A summary of my CV:
- Academic formation
- Work at CERN
- Work at DESY

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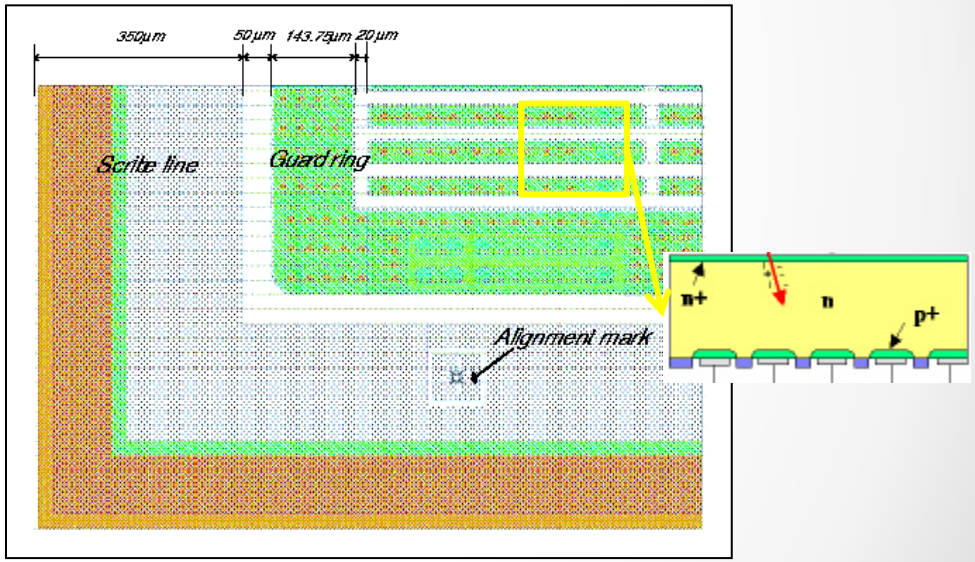
- 1996-2001 (Santiago de Compostela): University degree in Physics, specialized in Electronics.

- 2002-2003: Technical Student position at CERN in LHCb experiment.

Modification of the layout of the Silicon pixel detector of the spectrometer and testing the readout chip

Use of CAD tools and lab equipment

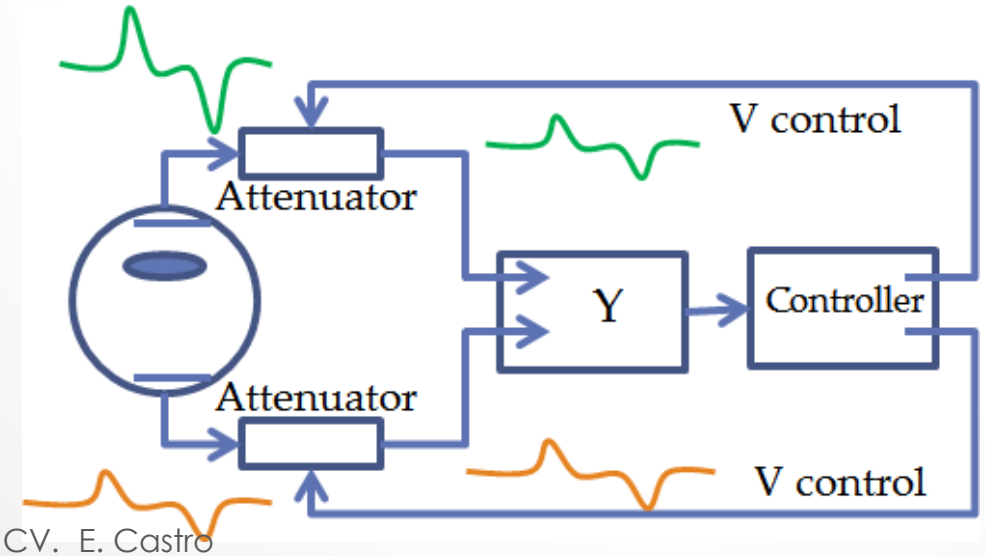


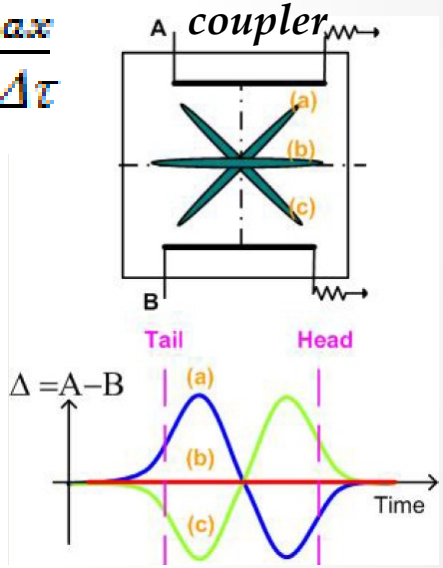
- 2003-2005: Doctoral Position at CERN. Work on instrumentation for beam diagnostics in the LHC.

