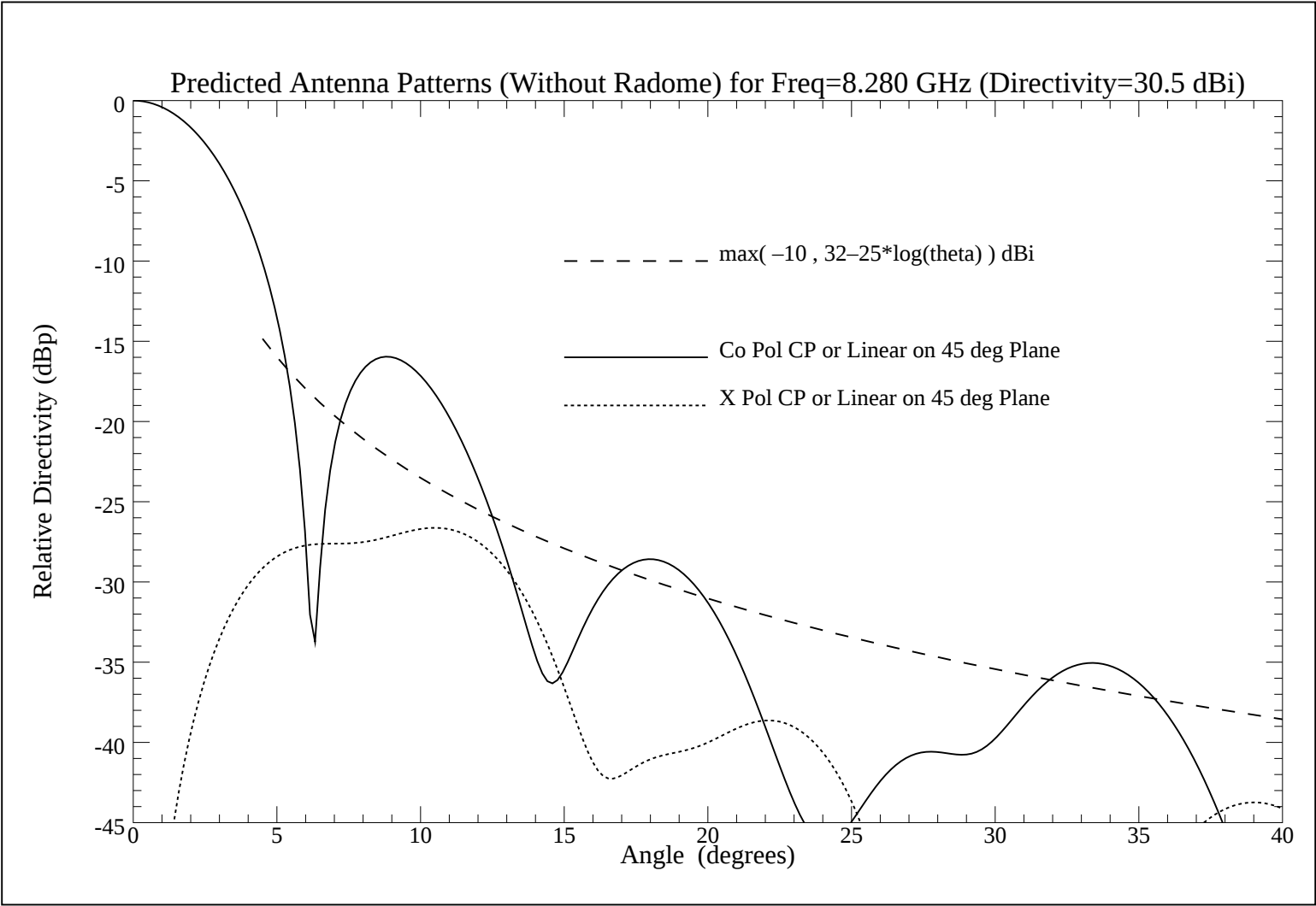


Figure 38: Antenna Patterns for 8.280 GHz

