

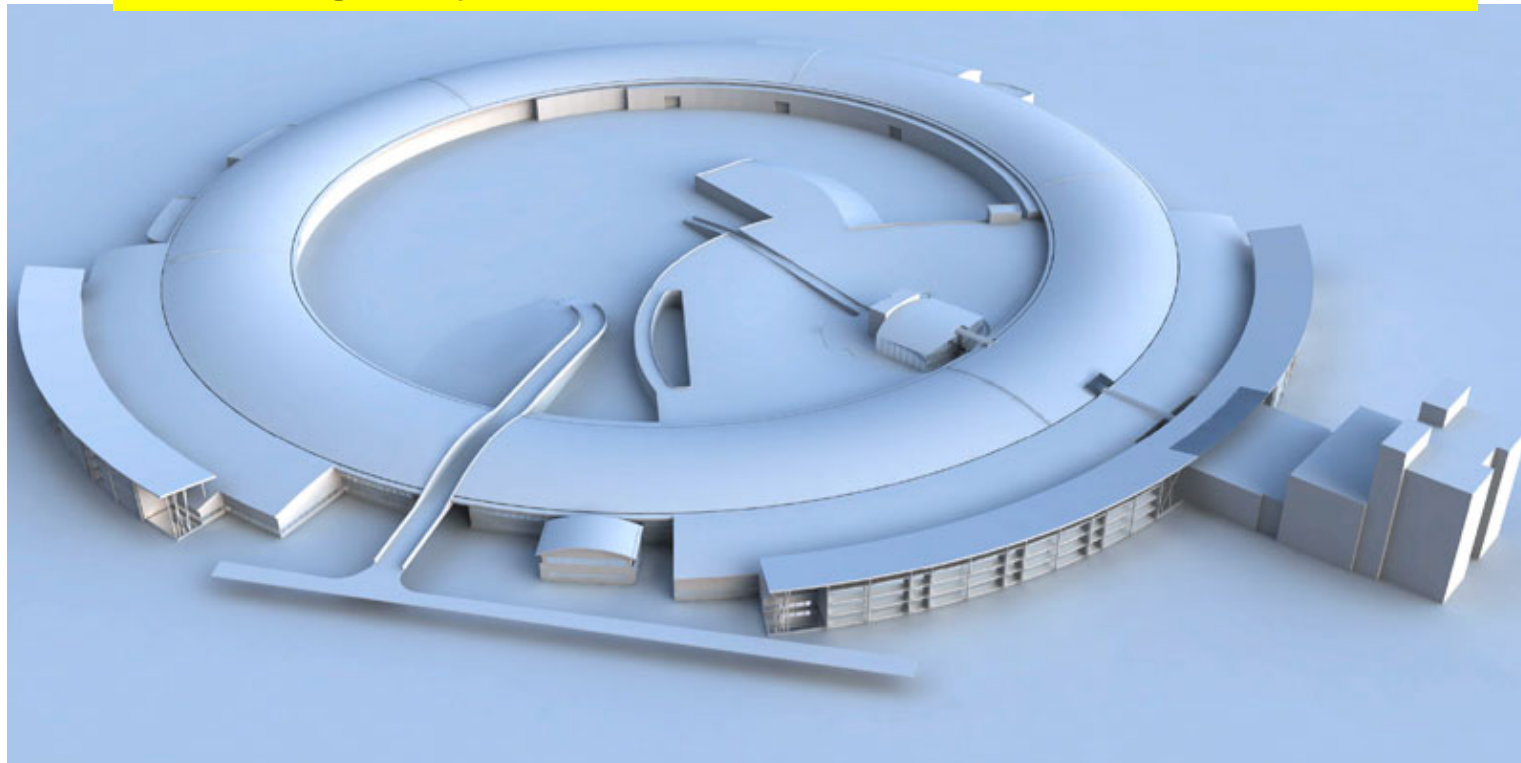


- 1) Why the ESRF wants to upgrade its BPM system ?**
- 2) Clean & Clear Turn-by-Turn measurements**





the Upgrade Programme is an exceptional 10 year project that will greatly extend the scientific impact of the ESRF.





The costs for this 2008-2018 programme are :

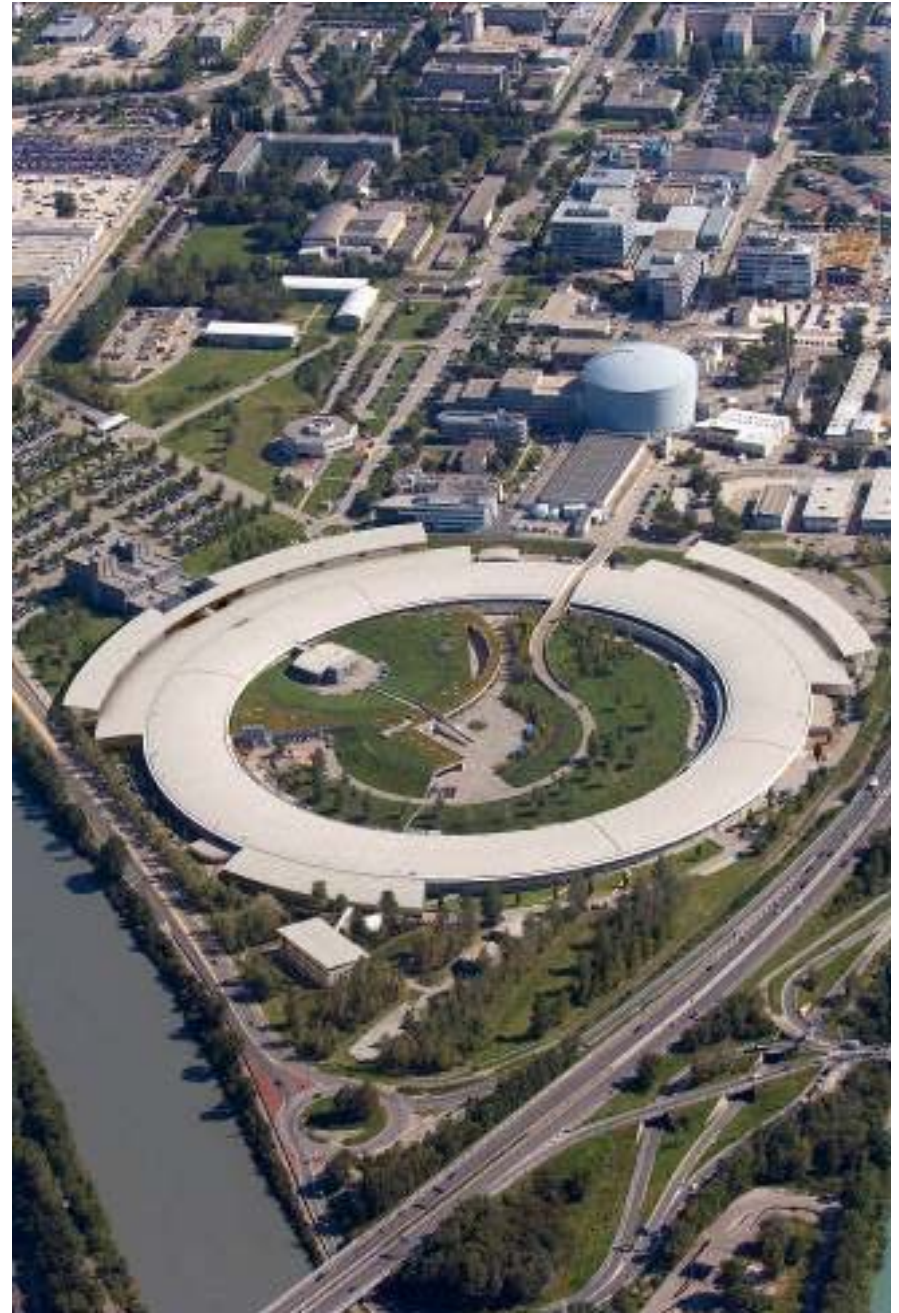
X-ray source upgrades	50 M€
Beamline upgrades and new beamlines	92 M€
Experimental Hall extension	45 M€
Instrumentation development and beamline support	45 M€
Grand Total Capital Investment	232 M€ +