Chromaticity measurement using the 'Head-Tail effect' in a bunch of particles: kick the bunch and see evolution.

Implementation of a system composed by a microcontroler and attenauators to minimize the kick strength.

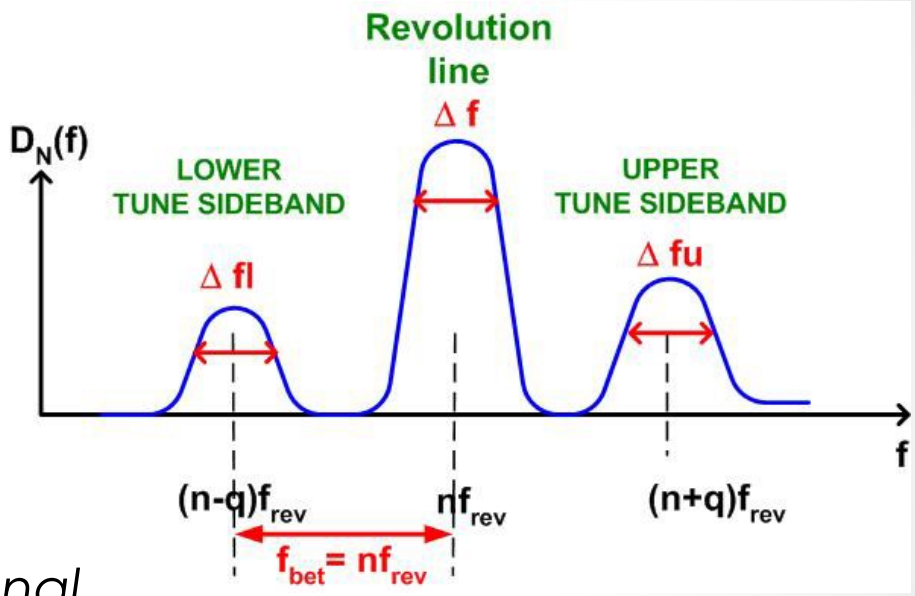
$$\xi = \frac{-\eta \cdot \Delta\Psi_{max}}{Q \cdot \omega_{rev} \cdot \Delta\tau}$$





General *beam diagnostics* using '*Schottky signals*' measured using a 1.8GHz pick-up (Fermilab).

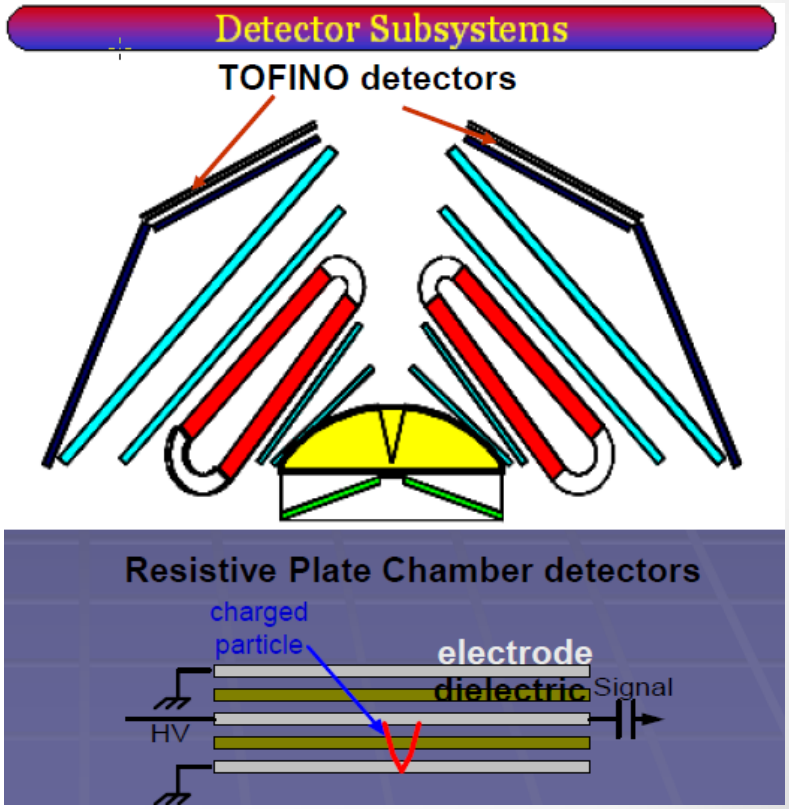
Transverse Schottky spectrum can provide:
Chromaticity, betatron tune, momentum spread…



Creation of the DAQ chain involving downmixing of the signal, data acquisition and data analysis.

