IN15 Upgrade

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In15 In11 upgrades?

Std solenoid:

1m long (centered at zero), 6 cm radius 150 turns.

In20 coils:

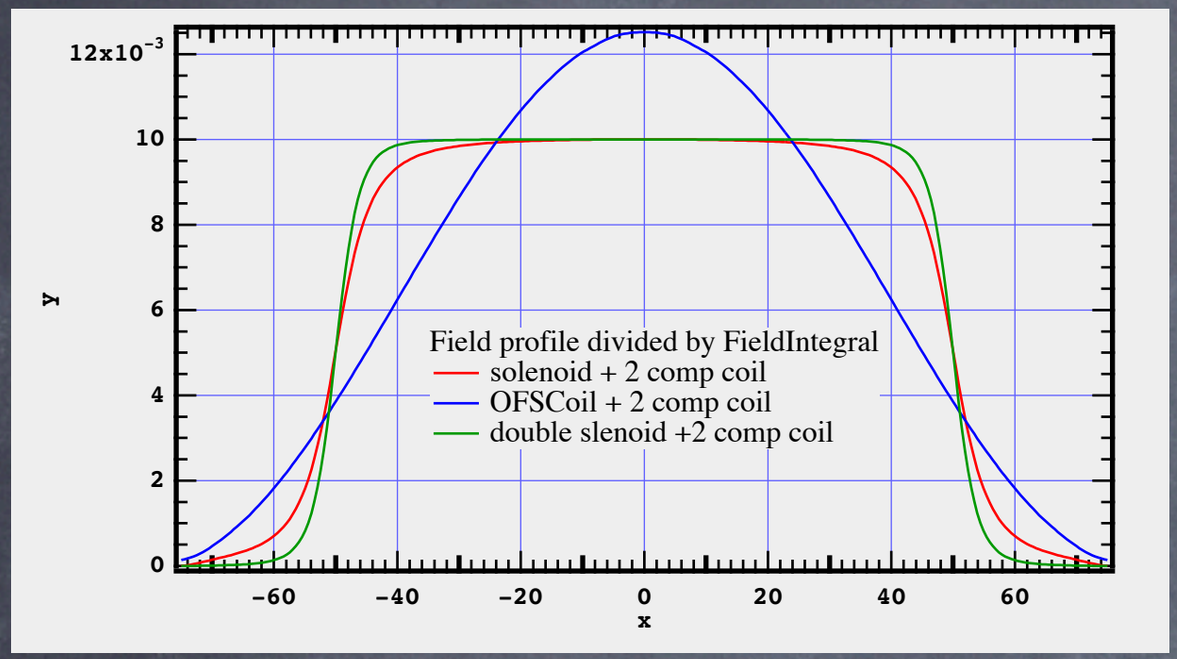
1.41m => 0.13m long 29(!) layers, 4 cm radius.

compensated solenoids:

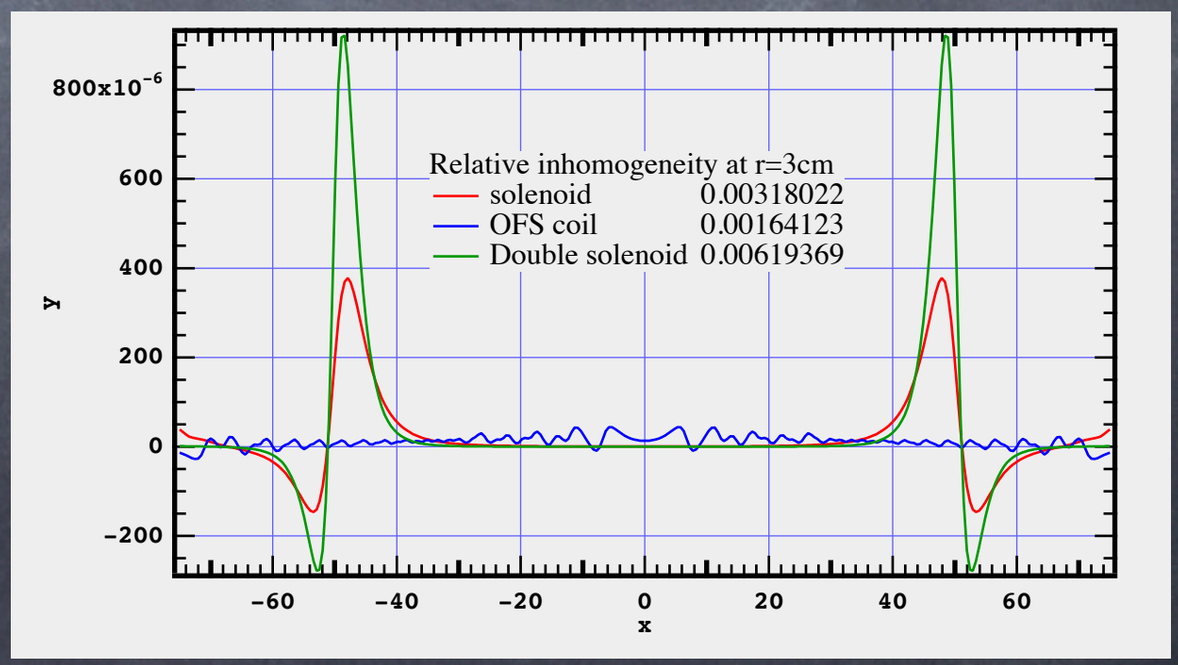
1m long r_{in}=5 cm r_{out}=7 cm radius 150 turns I_{out} ~0.5·I_{in} ensuring zero dipole moment.

for all configurations there were 2 coils 6 cm radius at + and- 75 cm which brings down the field to zero (needed for π or π/2 flipper operation)

