

MEMO

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Subject: Sight lines - part 2

The original IDL procedure employed in first memo [1] has been modified to calculate the projected magnetic field $B_{rz}^{proj} = B_z \cos \theta - B_r \sin \theta$, where $\theta = \arctan(z_2 - z_1/r_2 - r_1)$, as derived in N.Basse's report [2]

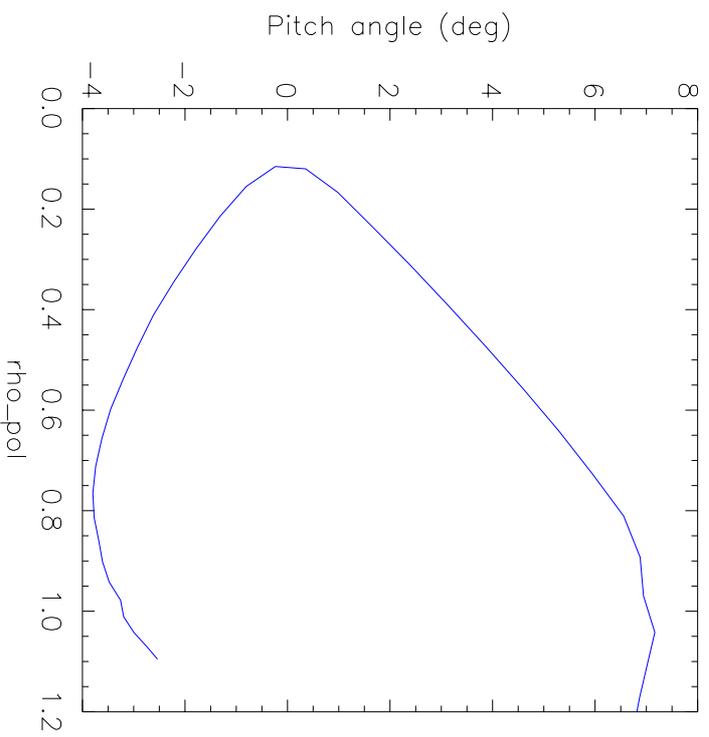
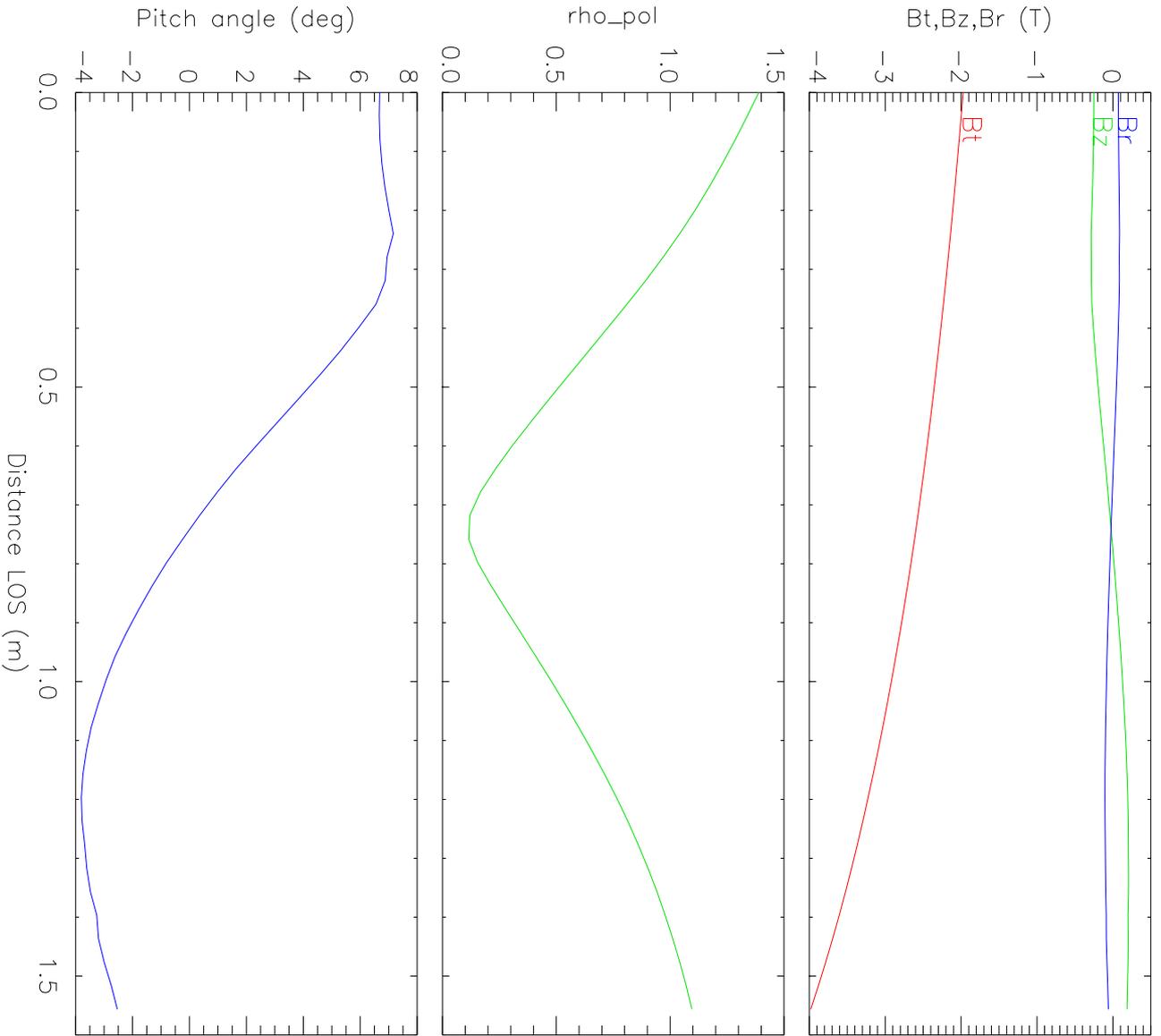
The case studies were repeated with the orthogonal pitch angle $\angle(B_{rz}^{proj}/B_t)$ for the diagonal L1 line of sight (LOS) for shot number 14034 (upper single null ITB with Mk.IIa divertor) - which is the same as figure 2 in [2], and for the L3 LOS (vertical) for each of the four shots in [1].

As reported by N.Basse in [2] the orthogonal pitch angle for the diagonal L1 line of sight (the upper to lower diagonal) is practically the same as for $\angle(B_z/B_t)$. The pitch angles for vertical L3 LOS has similar absolute values to $\angle(B_z/B_t)$ but extends to the negative half and hence almost doubling the range to typically $\pm 3.5^\circ$. For the two shots (14483: Improved H-mode and 14541: high beta normalized) in the new Mk.IIb divertor (lower magnetic axis) the pitch angle variation for vertical L3 LOS improves significantly (up to a total of 16° for shot 14541) suggesting that a quite acceptable degree of localization may be possible.