- 2005-2006: completion of PhD program in Santiago.
- 2007: Phd defense "*Transverse Diagnostics for High Energy Hadron Colliders*" .
- In pararell collaborating with the HADES experiment at GSI

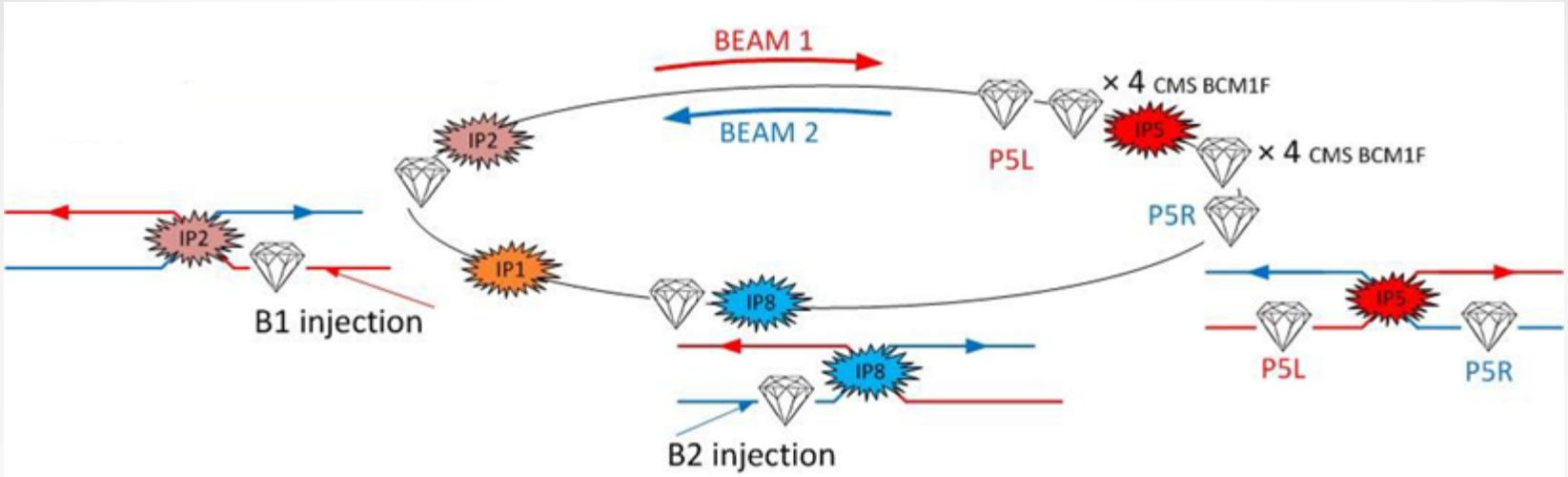
Testing of the FEE developed at the university of Santiago



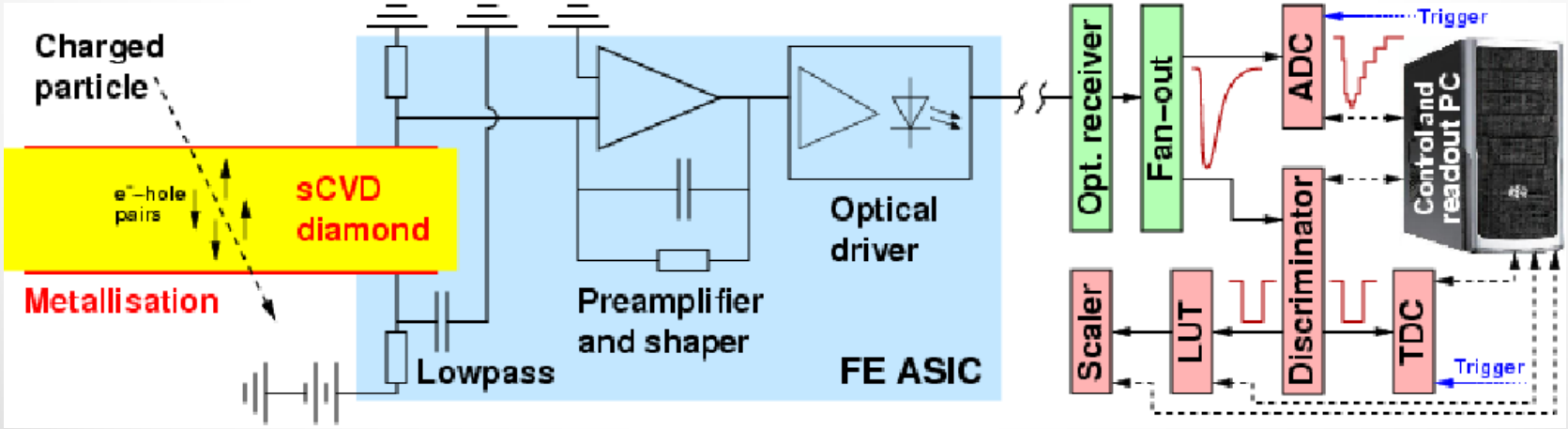
My work at DESY

- 2008-2013: post doc position in CMS group.
  - Setup of the DAQ for the diamond based Beam Conditions Monitor for CMS
  - Setup of the DAQ for the diamond based BLMs in the LHC ring.