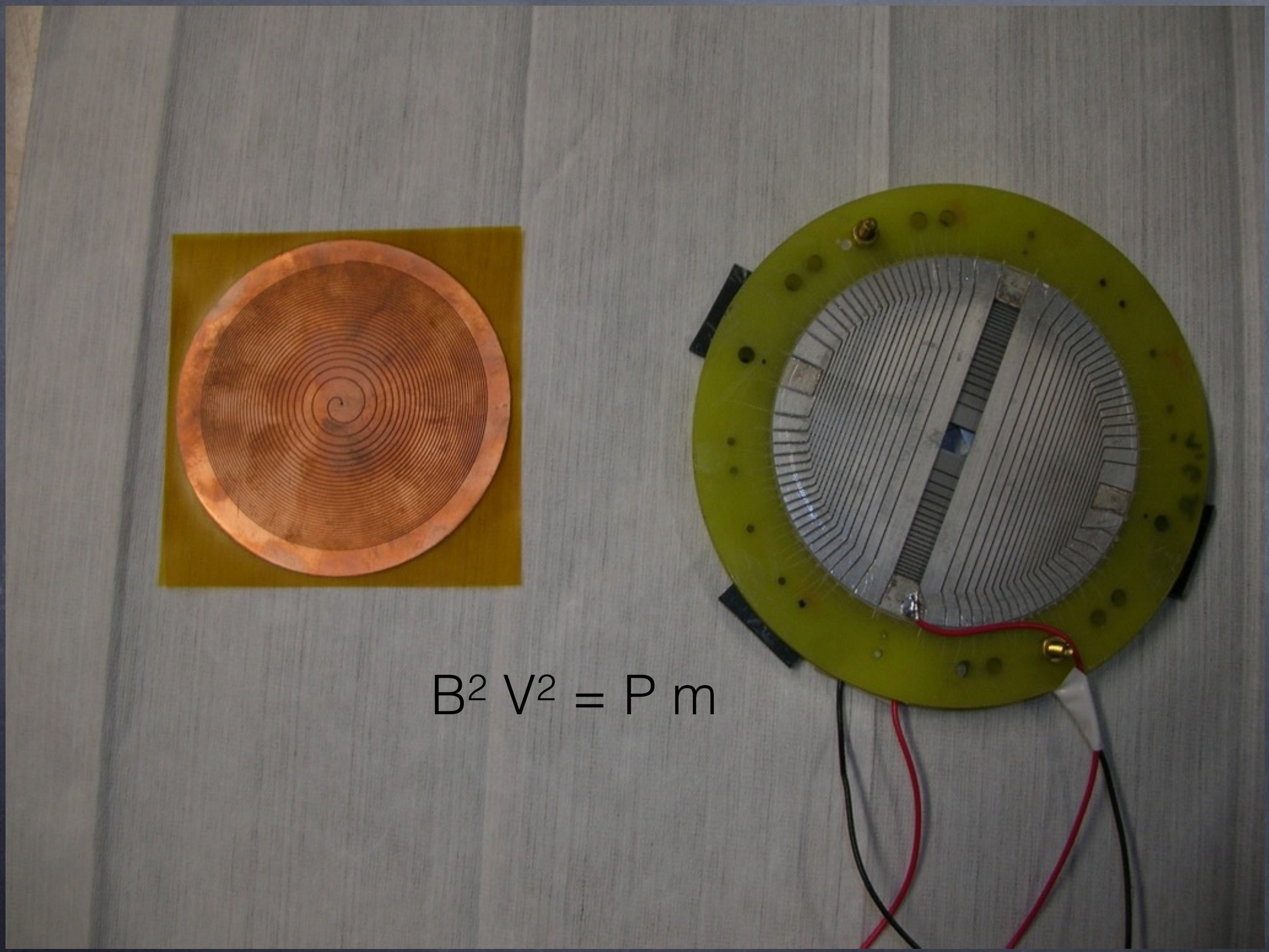
In15 In11 upgrades?



$$\Delta \int B dz \cong \frac{r^2}{8} \int \frac{1}{B(z)} \left(\frac{\partial B(z)}{\partial z} \right)^2 dz$$



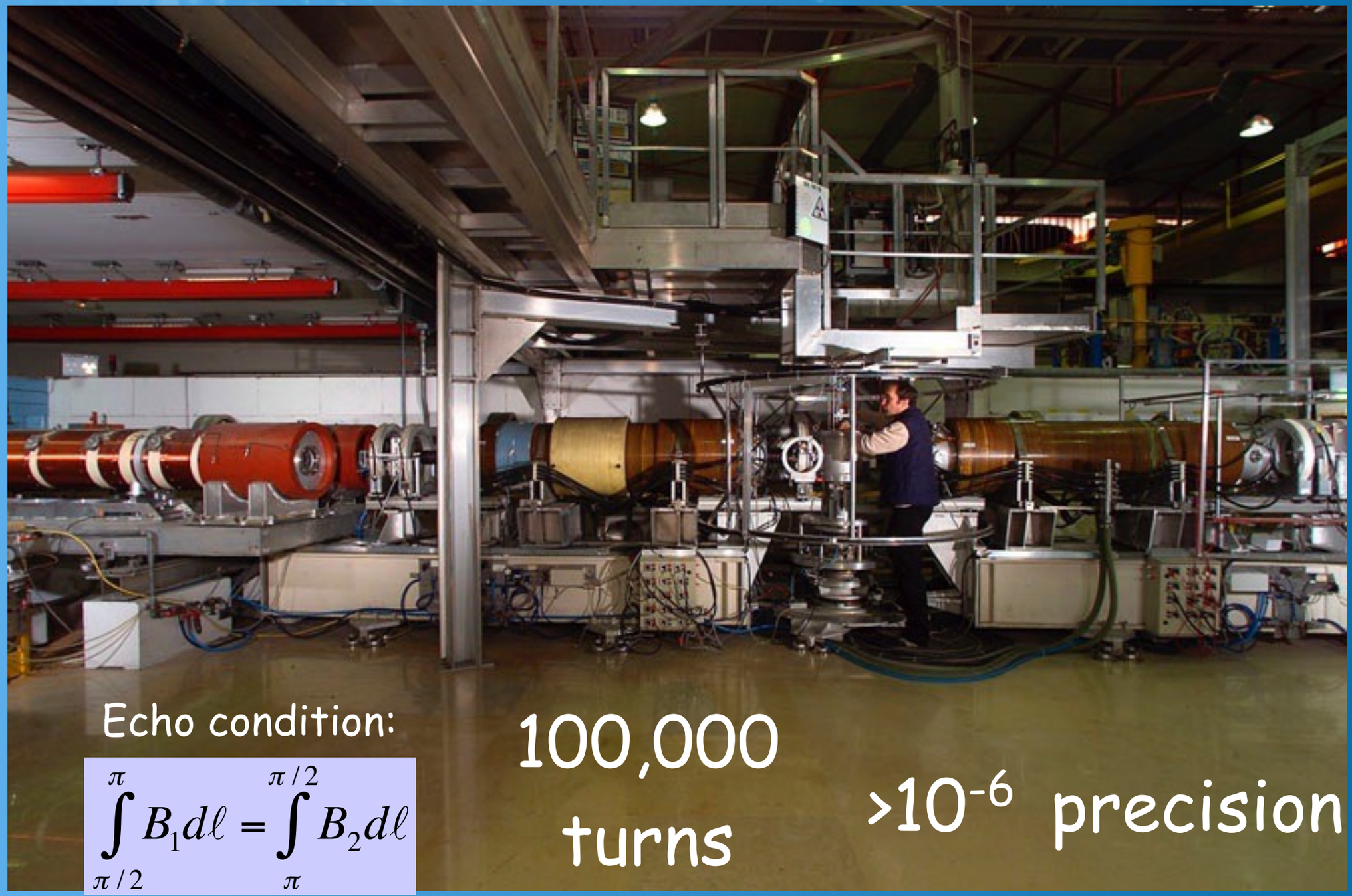
Fresnel coils



$B^2 V^2 = P\ m$

IN15 2014

The measured quantity is: $S(q,t)/S(q,0)$ where:



