



Generation of High-Energy Synchrotron Radiation with a 10-T SCW

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Aim

High-Energy Electron Storage Ring (8GeV)

+ High Magnetic Field (10T Superconducting Wiggler : **SCW**)

→ High-Energy Synchrotron Radiation (\sim MeV)

→ Nuclear Astrophysics . . . e.g. (γ, n) process

Nuclear Physics

Compton Scattering Using \sim 500keV Photons

Positron Beam

etc.



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Photons from Uniform 10T Field
Photons from SCW
- ・ ビーム試験について *about Beam Test*

See also <http://acc-web.spring8.or.jp/~soutome/>



*** Brief History ***

1995～ SCW製作のための検討、設計、R&D (with Budker INP, Russia)

1999 SCW完成 *Fabricated*

2000/1 SPring-8 に搬入、励磁試験、磁場測定 *Transported to SP8, Field Meas.*

2001/11～ 冷却能力改善、設置に向けた検討と真空機器類の製作 *Cooling, Vac. Comp.*

2002/8 蓄積リング5セル直線部に設置。 *Installed in Storage Ring*

2002/9 1回目のビーム試験 (0.1mA) *1st Beam Test*

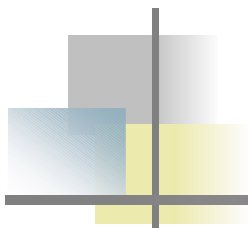
電子ビームに対する影響を見た。 *Effects on Electron Beam*

2002/11 2回目のビーム試験 (max. 0.91mA @ 9.5T) *2nd Beam Test*

放射線、熱負荷などの基礎データを取った。 *Radiation Level, Heat Load*

放射光スペクトルを測定した。 *Spectrum Meas. of Synch. Rad.*

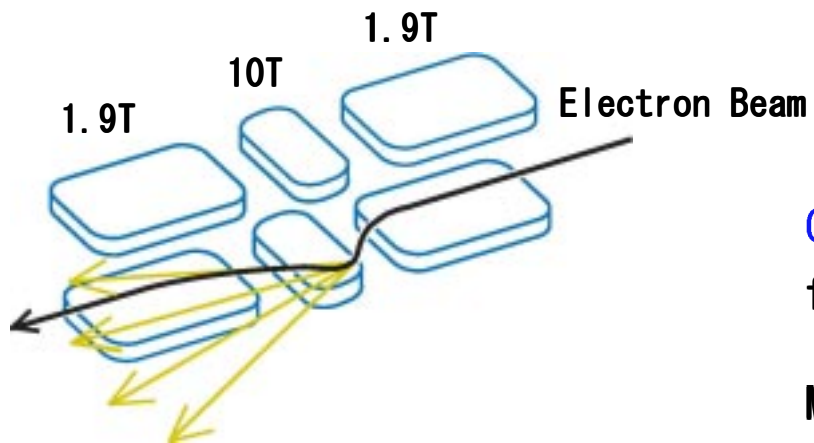
2002/12 蓄積リングより撤去。組立調整実験棟に移設。 *Moved to Test Bench*



*** about SCW ***

*** SCW について (概観) ***

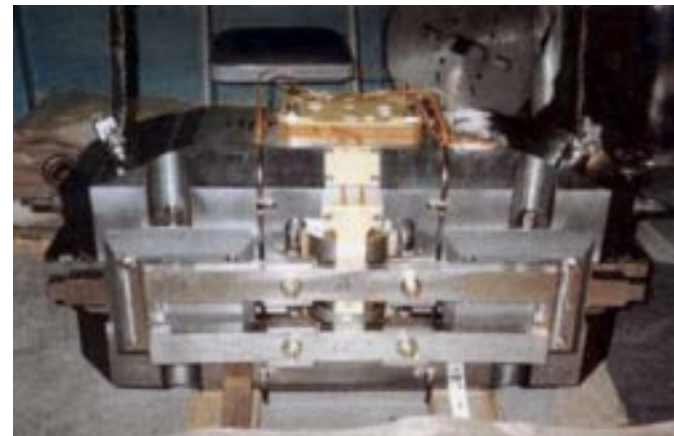
SCW: Superconducting Wiggler (Wavelength Shifter)