Distribution of the diamonds in the LHC



DAQ setup



- Since 2013 I work for the Beam dynamics group in DESY Hamburg.

My main contribution was to develop a GUI for orbit and dispersion correction for XFEL.

Principle of the orbit correction

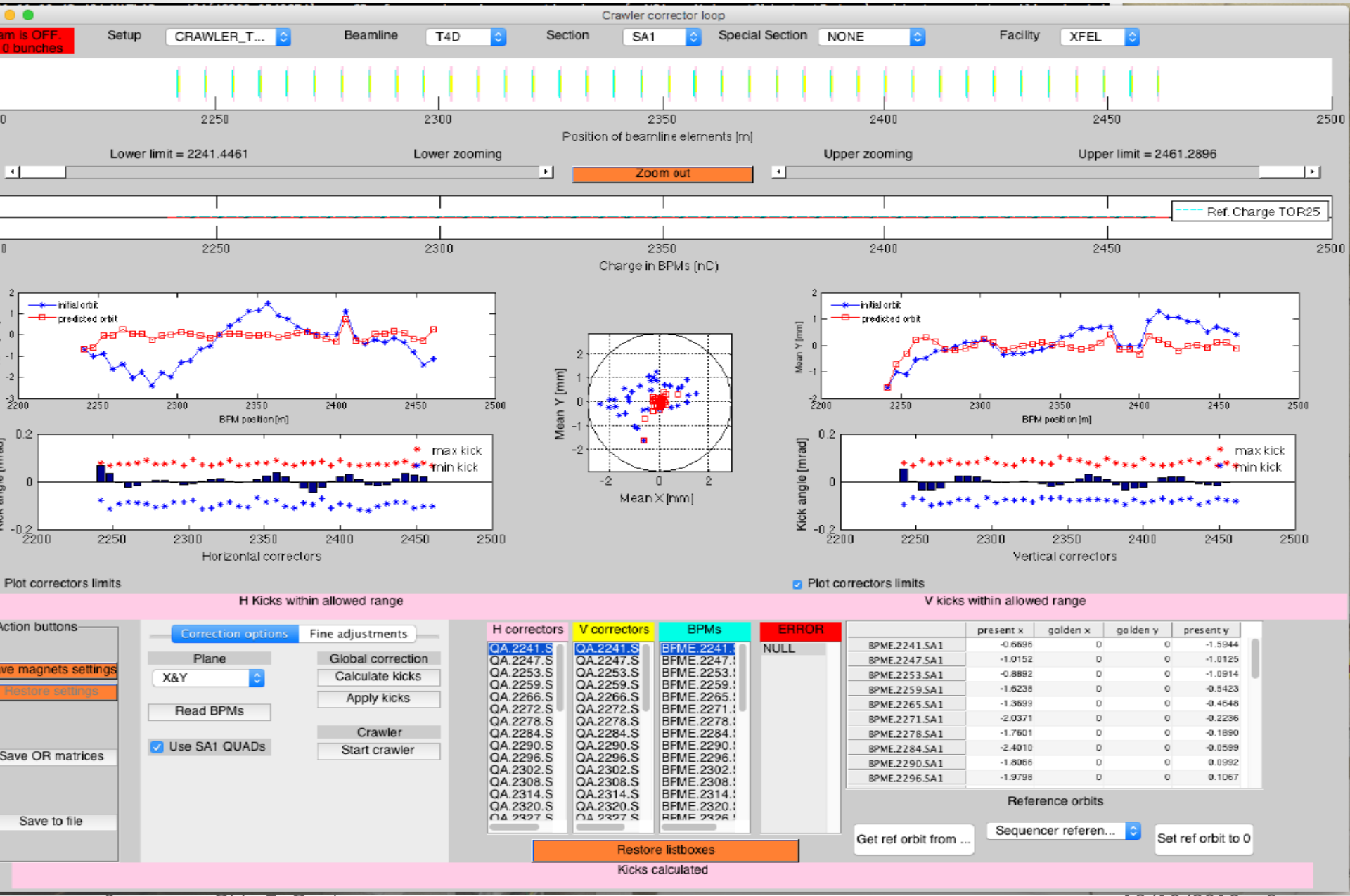
$$\Delta\vec{x} = OR \cdot \Delta\vec{\theta} \Rightarrow \Delta\vec{\theta} = OR^{-1} \cdot \Delta\vec{x}$$