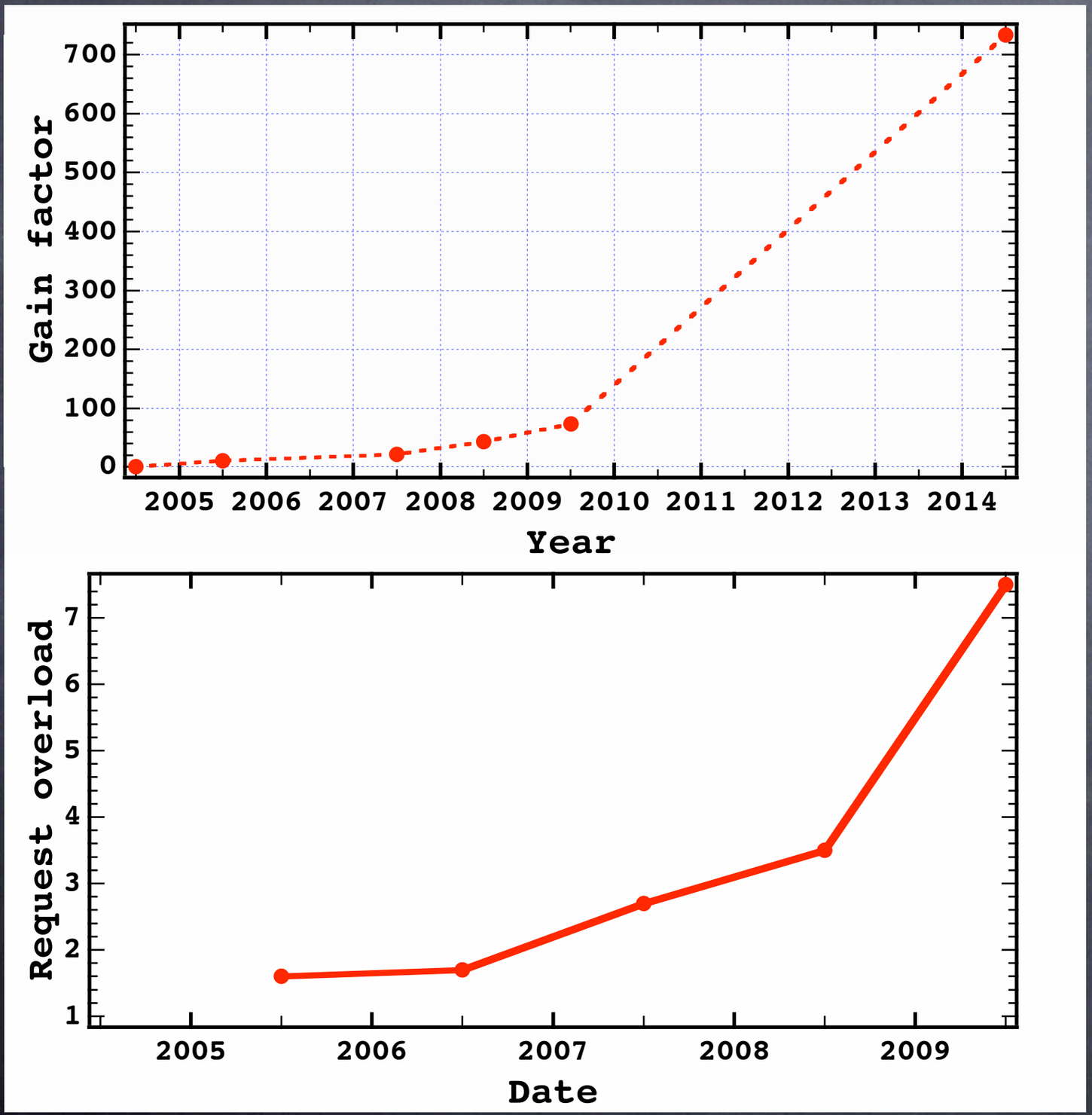
Echo condition:

$$\int_{\pi/2}^{\pi} B_1 d\ell = \int_{\pi}^{\pi/2} B_2 d\ell$$

100,000 turns

$>10^{-6}$ precision

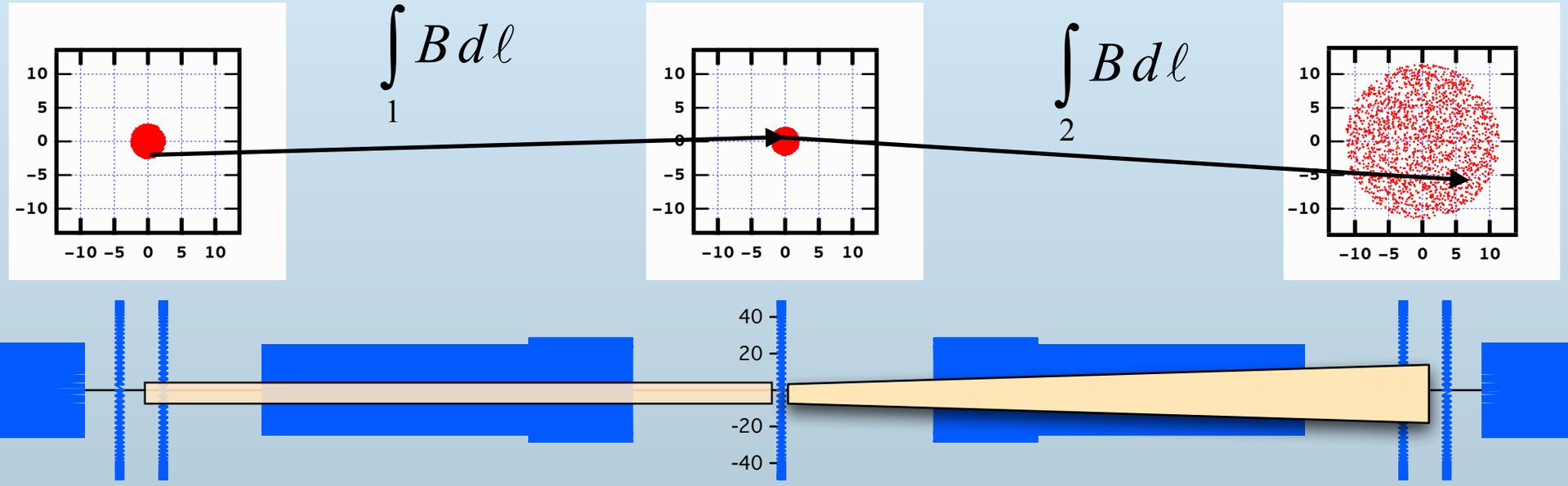
Gain=1/t=IP²R² (@500ns)