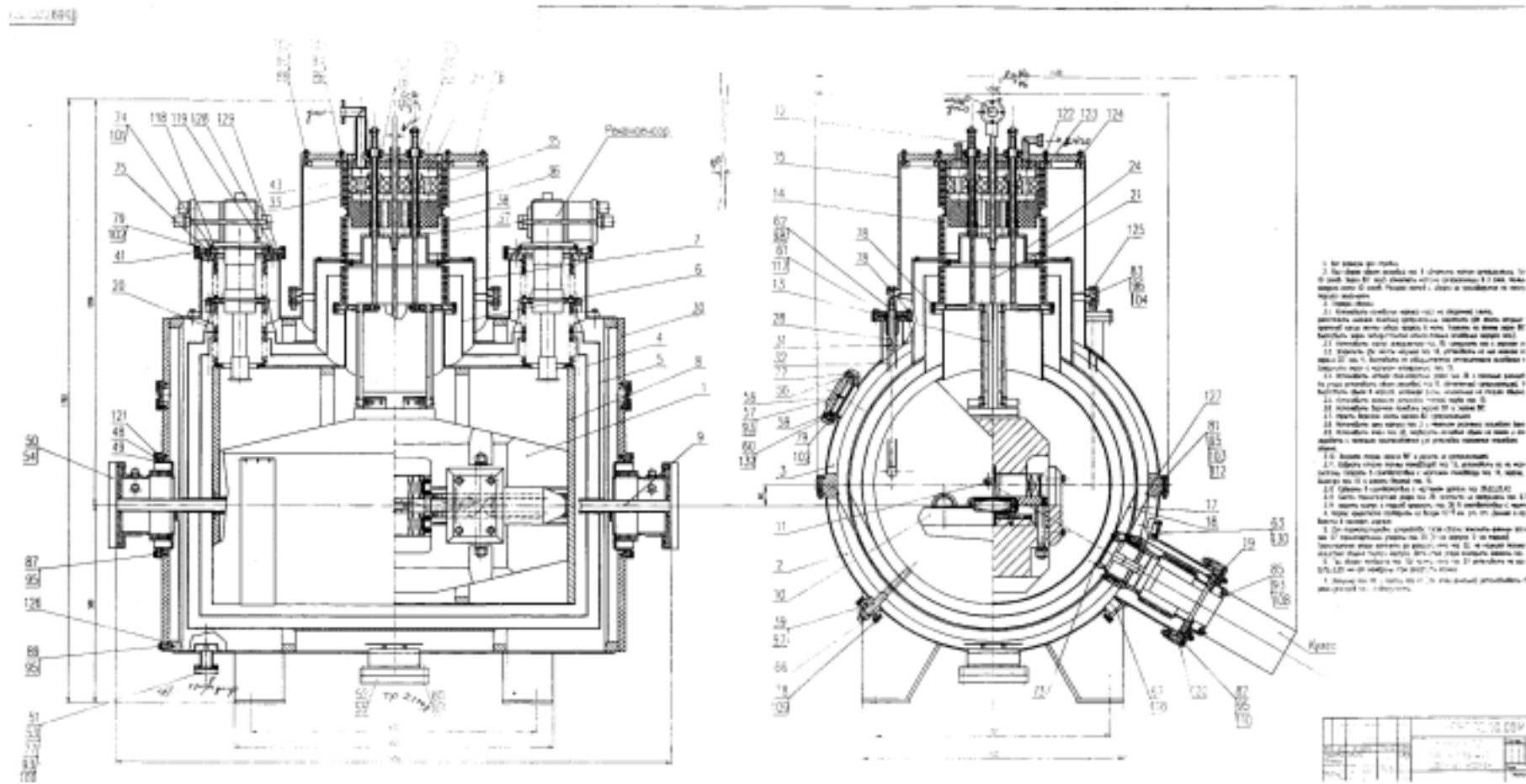
Horizontal $\sim \pm 25 \text{ mrad}$
Vertical $\sim \pm 25 \mu \text{ rad}$ for $1 \text{ MeV } \gamma$