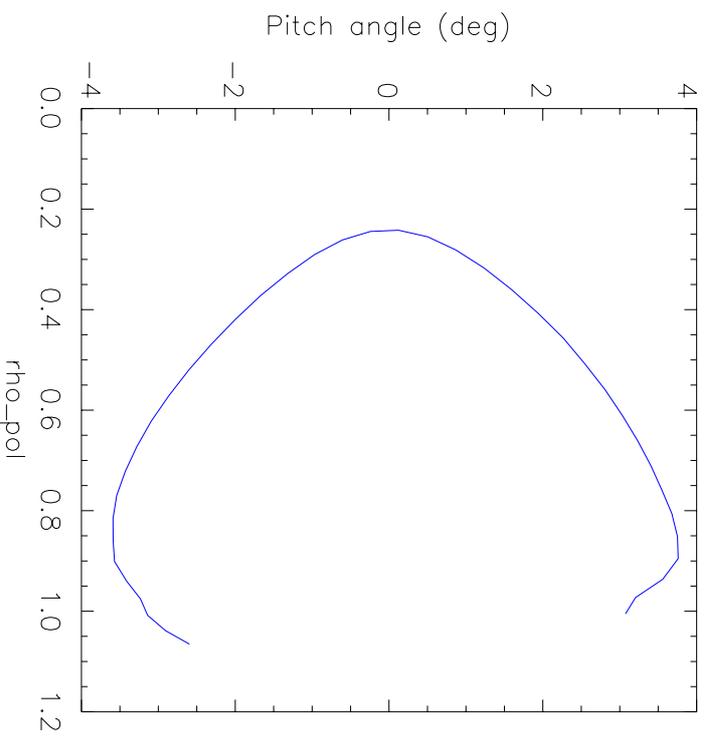
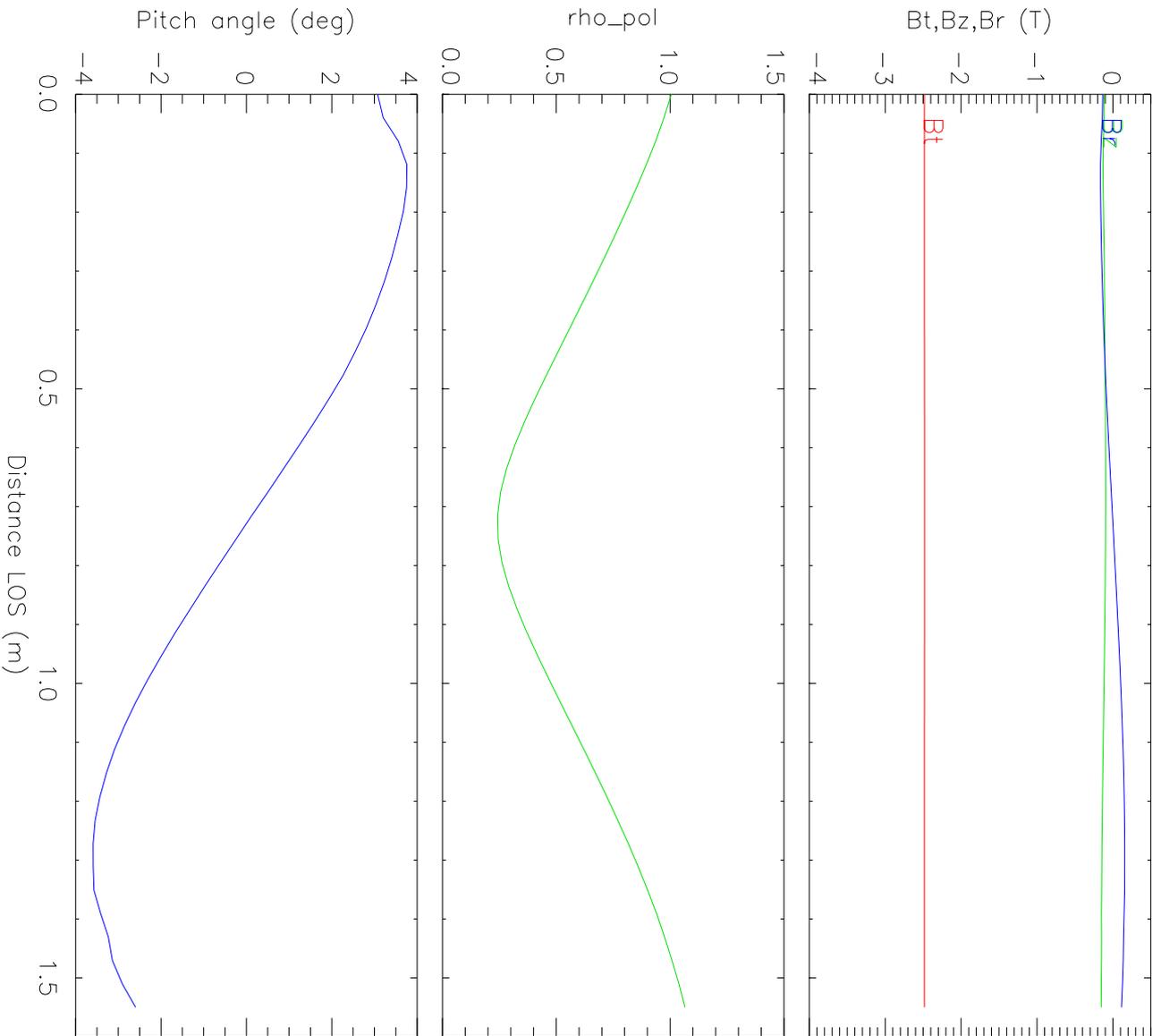
Of course the problems with the limitations on radial coverage range for the vertical L3 LOS has not changed, and the technical