Comparison : ESRF annual budget ~80 M€

X-ray source annual budget ~10 M€



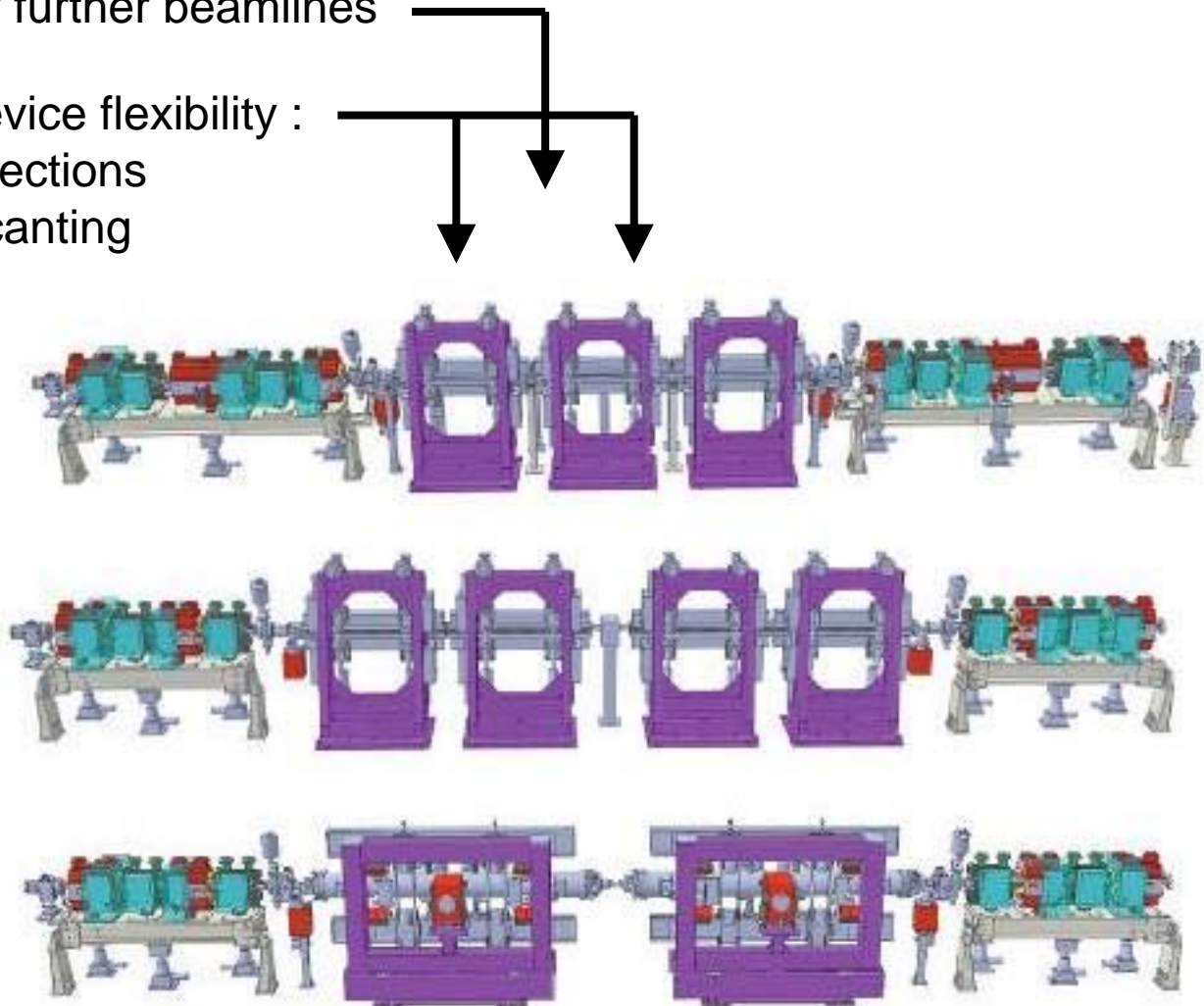
present



future

Accelerator and Source Upgrades Programmes for :

- Higher flux and brilliance
- **Higher photon beam stability**
- Increased capacity for further beamlines
- Increased insertion device flexibility :
 - 7m straight sections
 - Wide-angle canting



- 22 December 2006 : Conceptual Design Reports (CDRs) sent to SAC, etc.

2007

- 30 January: Directors approved extension “shell”
- 7 February: ESRF Users’ Meeting
- 14 February: Special meeting with Coordinating Group of SAC,
- 2 May: Submitted ESFRI proposal
- 3 May: Working copy of Purple Book sent to SAC
- 24/25 May: ESRF SAC meeting
- 1 June: Updated working copy of Purple Book sent to Council
- 11 June: ESRF Brochure delivered
- 1 June: sent Purple Book draft to Council
- 11/12 June: ESRF Council meeting
- 12 October: Deliver final Purple Book
- 24 October: Upgrade Information Meeting
- November ESRF Council meeting: **decision ??**
- Spring 2008: Define set of first phase beamlines