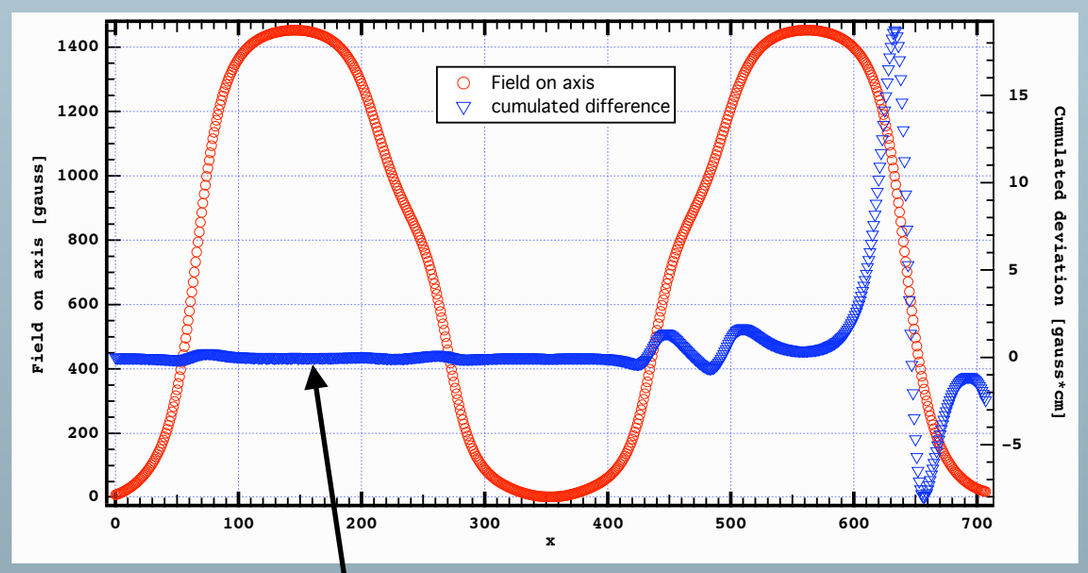
Major IN15 upgrades

Polarizer	I x11
Power supply	R² x2
Al Fresnel	I x2
Repolarizer	IP² x1.7
Precession coils	I x10

Coincidence ?

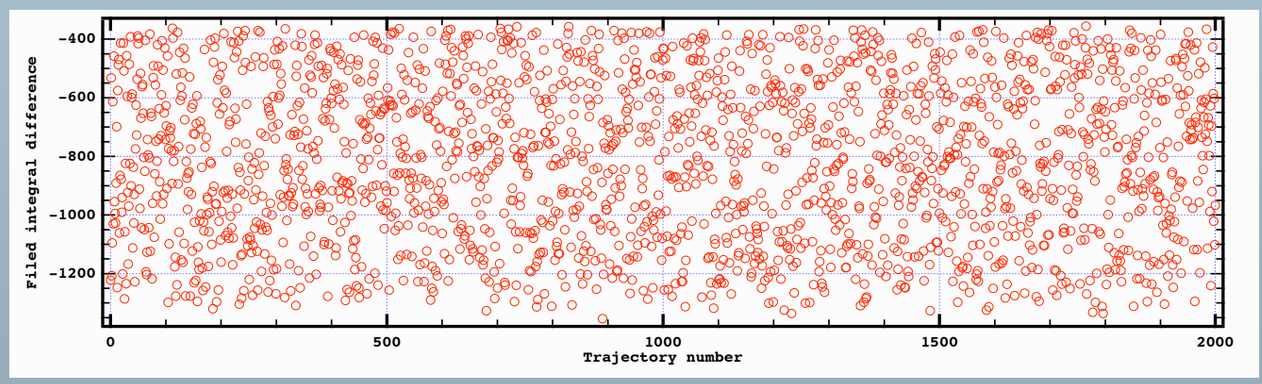


$$\int B(r,z)\,dz = \int B(0,z)\,dz + \frac{r^2}{8}\int \frac{1}{B(0,z)}\left(\frac{dB(0,z)}{dz}\right)^2 dz$$



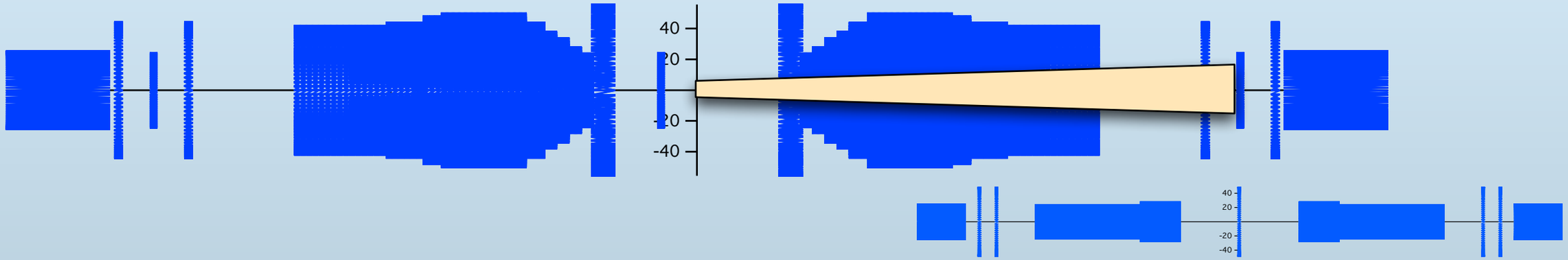
$$\left\langle B(r) - B(0) \right\rangle$$

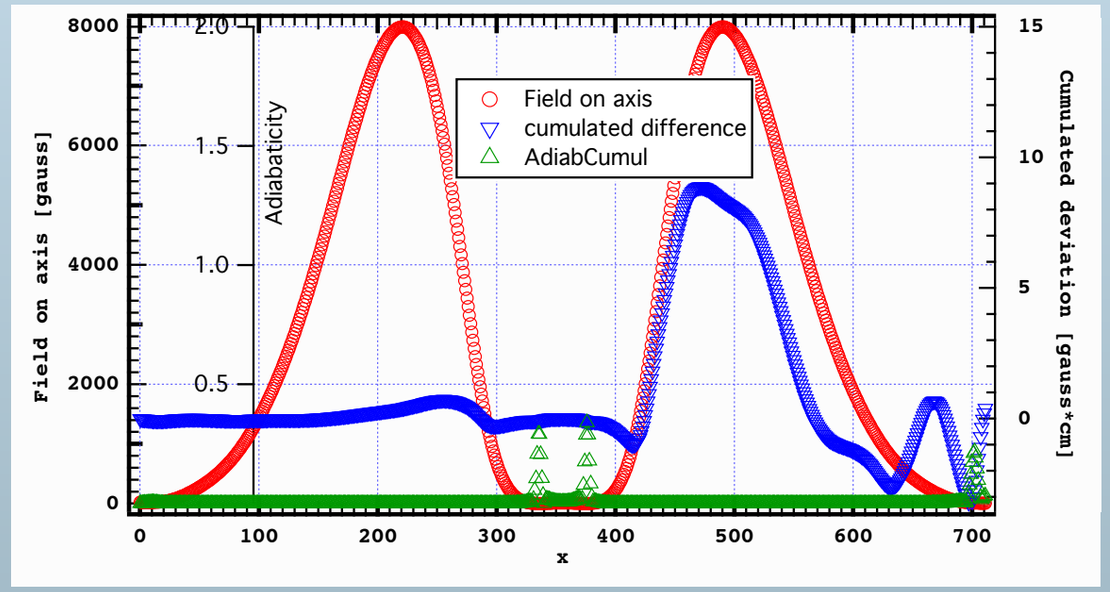
$$\Delta = \int_1 B\,d\ell - \int_2 B\,d\ell$$