problems related to the divertor may still preclude the implementation of this option.

[1] G.D.Conway, Memo dated 24th July 2001

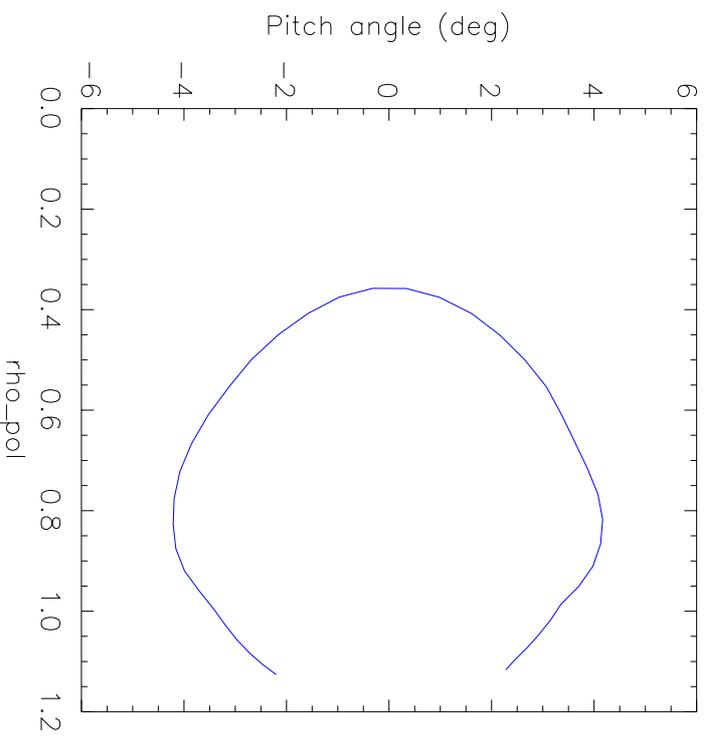
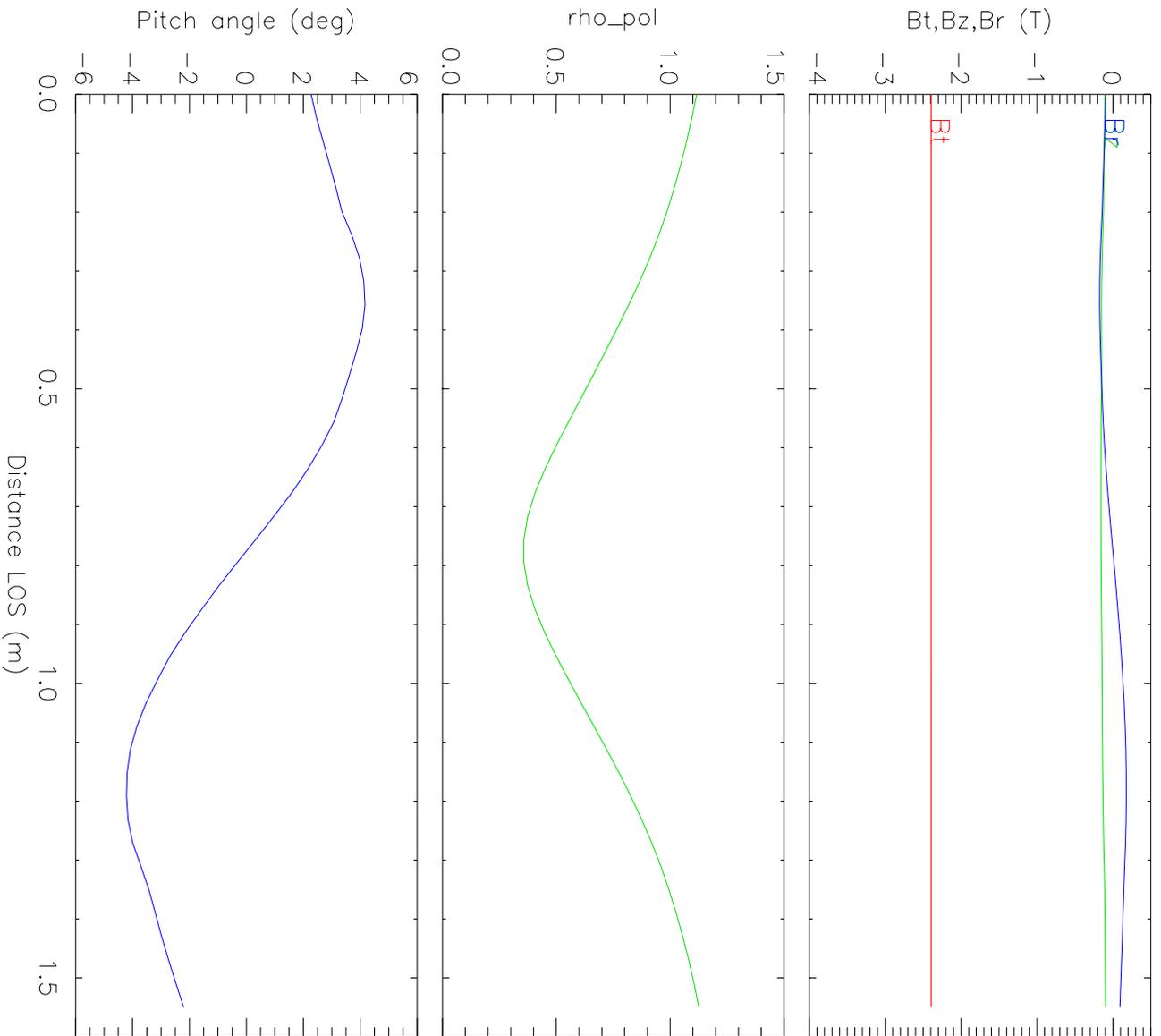