2008

- Launch first Upgrade activities



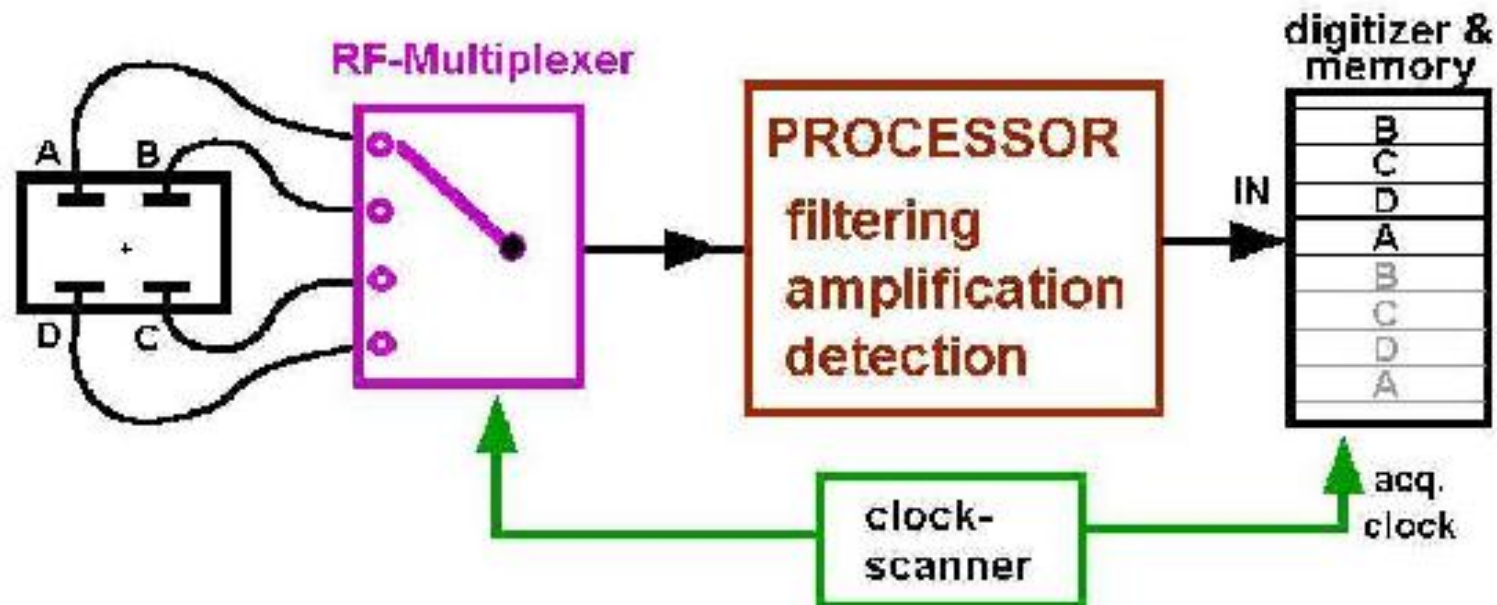
Why the ESRF wants to upgrade its BPM system ?

a) funds will become available

b) the present system is obsolete, but maintainable

**c) a new & modern system will offer higher quality of performance & functionality that will be needed and appreciated by various people :
operators, e-beam-physicists, X-ray users**

The 'problem' with the (slow) existing system :
it still works properly, after > 15 years of loyal service . . .





among its in-perfections :

for 1st Turn(s) measurement capability, 4 X 5mA from the Injector is needed

so : if no closed-orbit is achieved very rapidly then the corresponding electron beam losses, causing neutron creation everywhere, will interlock the Injector !!

the interlock threshold for these neutron detectors has dramatically decreased (following European radiation exposure regulations) since 1992 . . .

Conclusion : If ever the alignment or beam-steering of our Storage Ring or the Injector is totally lost (various causes can be envisaged) than the BPM system offers very limited measurement time to find & localize & remedy the cause

In other words : In exceptional circumstances the ESRF may get stuck for many days before it re-finds the conditions for storing an orbit in the Storage Ring

So : Low current, pure single shot BPMs can be an absolute necessity



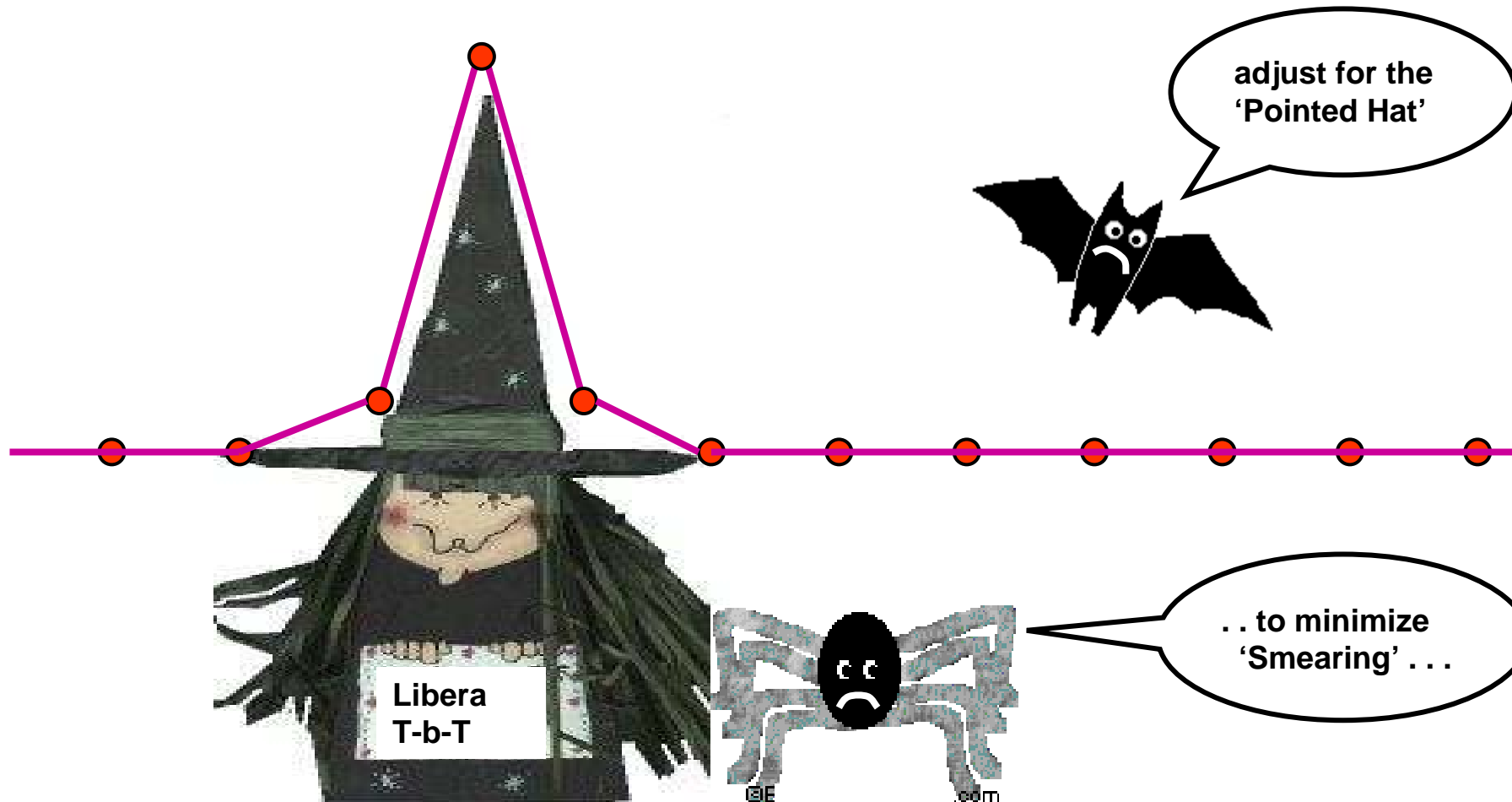
The Libera-Brilliance offers through,
its superior performance (resolution, sensitivity and stability),
and superior functionality (various data output channels, interlock function)
other advantages :