Use of SVD

From linear transport theory:

$$x_{final} = R_{11} \cdot x_{initial} + R_{12} \cdot x'_{initial} + R_{13} \cdot y_{initial} + R_{14} \cdot y'_{initial} + R_{16} \cdot \left(\Delta p / p_0\right)_{initial}$$

Screenshot of the GUI



- Orbit and dispersion correction:

Dispersion is the momentum dependence of the deflections induced by a magnetic field to a charged particle.

$$\begin{pmatrix} (1-\alpha)\cdot\Delta\vec{u} \\ \alpha\cdot\Delta\vec{d} \end{pmatrix} = \begin{pmatrix} (1-\alpha)\cdot OR \\ \alpha\cdot DR \end{pmatrix}\cdot\Delta\vec{\theta}$$

The difficulties here are just the calculation of the DR matrix.

Tool was only implemented and used for the injector.

Resources:

- *Optics server*
- *Several ML servers*: orbit, magnets, quad movers, bunch pattern, charge…
- Use of *DataGui*, a Matlab library developed at DESY to ease the design of Matlab GUIs.
- *xcomm* for communication with the ML servers.

- Aditionally: use of Elegant, and MAD8 to simulate beam dynamics.

- Current task:

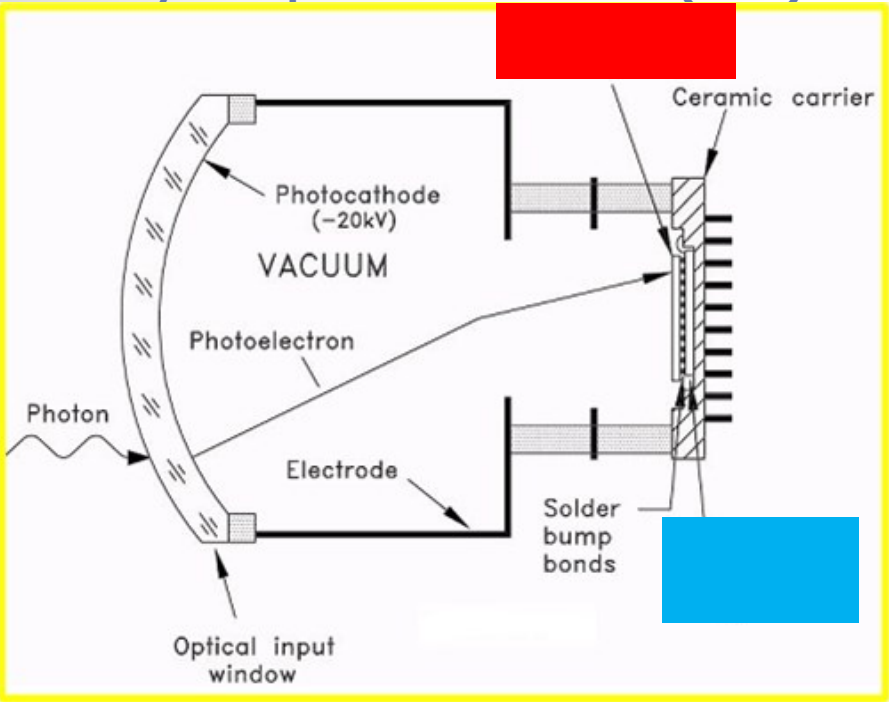
I am in charge of making the SASE statistics for XFEL and figure out how to automate the calculation and visualization in the control room.

Summary of the skills acquired along the way…

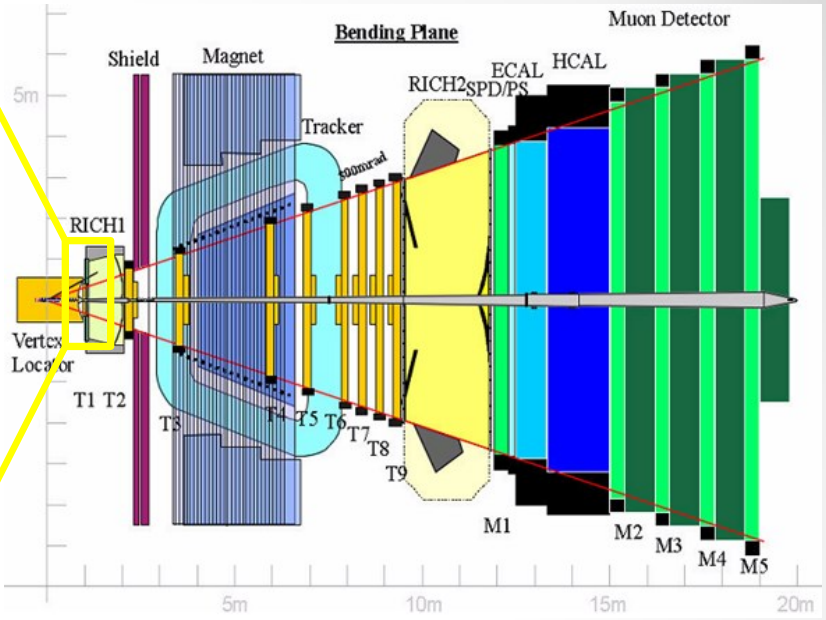
- Programming: C, Matlab, development of GUIs (Matlab, jddd…)
- Data analysis: ROOT, Matlab
- Beam dynamics: Elegant, MAD
- Laboratory experience

