# Helical undulator magnetic field in OPERA

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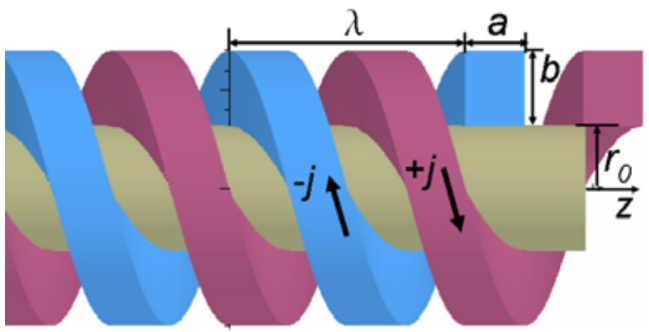
BMAD (infinitely long undulator)

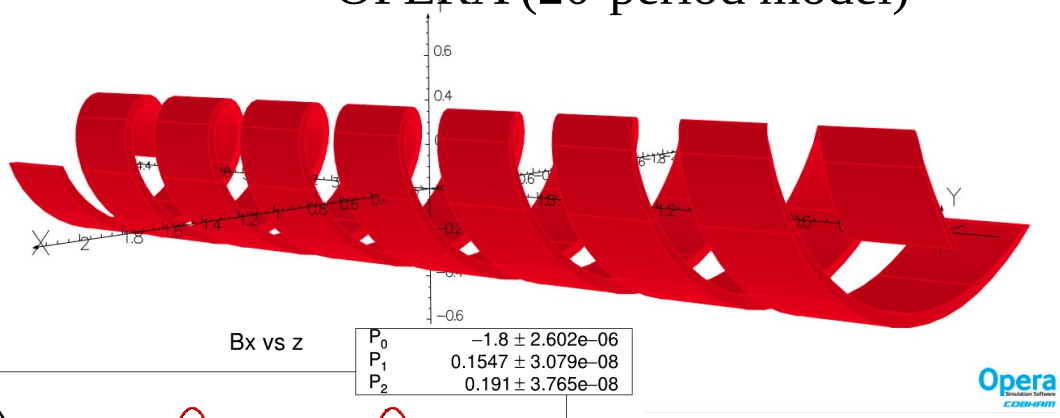


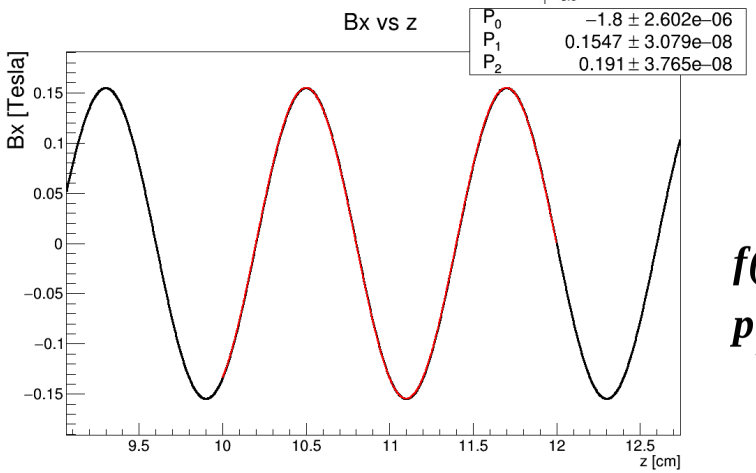

λ = 12 mm
$r_0$ = 3.15 mm
b = 0.5 mm
a = 3.84 mm
j = 1 kA/mm$^2$

$$\mathbf{B} = B_0\left\{\hat{x}\cos(kz) + \hat{y}\sin(kz)\right\}$$

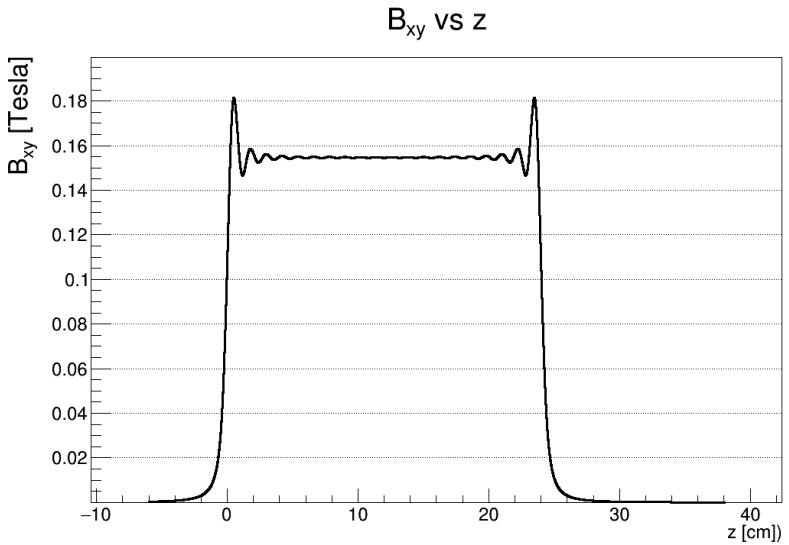
$B_0$ = 0.1537 Tesla

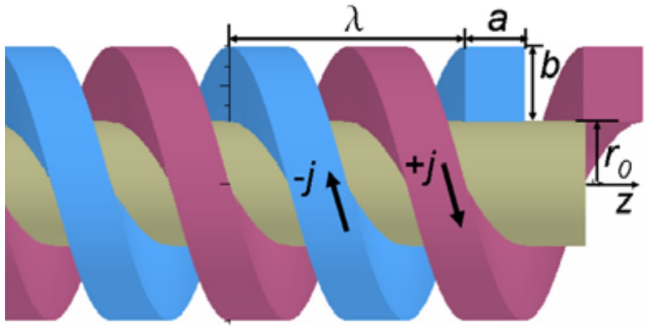
OPERA (20-period model)



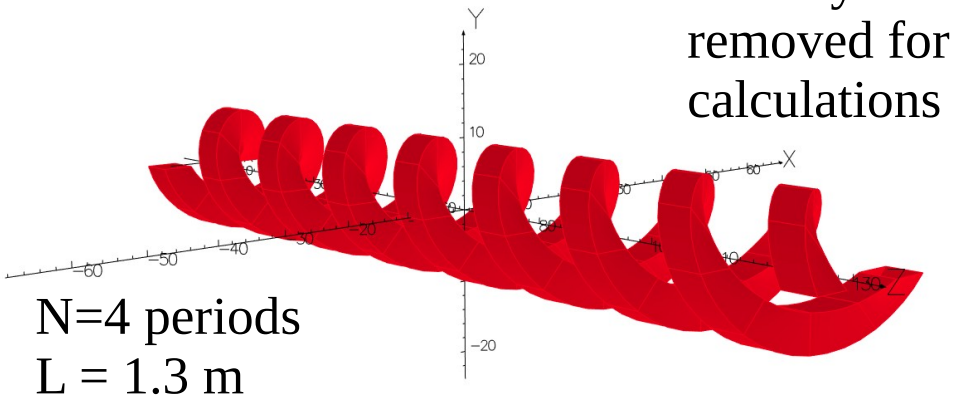



***f(x)=$p_1$*sin((x-$p_0$)/$p_2$)***
***$p_1$=0.1547 Tesla***






Steel cylinder is removed for the first calculations




N=4 periods
L = 1.3 m

$\lambda$ = 32.5 cm
$r_0$ = 4.5 cm
b = 5 cm
a = 5 cm
j = 1101.24 kA/cm$^2$

$B_0$ = 0.15 Tesla