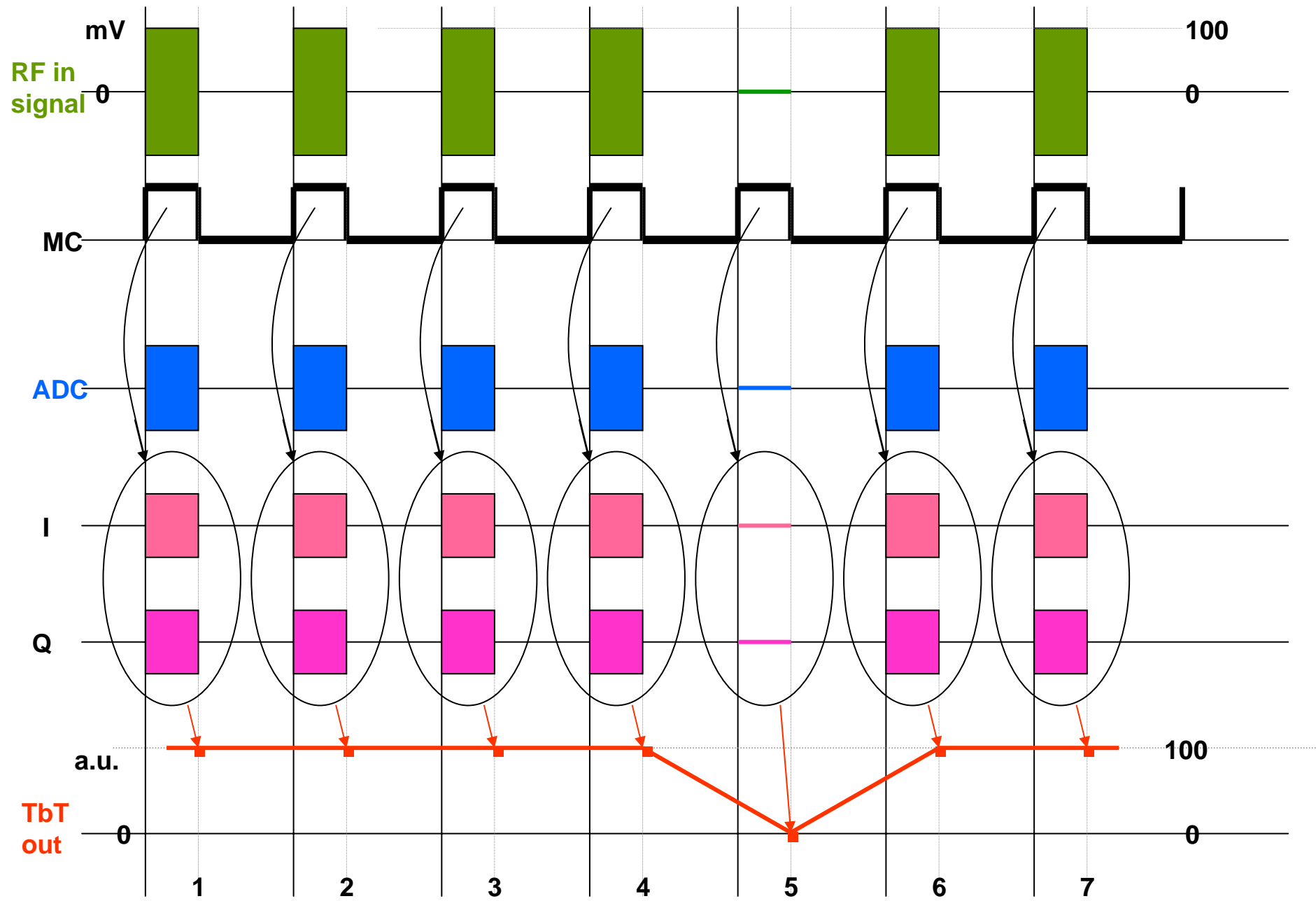
- 1) special accelerator physics studies can be performed now
or performed with much more ease & speed
- 2) the X-ray source (and its beam-line Users) should benefit from improved stability