Critical Photon Energy = 0.43 MeV
for $E_e = 8 \text{ GeV}$, $B = 10 \text{ T}$

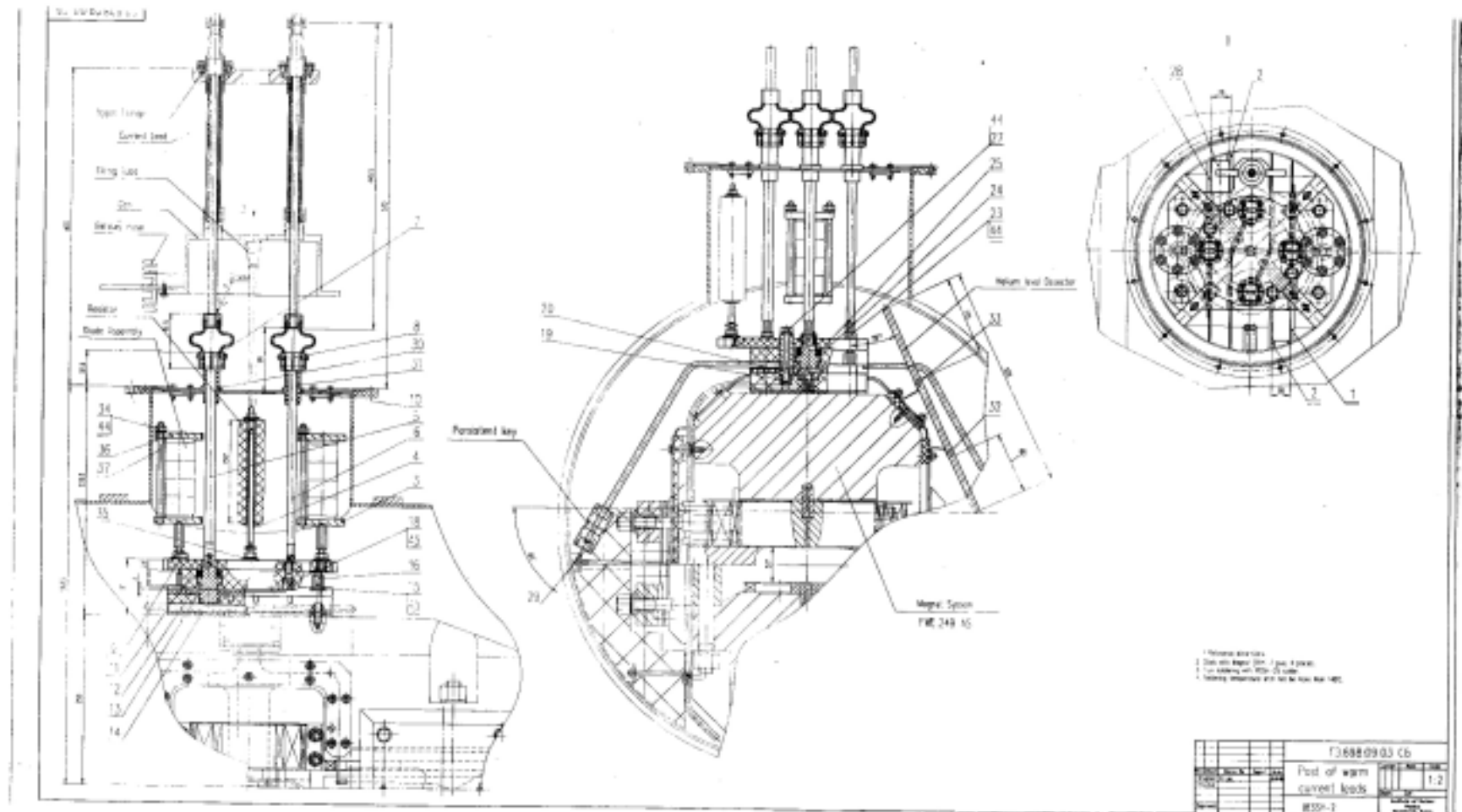
Most of the power is found in
frequencies near $\nu_c = E_e/h$.