Extra slides

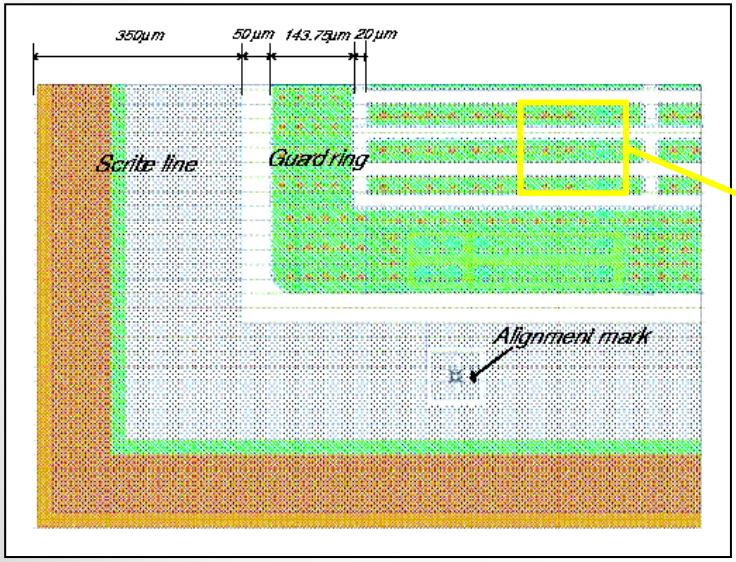
Hybrid photon detector (HPD)