[2] N.P.Basse *et al* 'Pitch angle variation and turbulence profiles in ASDEX Upgrade', report dated 30th July 2001



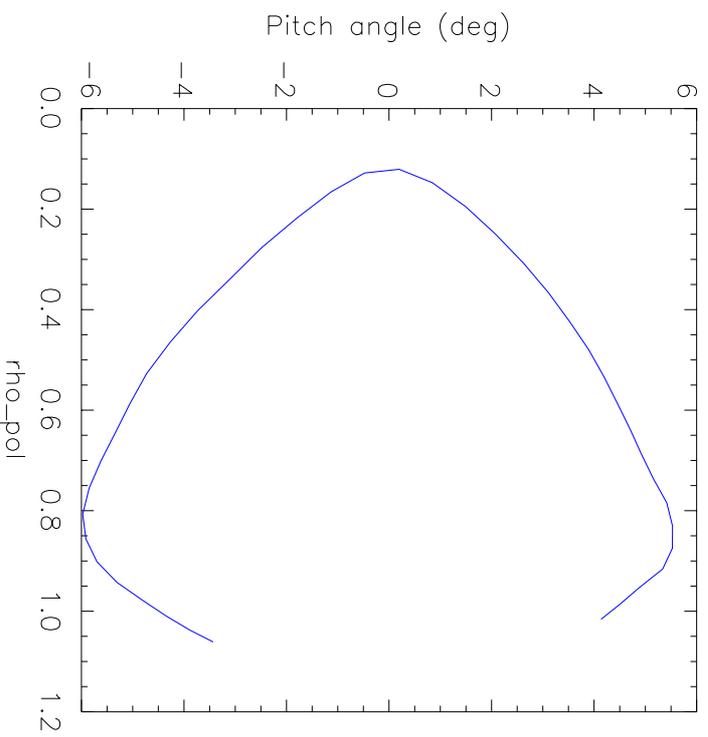
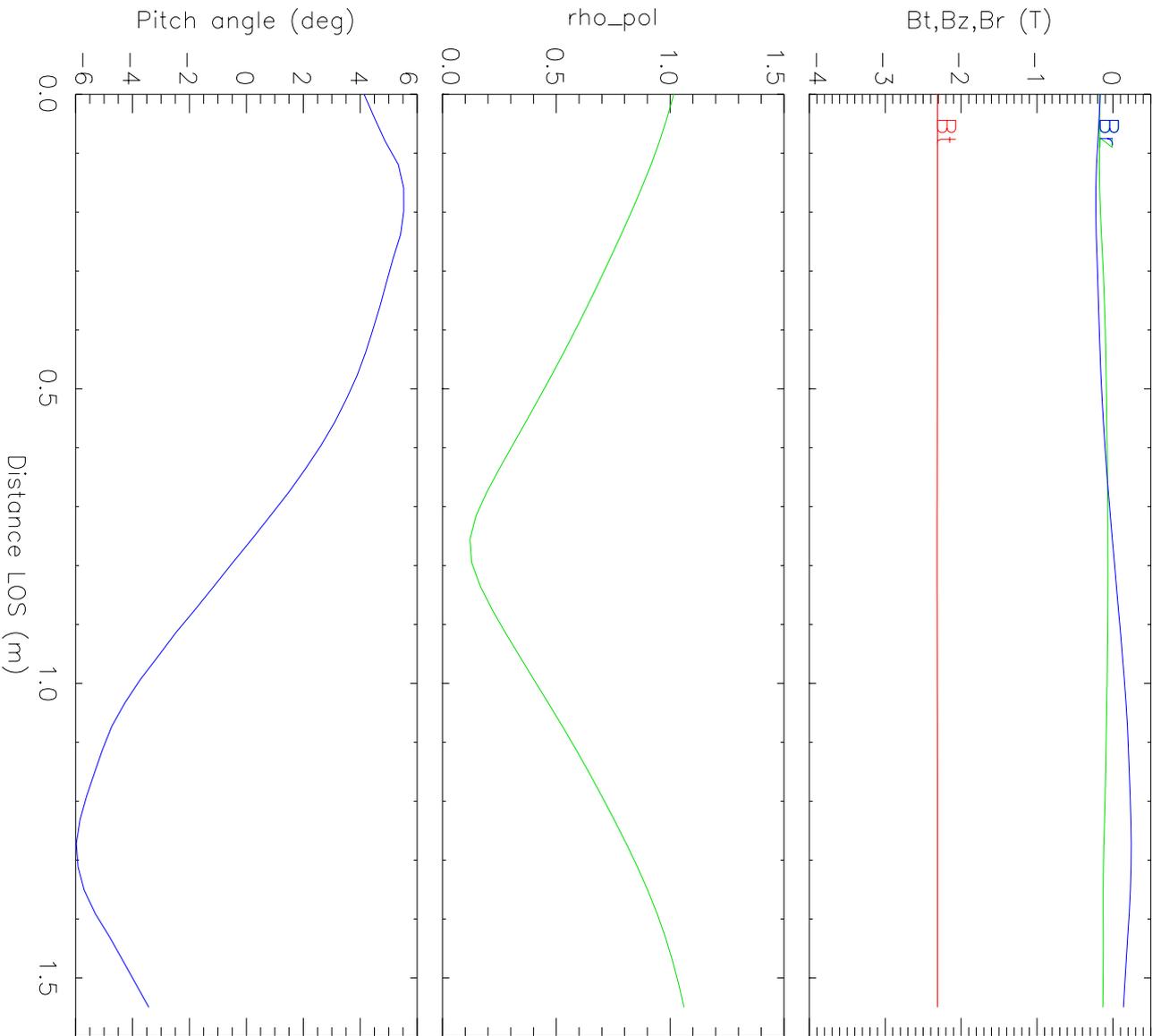