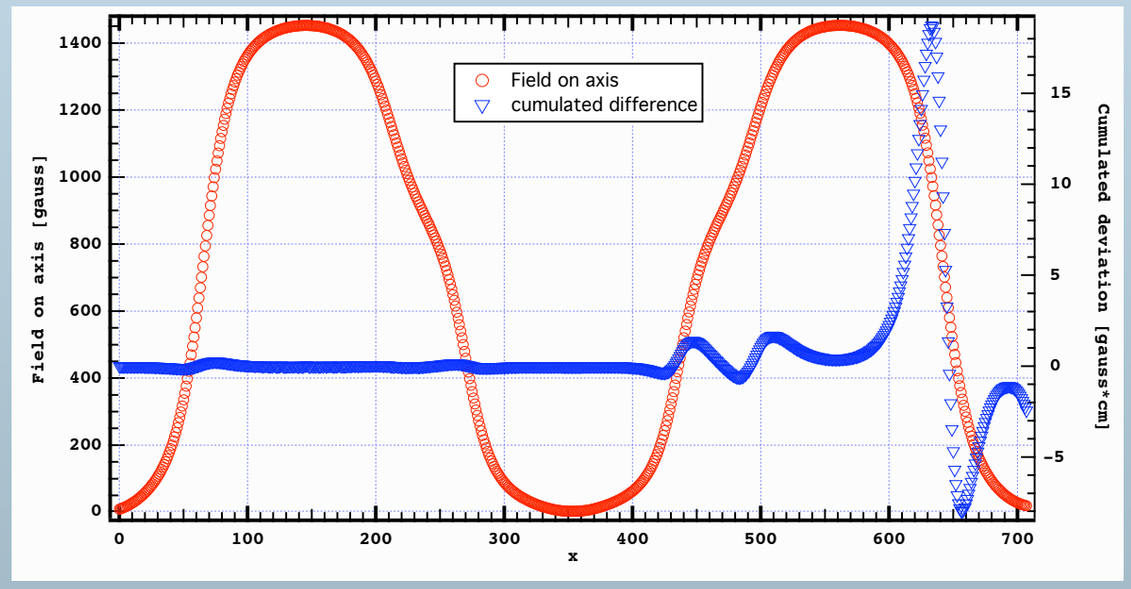
Std dev 269 Gauss cm

IN15 Upgrade





Std dev
569 Gauss cm



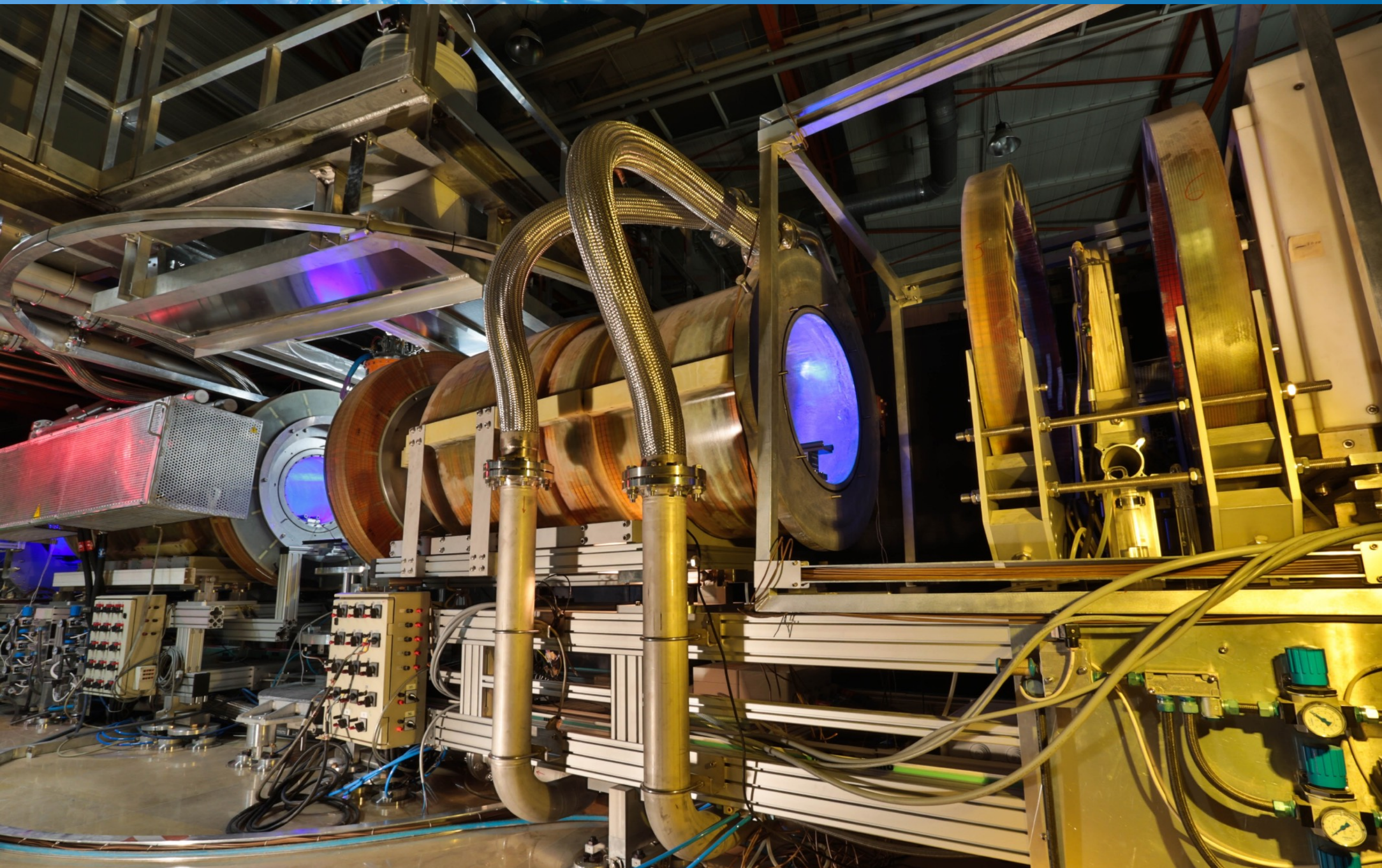
Std dev
269 Gauss cm
(4x upscale =1345)