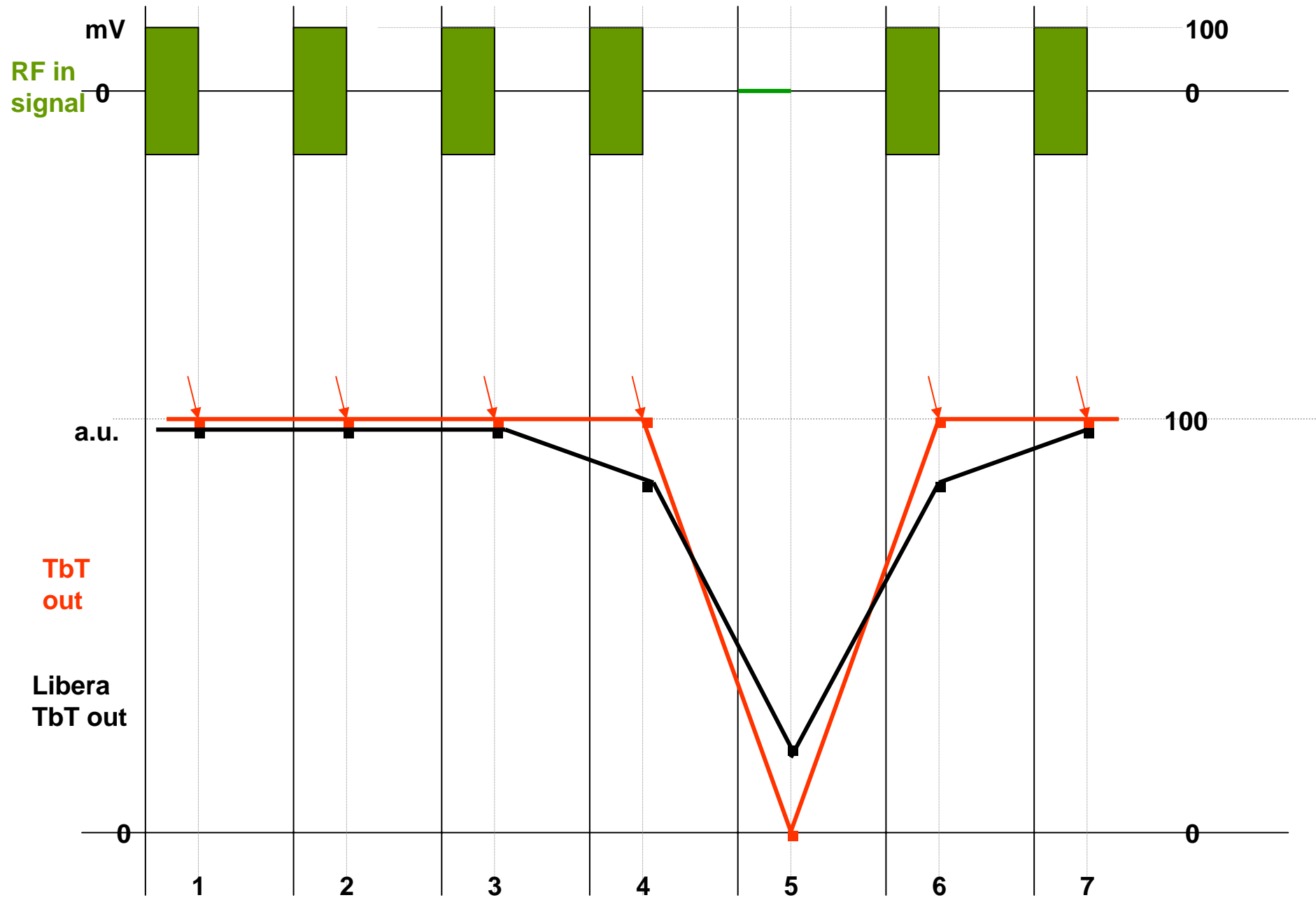
The ESRF envisages the procurement of (at least)
230 Liberabrand-Brilliance units in 2009 (2008 ?)

We anticipate that major procurement with the procurement of 8 units now (Oct. 2007),
so to fully assess their performance, and the resulting benefits to our institute,
so to ensure that, as soon real funds become available, we are ready to order.

2) Clean & Clear Turn-by-Turn measurements









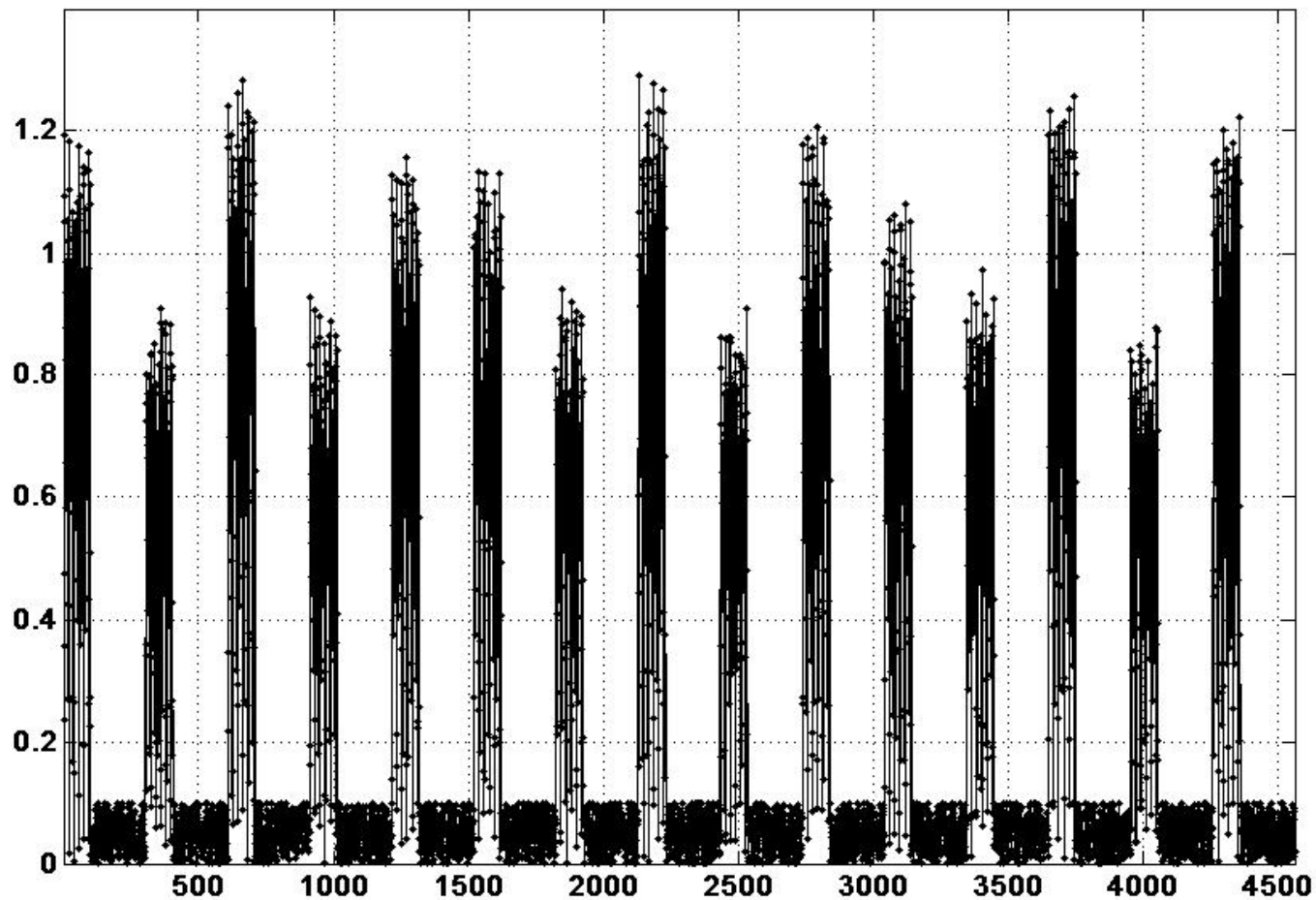
Limiting the bandwidth of the TbT output to $\sim 0.3 \times$ the TbT freq. is theoretically rigorous & sound (Nyquist)

