Field Profiles that Ramp from 15 T to 1.5 T at 7 m

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The solid black line of Fig. 1 plots the on-axis "Desired Field" of my 4/25/2013 report: $B(u) = nB_0/[n+bu^2(n+2-2u^n)]$, where $B_0 = 15$ T; $n = 6$, $b = (15T/1.5T - 1) = 9$; $u = x/L$, $x = z + 37.5$ cm, and $L = 737.5$ cm. If particle-loss analyses suggest that this field profile transitions too quickly to zero slope, the dashed lines plot alternative profiles. The curve with the most gradual approach to zero slope has $n = 1$ and duplicates the inverse cubic equation of Rick Fernow, et al. The other curves are for $n = 2$ and $n = 4$.

Please let me know which of these curves you would prefer me to use. Note that a consequence of a gentler transition to zero slope at $z = L$ is a sharpening of the peak near $z = -37.5$ cm. The turquoise curve plots the approximate limit to the sharpness of field achievable with magnets of 120 cm inner radius.

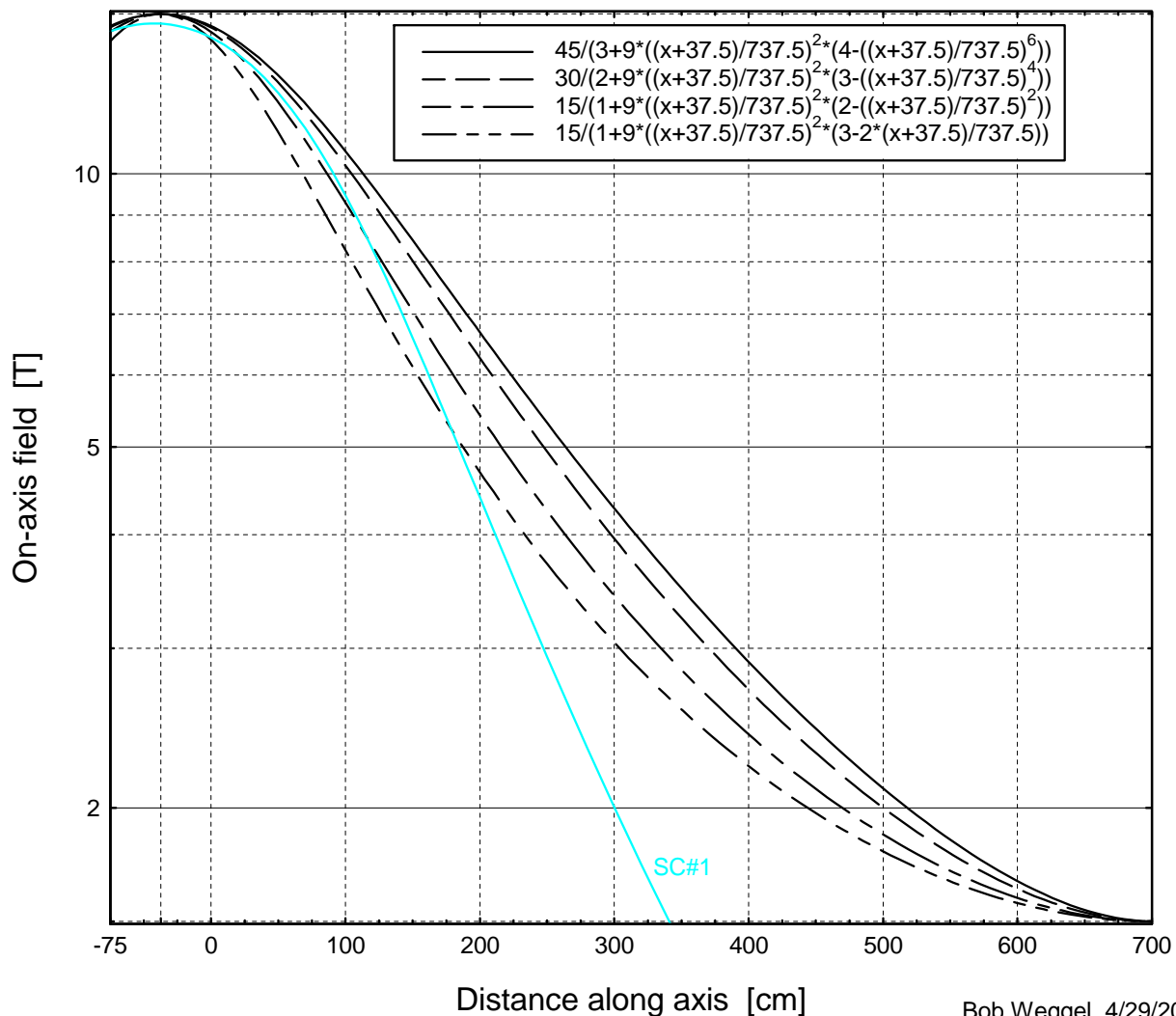## On-Axis Field Profiles that Ramp from 15 T to 1.5 T at 7 m

Legend:
- $45/(3+9*((x+37.5)/737.5)^2*(4-((x+37.5)/737.5)^6))$
- $30/(2+9*((x+37.5)/737.5)^2*(3-((x+37.5)/737.5)^4))$
- $15/(1+9*((x+37.5)/737.5)^2*(2-((x+37.5)/737.5)^2))$
- $15/(1+9*((x+37.5)/737.5)^2*(3-2*(x+37.5)/737.5))$

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Fig. 1. Field Profiles that ramp from 15 T to 1.5 T at z = 7 m.