IN15 2015

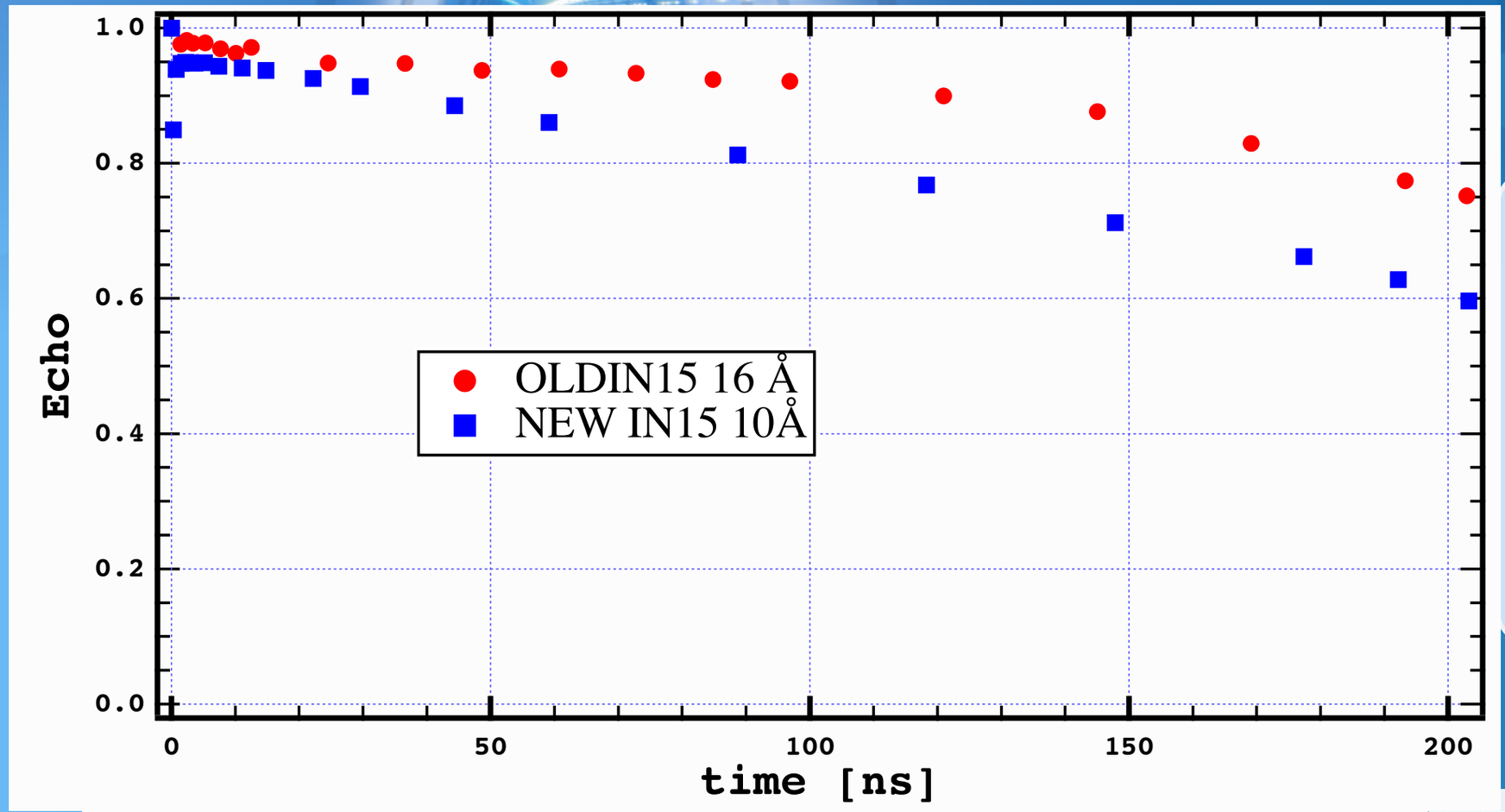
NEUTRONS FOR SCIENCE ®

IN15 2016

NEUTRONS FOR SCIENCE ®



IN15 upgrade



$$t \propto \lambda^3 \int B\, dl$$

$$I \propto \lambda^{-5}$$

4 x higher field integral

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1/1.6 x shorter wavelength