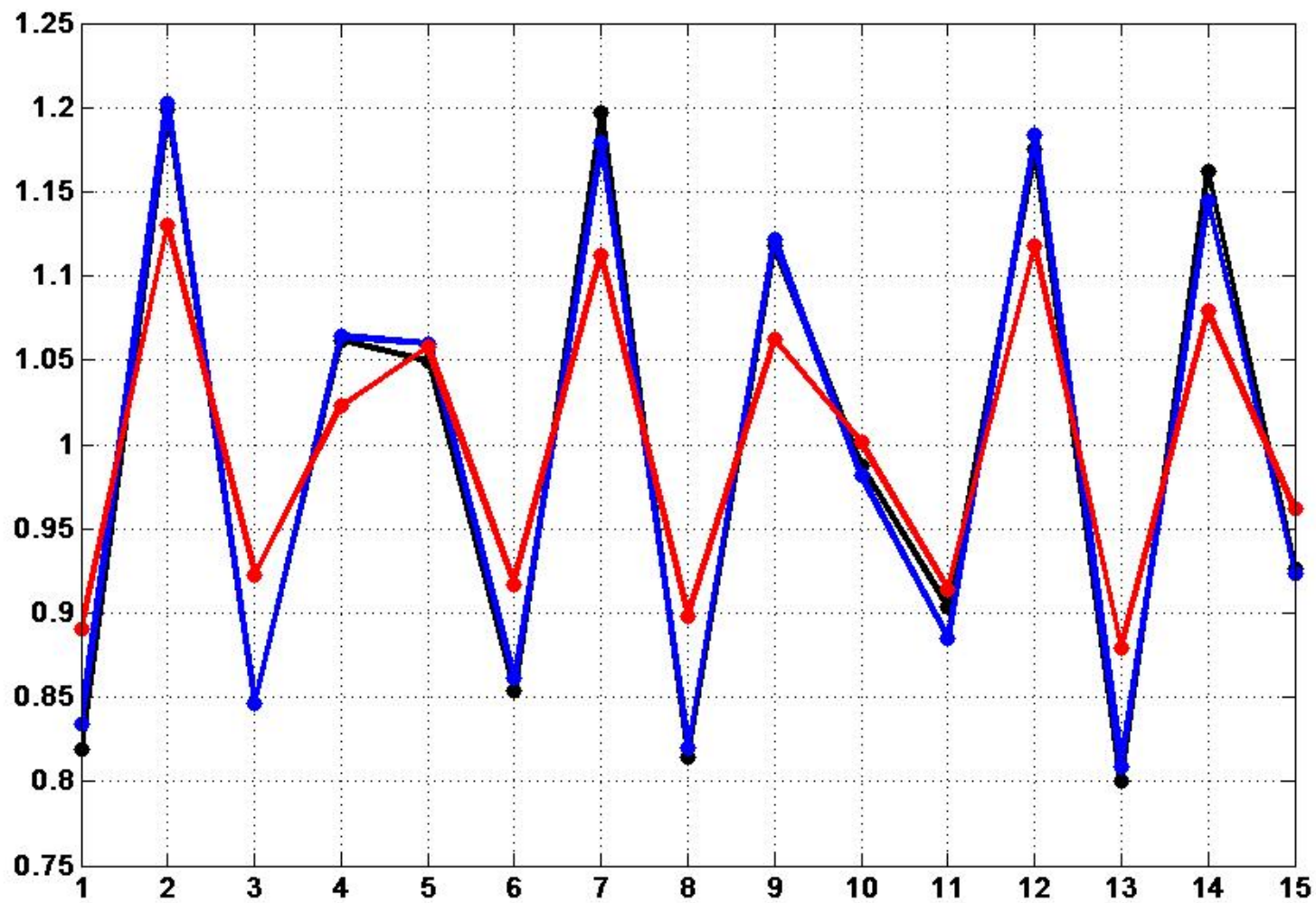
But with typical tune frequencies at $\sim 0.4 \times$ the TbT freq. the measured tune amplitude is attenuated

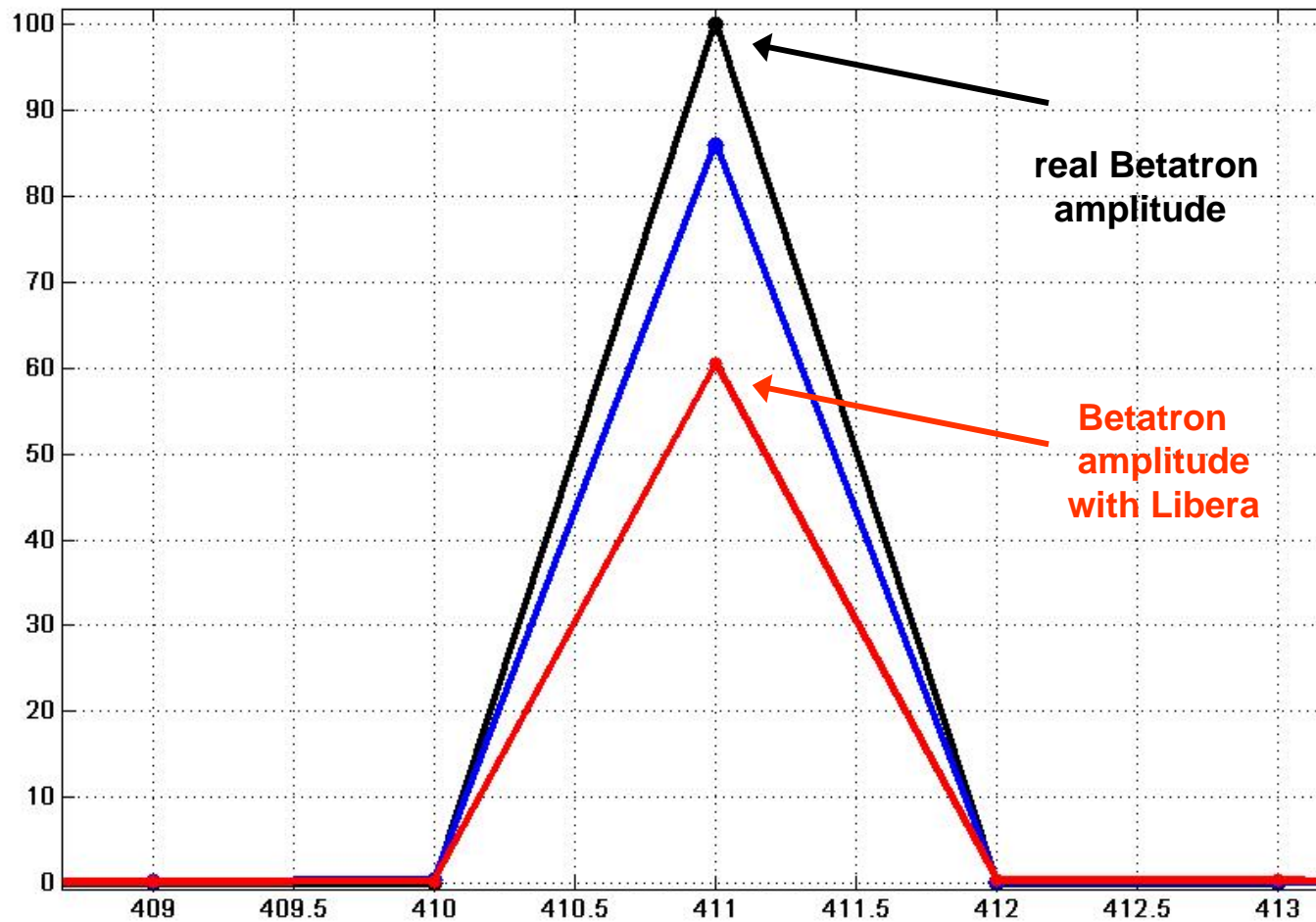
The attenuation is a function of the tune frequency, so the filter characteristics need to be known to compensate for this