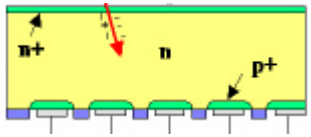


LHCb spectrometer



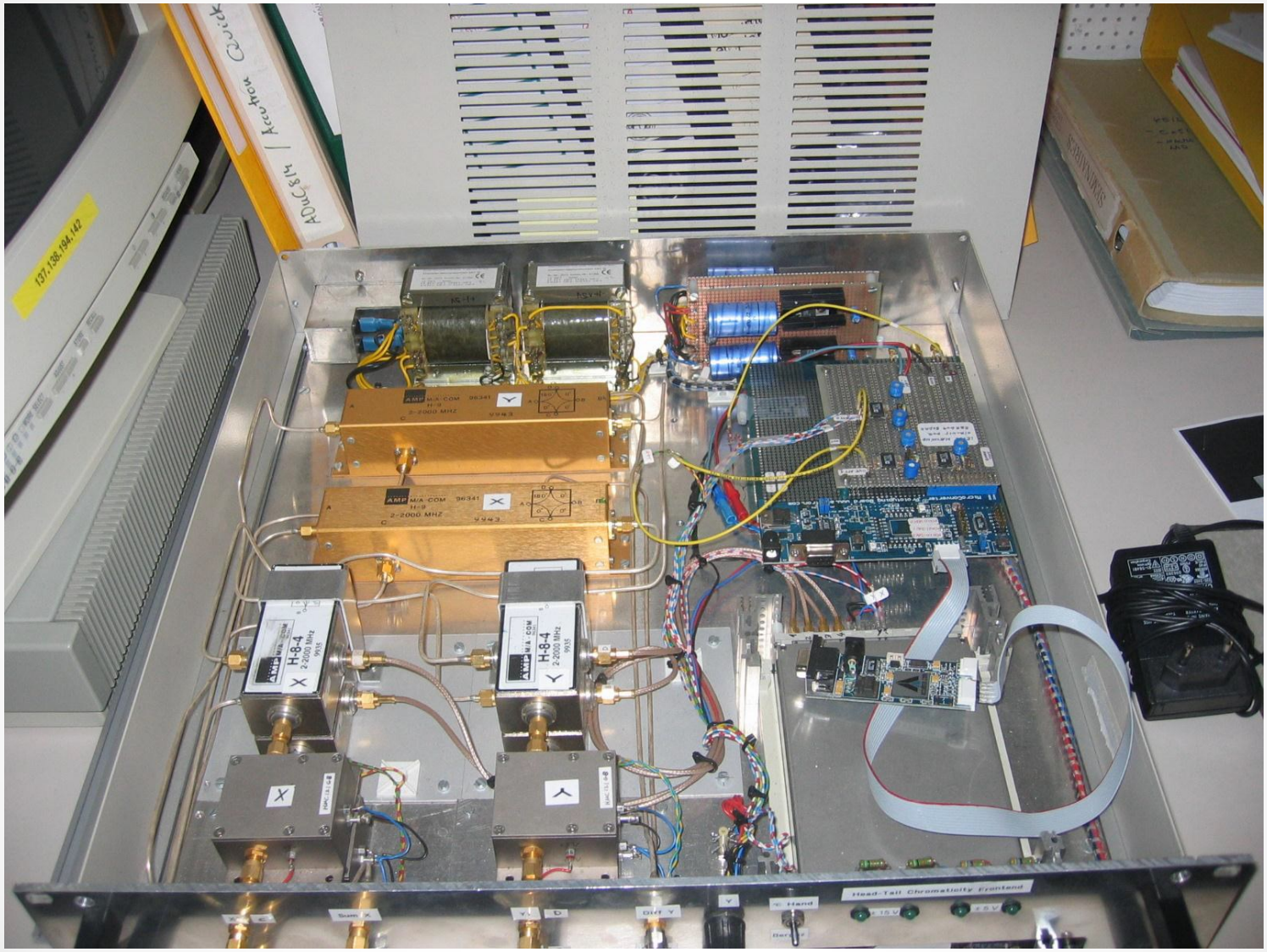
Silicon pixel detector





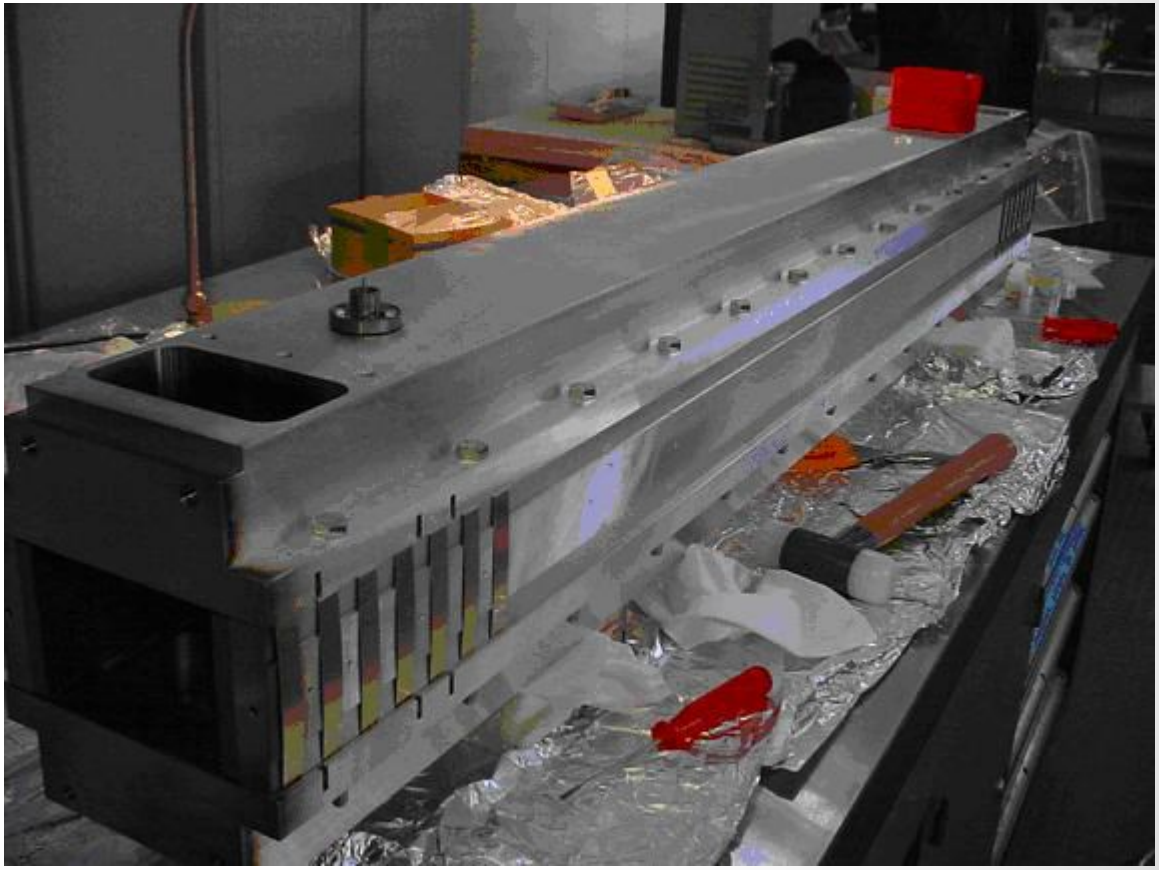
- A charged particle creates pairs e-h in the Si.
- The charge is collected by the reverse biased diodes.
- An electronics channel is bump-bonded to the Si cells.