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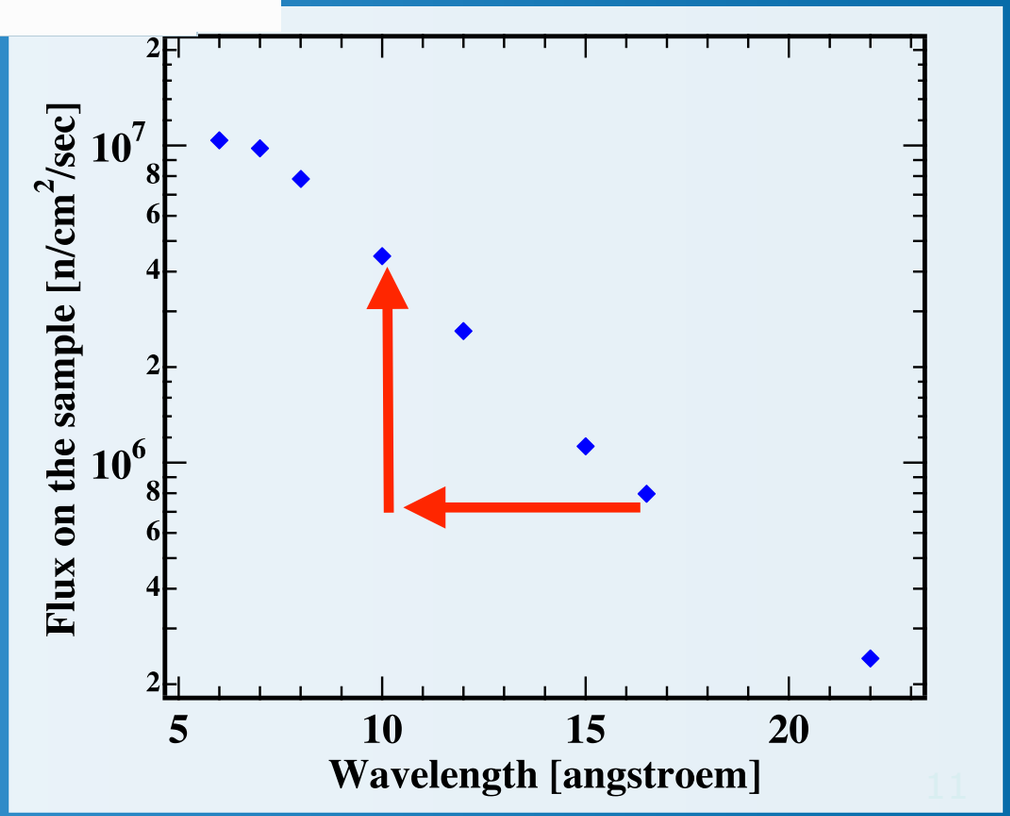
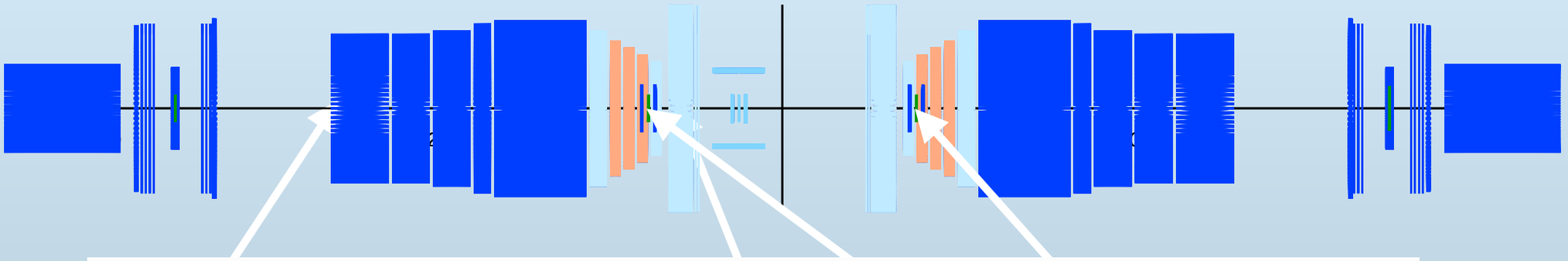
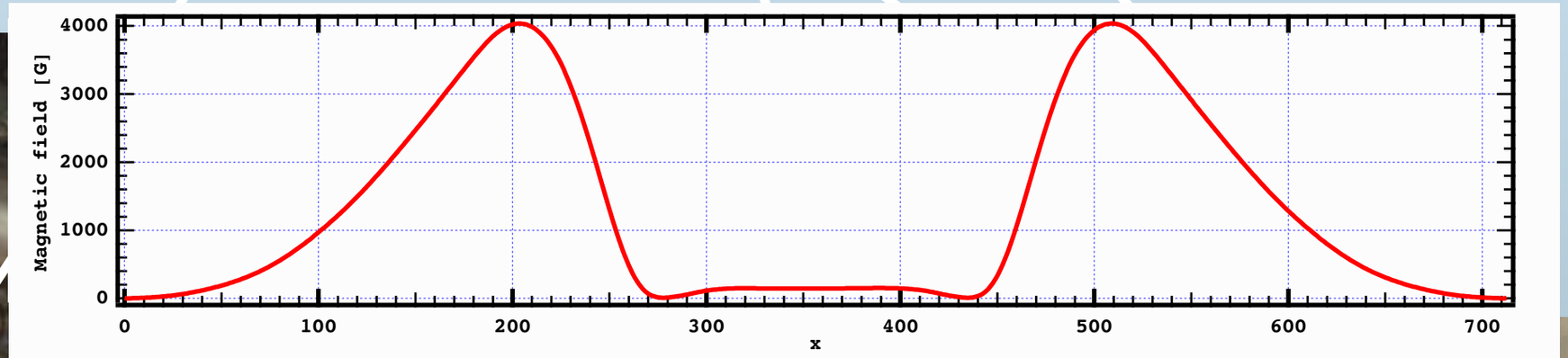
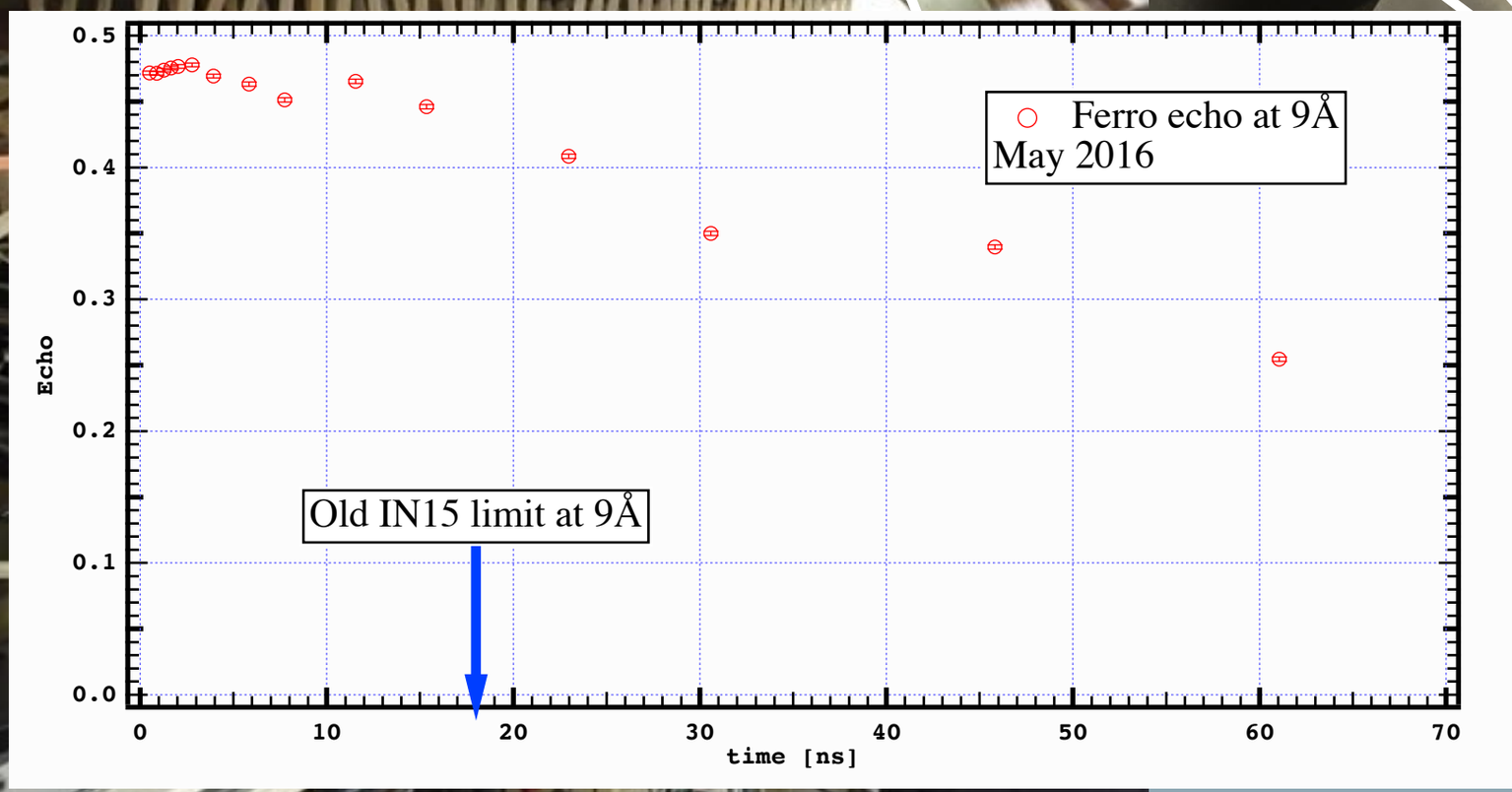
10 x higher intensity!