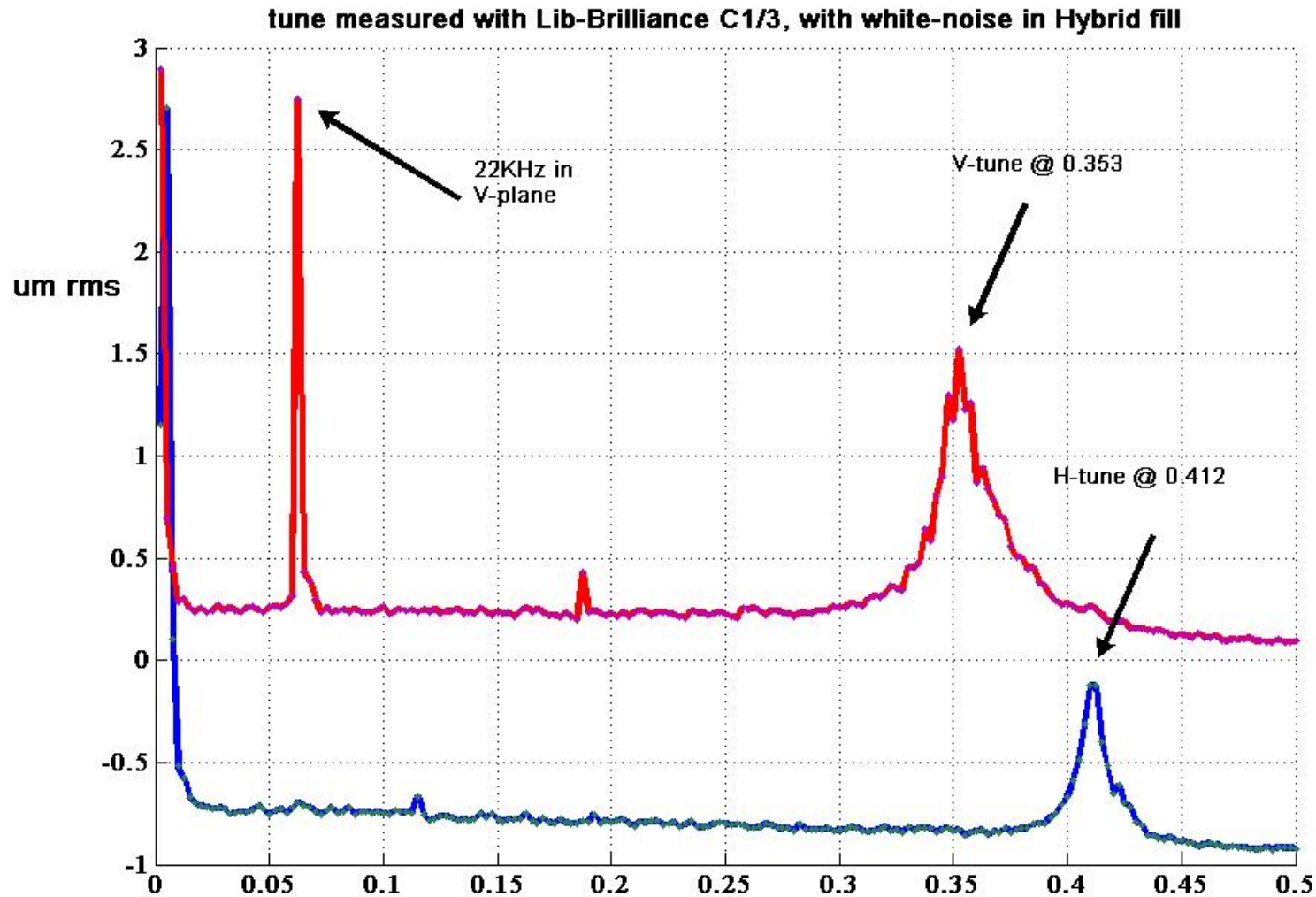
Instead a simpler filter function, a 'summer' of the ADC samples of those that contain beam signal (in case of partial fills), would avoid all this without creating other effects through 'aliasing'

This should also improve the Liberas resolution performance with partial fills (and this for all outputs, TbT, FA and SA) since ADC samples that contain NO Beam signal (but only noise) would be discarded