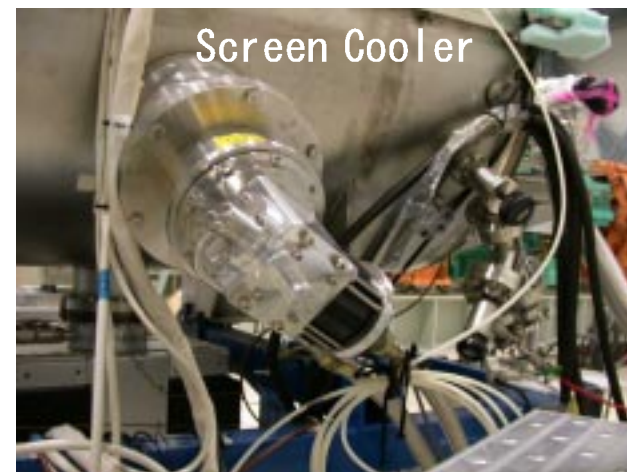
Structure



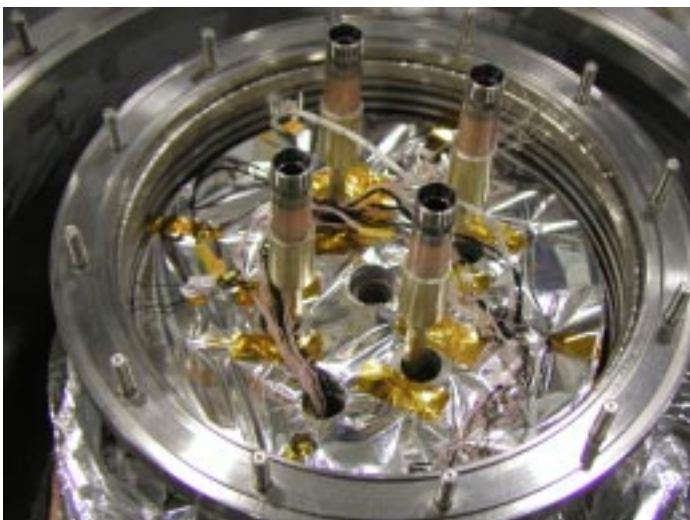
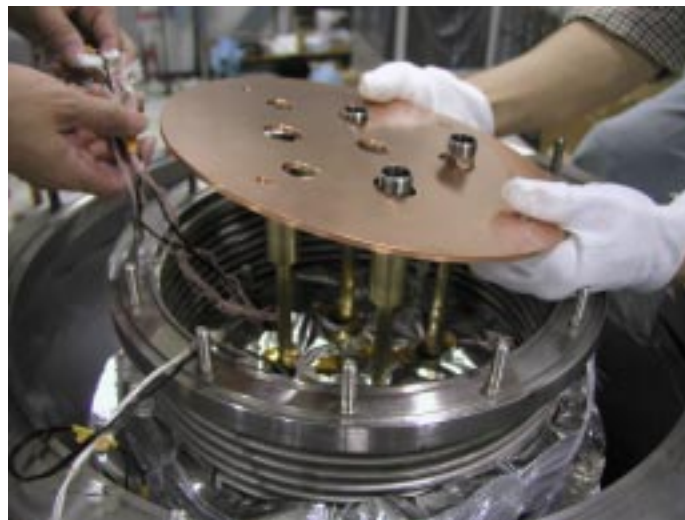
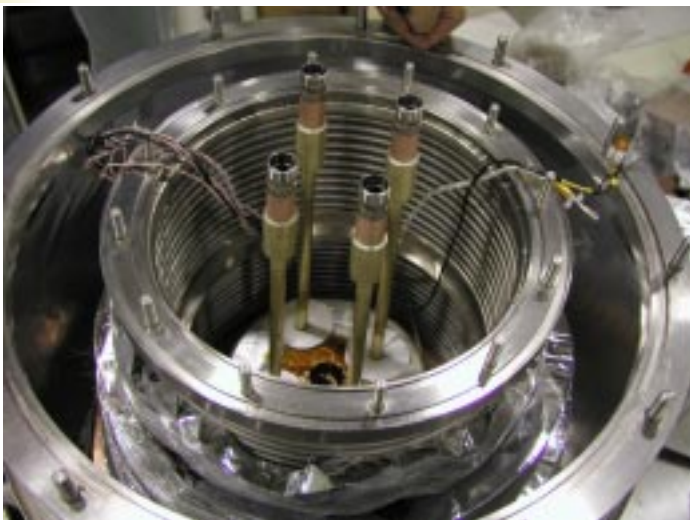
Structure (contd.)