‘CLOSED ORBIT COMPENSATION BOX’

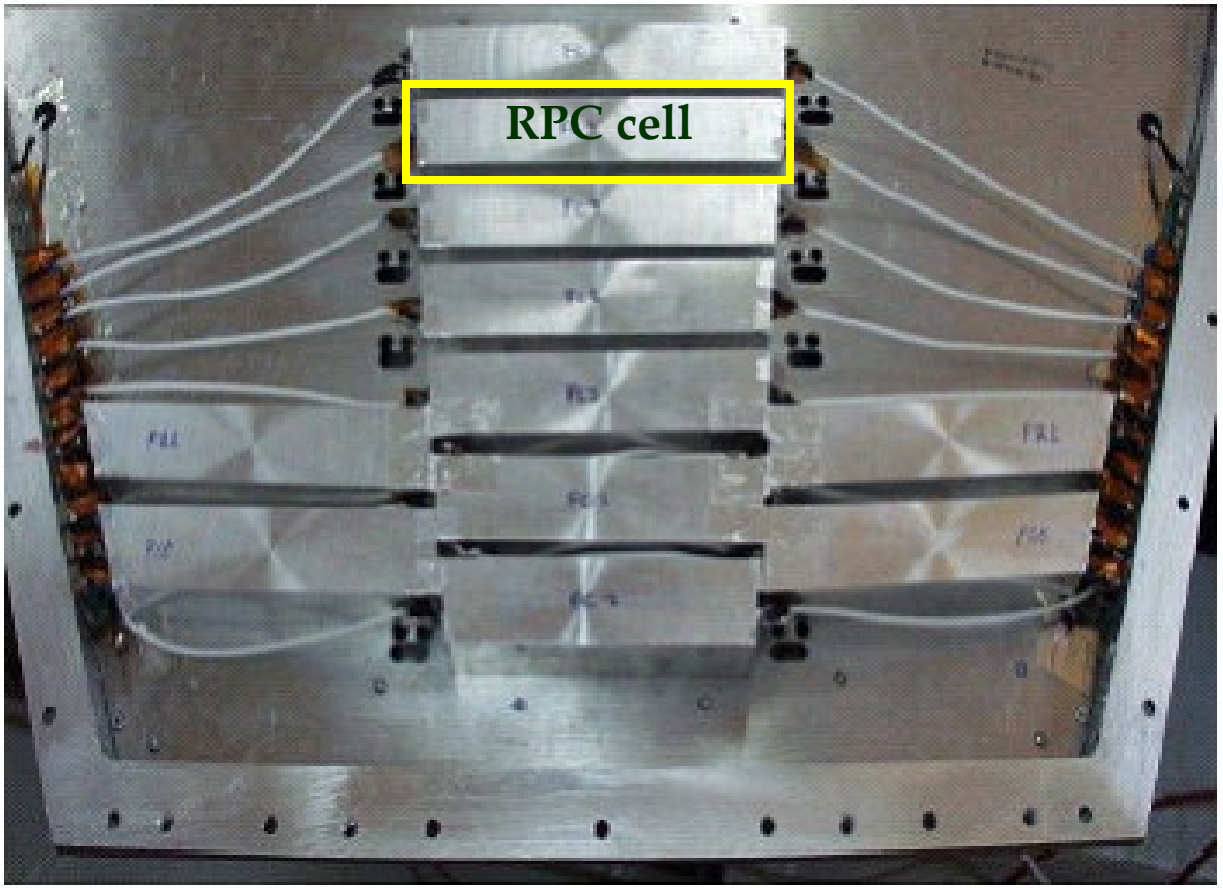


Beam diagnostics in LHC using '*Schottky signals*' in a beam of particles measured with a 1.8GHz '*slow wave slotted waveguide*'.

Check possibility of using Schottky signals as a method for transverse beam diagnostics (tune, chromaticity, $\Delta p/p$, …)



HADES RPC detector box used for tests



SVD

$$\Delta\vec{x} = OR \cdot \Delta\vec{\theta} \Rightarrow \Delta\vec{\theta} = OR^{-1} \cdot \Delta\vec{x}$$

$$OR^{-1} = V \cdot \Sigma^{-1} \cdot U^T \Rightarrow \Delta\vec{\theta} = V \cdot \Sigma^{-1} \cdot U^T \cdot \Delta\vec{x}$$

$$\Delta\vec{\theta} = V \cdot \begin{pmatrix} \frac{1}{\sigma_1} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \frac{1}{\sigma_N} \end{pmatrix} \cdot U^T \cdot \Delta\vec{x} \quad [5]$$