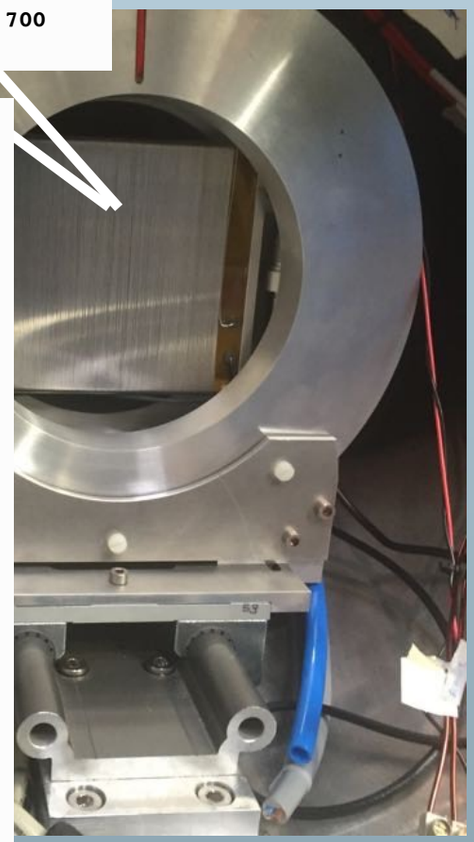


Ferromagnetic echo

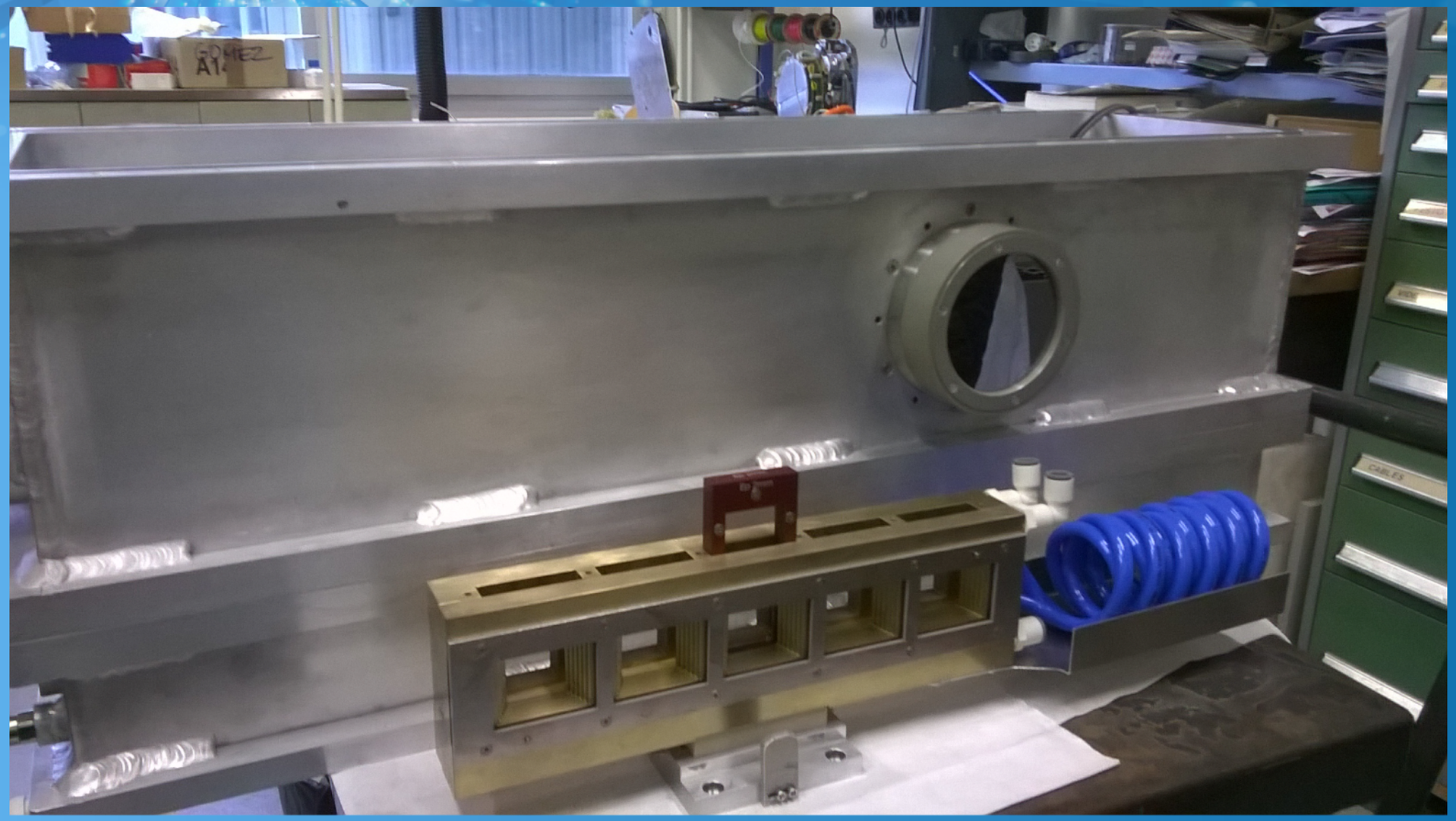






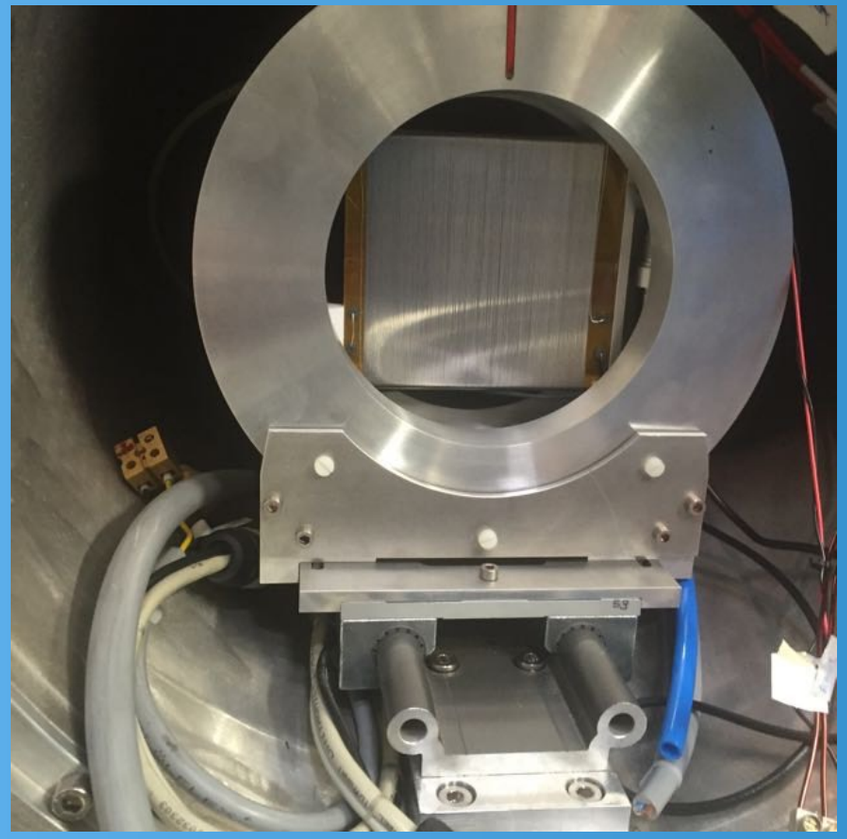


IN15 Projects



Sample changer ?

Small echo

Using the same removable flippers shortest to longest times scale extended from 1:1000 to 1:10000

Very compact coils no need to dismount them