SCW in test-bench



Cryostat Improvement



advised by Prof. T.Hata (Osaka City Univ.)

Contact Frange

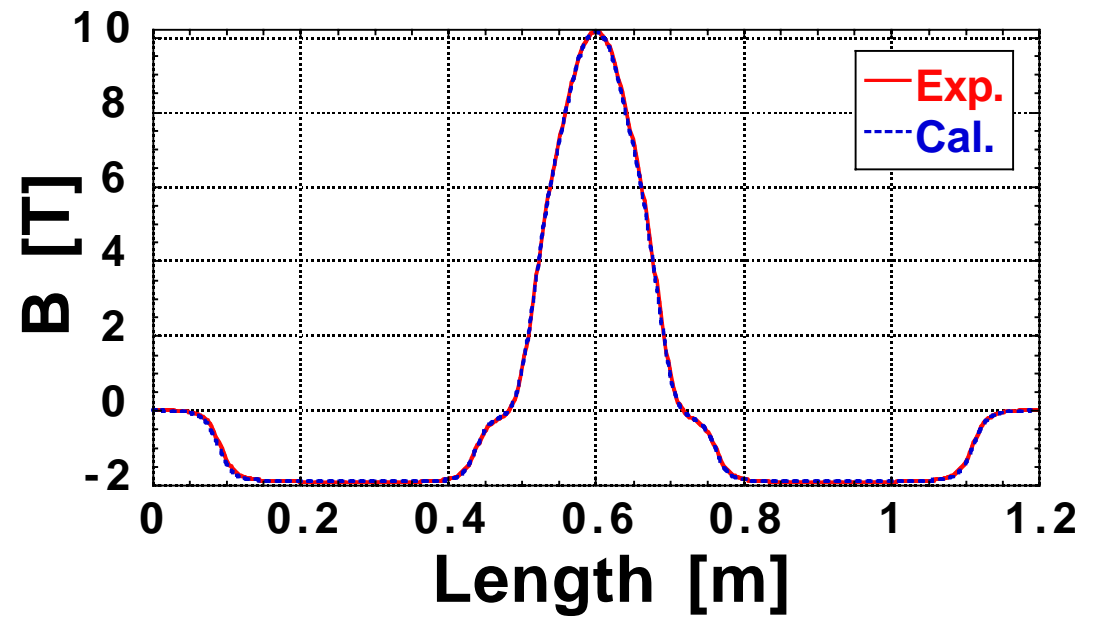


工事前
before



工事後
after

Dipole Field of SCW



Side Pole

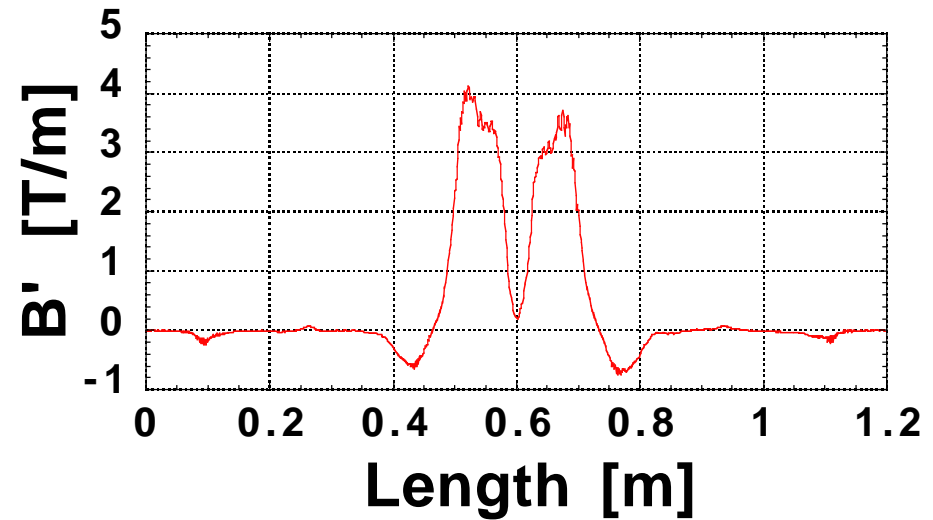