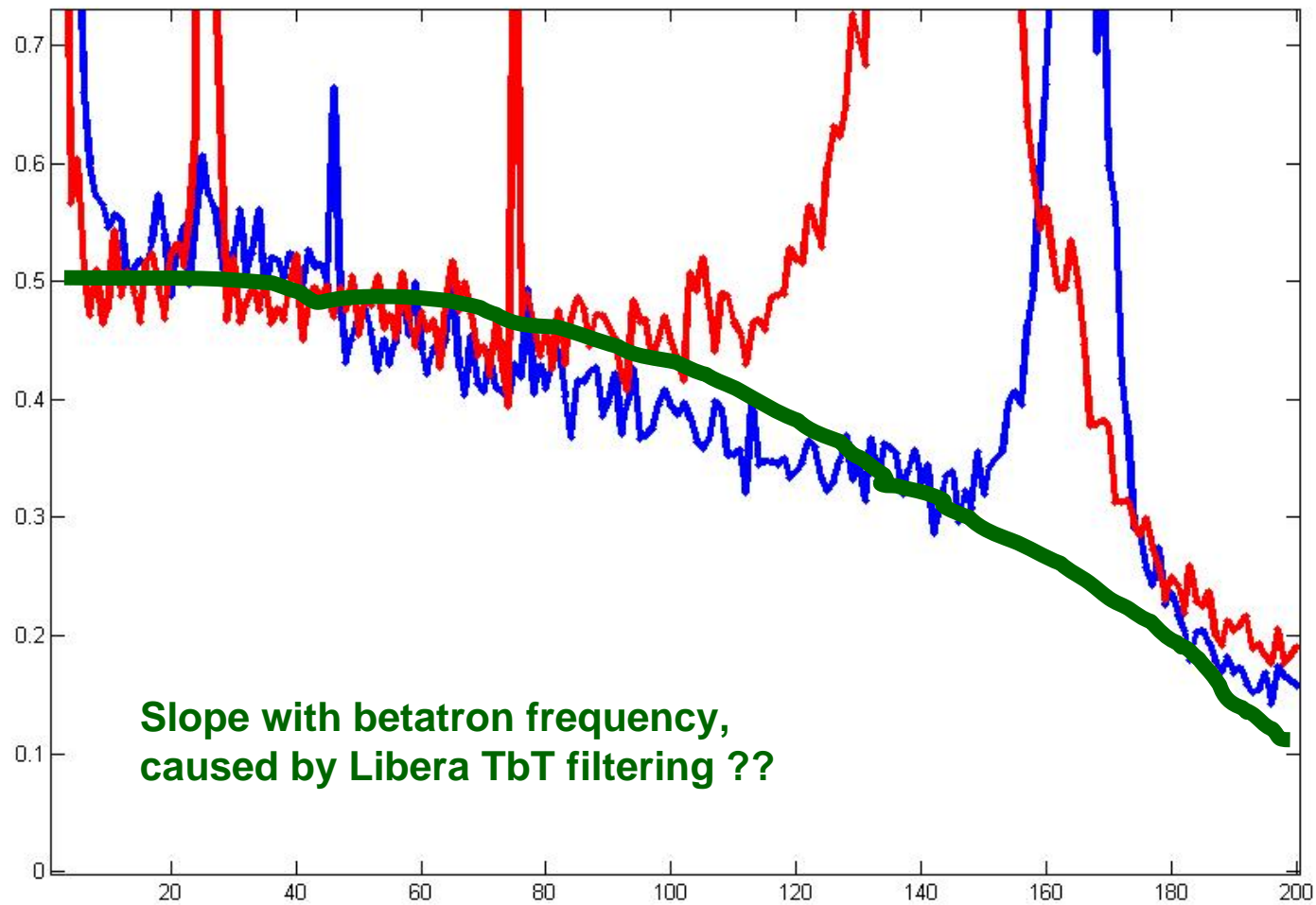








Thank you for the Try-Out Libera-Brilliance !!





**Turn-by-Turn beam position measurements
allow accelerator physicists to measure :**

- **The linear optics (the lattice parameters) of the accelerator, like
Betatron functions & Phase advance**
- **The small distortions to these optics like focussing errors
and to localize them**
- **Phase modulations under different conditions (resonance corrections)**
- **Betatron coupling between the Hor. & Vert. planes**
- **Non-linear optics like tune-dependence on amplitude**

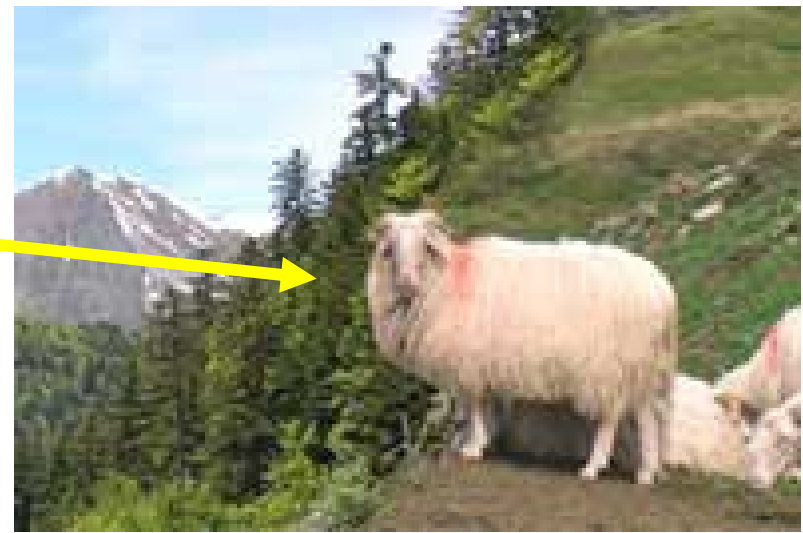
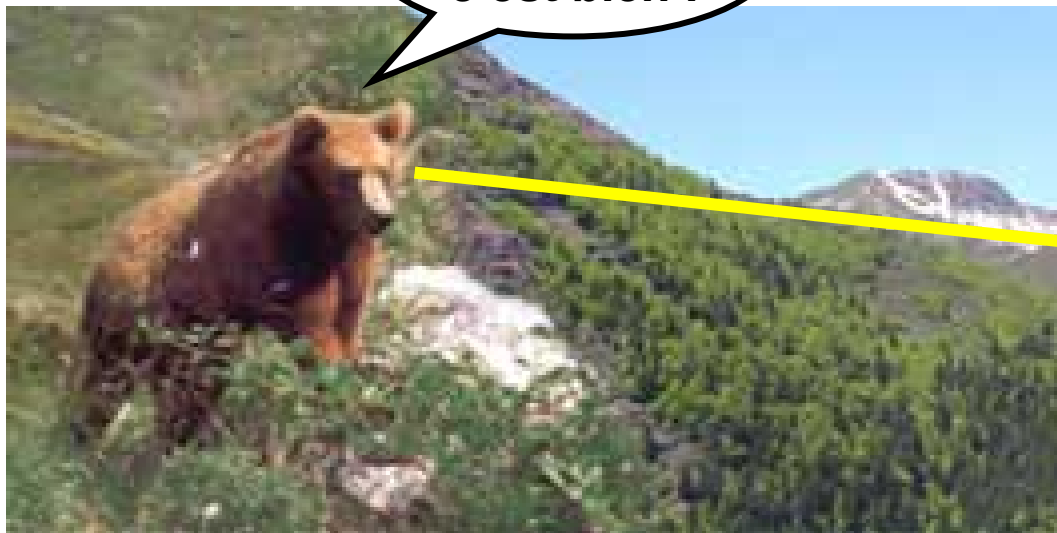
Thanks to Instrumentation Technologies, Trade between Slovenia and France has increased in recent years

**But Slovenia has much more to offer :
e.g. Bears to re-populate the French Pyrenean mountains,
Franska, a 7 year old female was introduced in April 2006**



'when your ecologists demand bio-diversity'

la France,
c'est bien !



**But FRANSKA, instead of putting young bears on earth,
became a real Killer for Lamb & Sheep and a nightmare for sheperds :**

Hundreds of Lambs were killed in just over one year !



Franska, the female Slovenian Bear introduced in the Pyrenean Mountains, to re-populate this region with bears,

was finally killed, on August 9th 2007 by a car, when crossing the motorway

After having killed herself hundreds of lamb & sheep in just over one year . . .

It was found however, that Franska was not as young (7 years) as the Slovenian authorities had stated, but more than 17 years old . . . !



You can sell us OLD bears . . .



But we want 'state-of-the-Art' BPMs !!