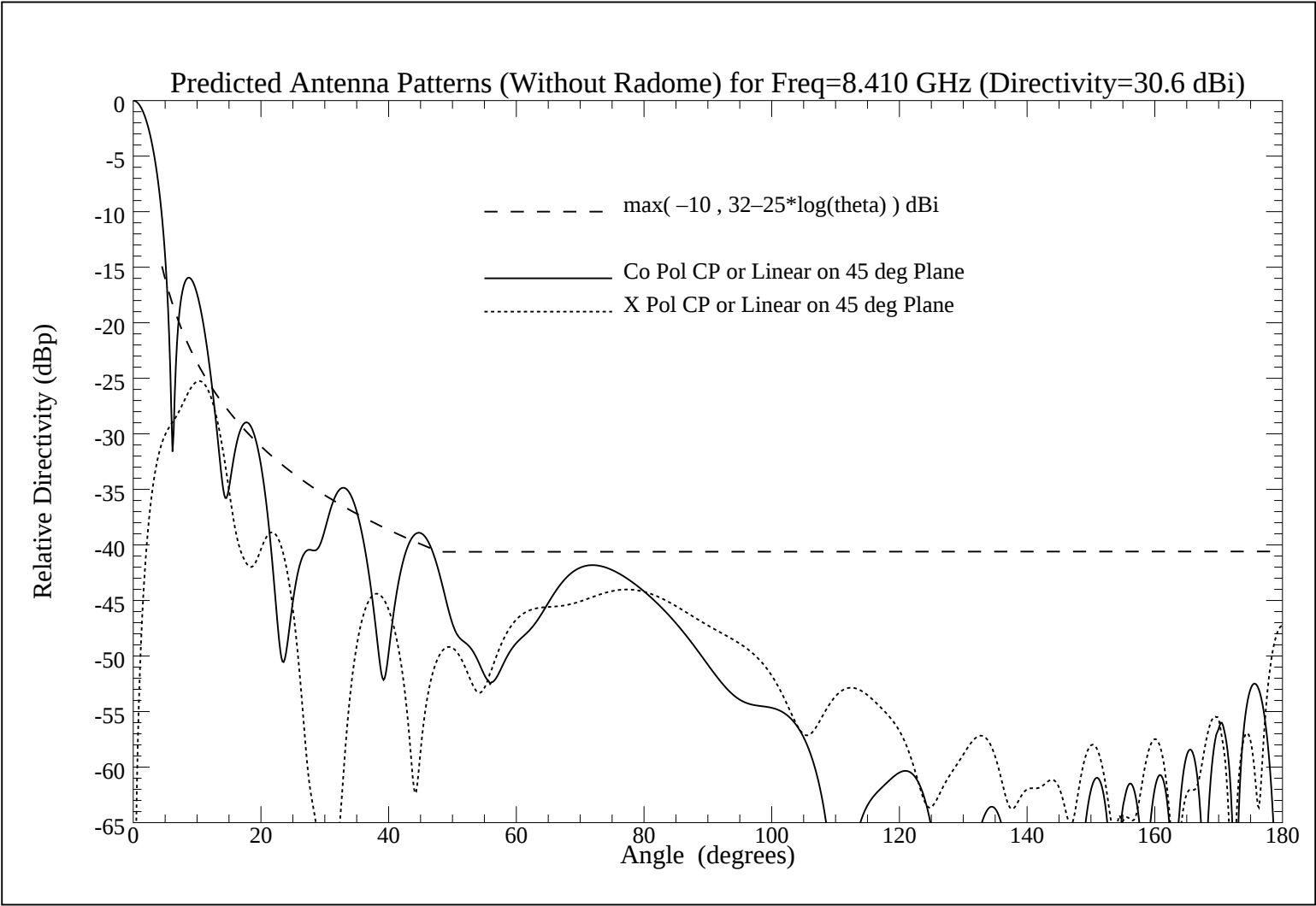


Figure 39: Antenna Patterns for 8.410 GHz