Central Pole

Side Pole

Quadrupole and Sextupole Fields

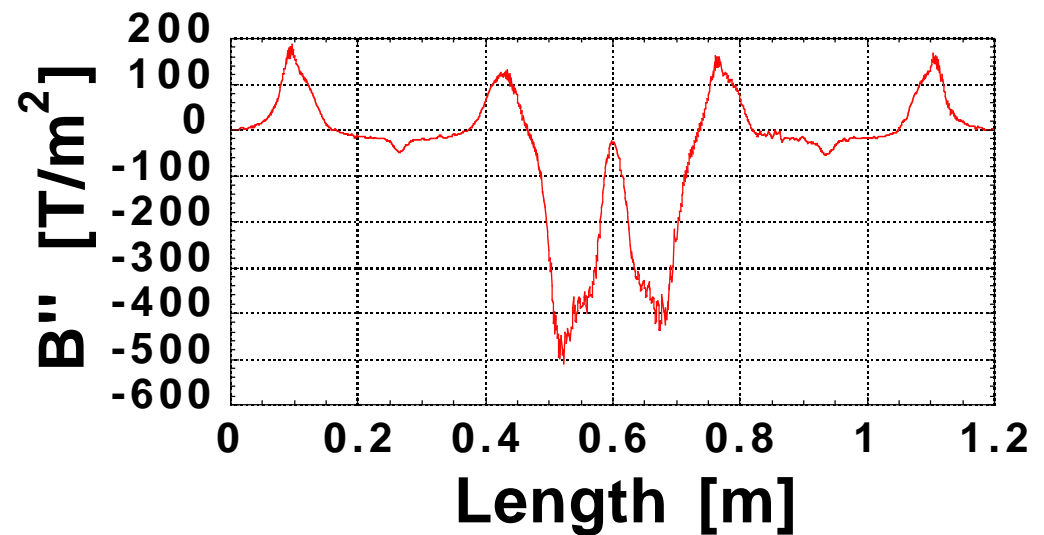
Quadrupole Field

0.50T (integrated)
defocusing



Sextupole Field

45T/m (integrated)
focusing





Electron Orbit