AUG Shot: 14034 @ 0.800 s
 LOS Start R,z (m): 2.24 : 0.480
 LOS Stop R,z (m): 1.11 : -0.59
 No. of points: 40



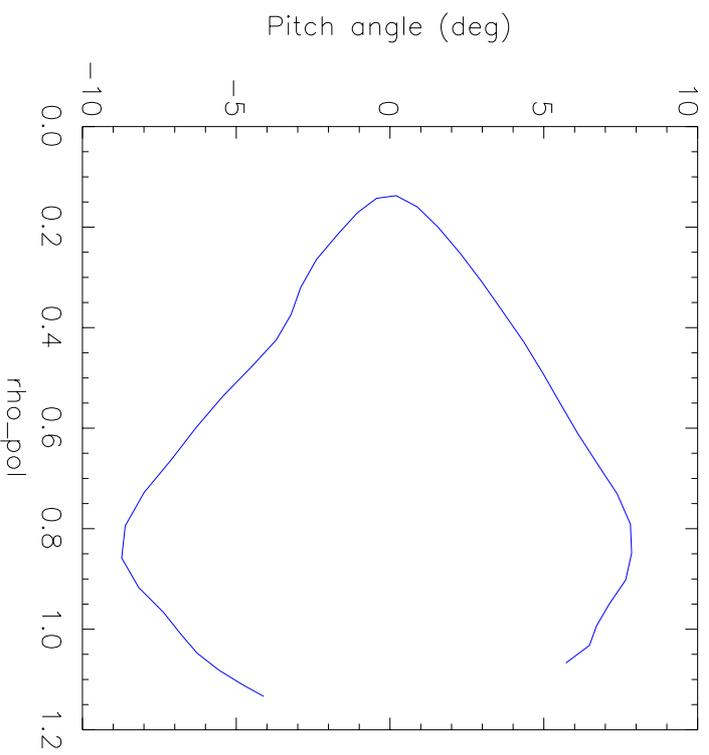
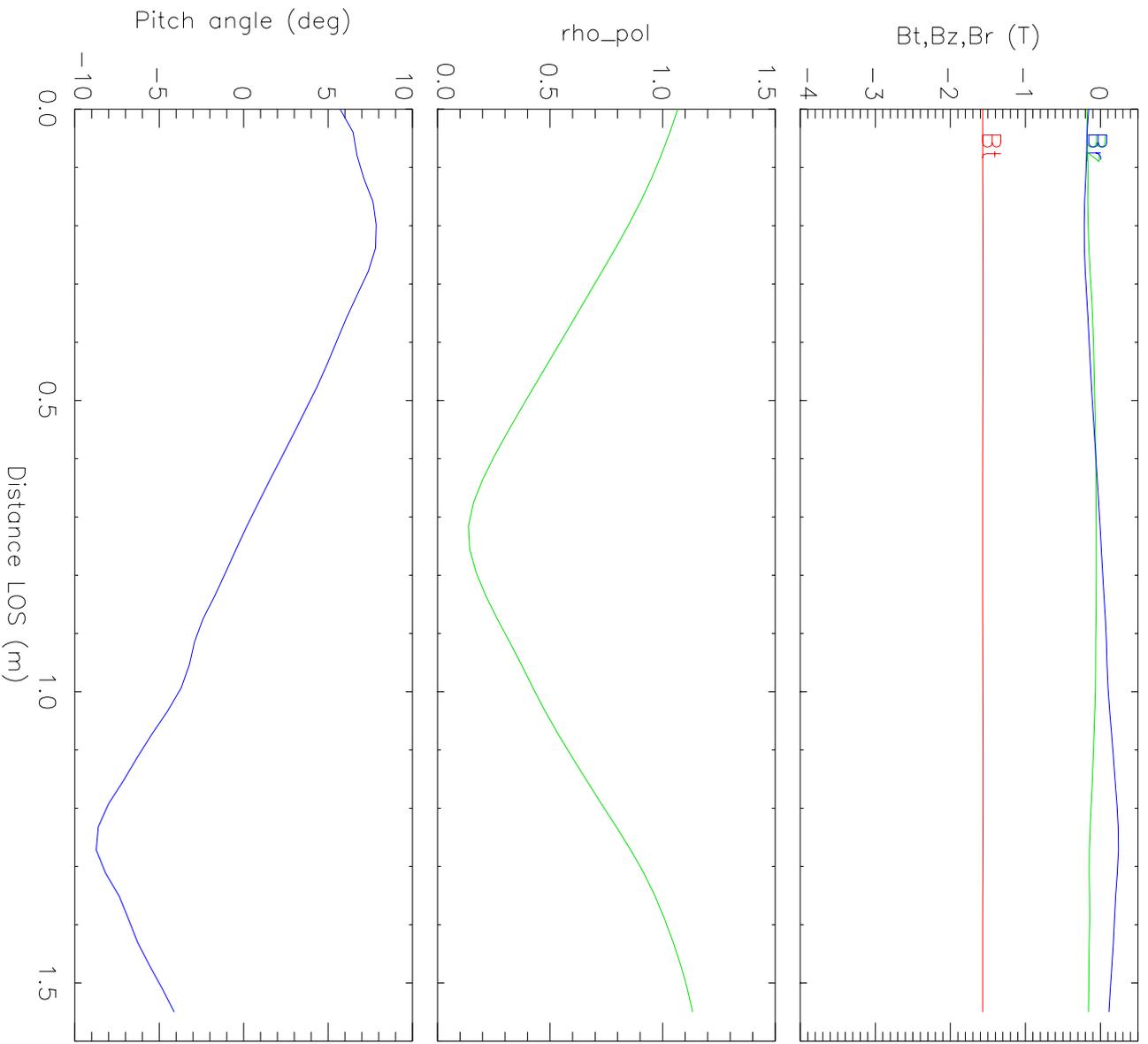
AUG Shot: 14034 @ 0.800 s
 LOS Start R,z (m): 1.78 : -0.70
 LOS Stop R,z (m): 1.78 : 0.850
 No. of points: 40



AUG Shot: 13553 @ 0.510 s
 LOS Start R,z (m): 1.78 : -0.70
 LOS Stop R,z (m): 1.78 : 0.850
 No. of points: 40



AUG Shot: 14483 @ 2.000 s
 LOS Start R,z (m): 1.78 : -0.70
 LOS Stop R,z (m): 1.78 : 0.850
 No. of points: 40



AUG Shot: 14541 @ 4.000 s
 LOS Start R,z (m): 1.78 : -0.70
 LOS Stop R,z (m): 1.78 : 0.850
 No. of points: 40