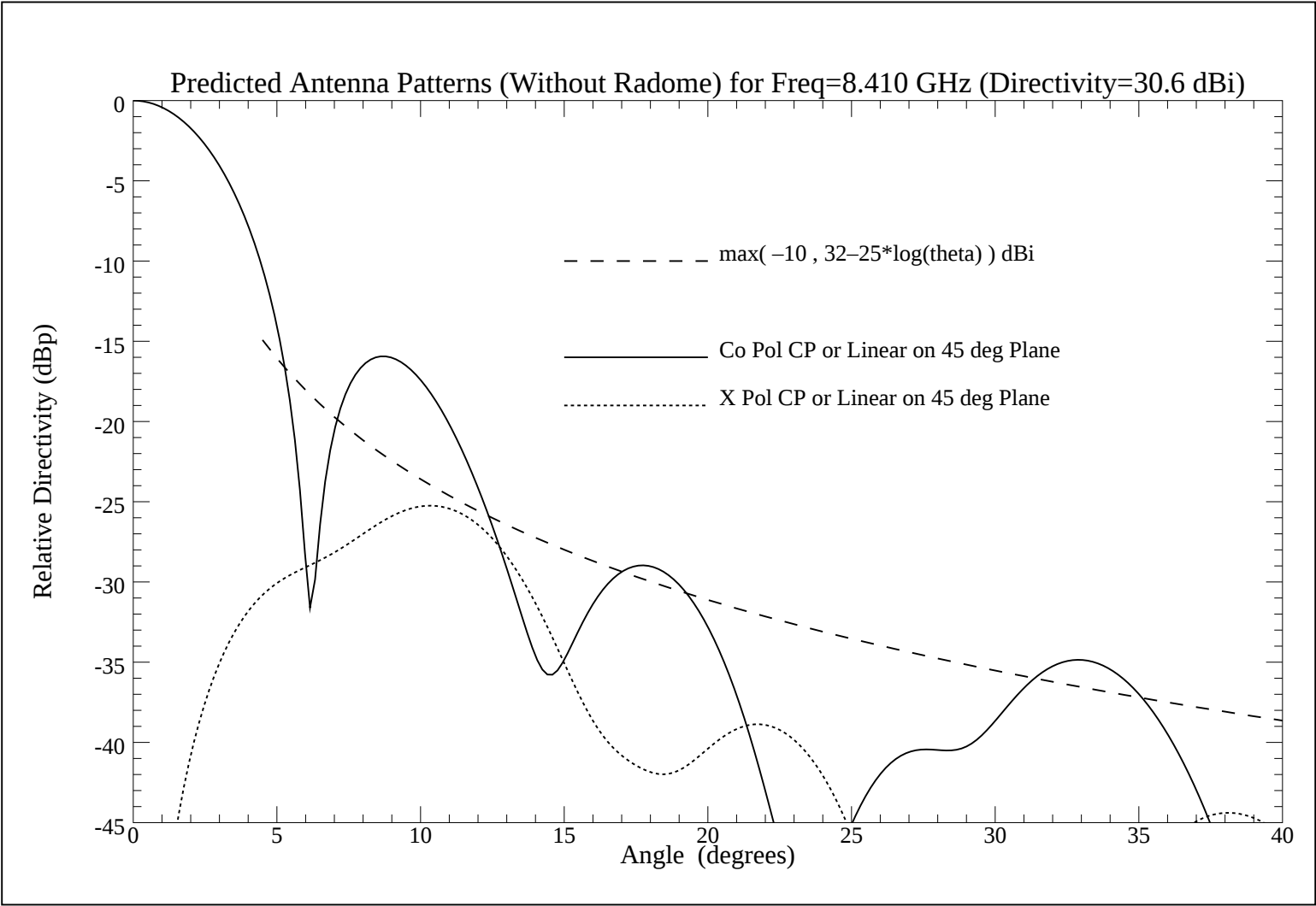


Figure 40: Antenna Patterns for 8.410 GHz