



IFIC - Instituto de Física Corpuscular



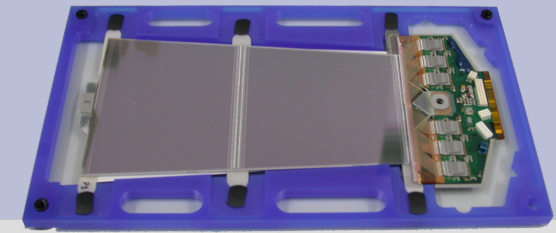
PARTICIPATION IN THE DESIGN AND R&D ACTIVITIES FOR A FUTURE LINEAR COLLIDER

IFIC - Valencia

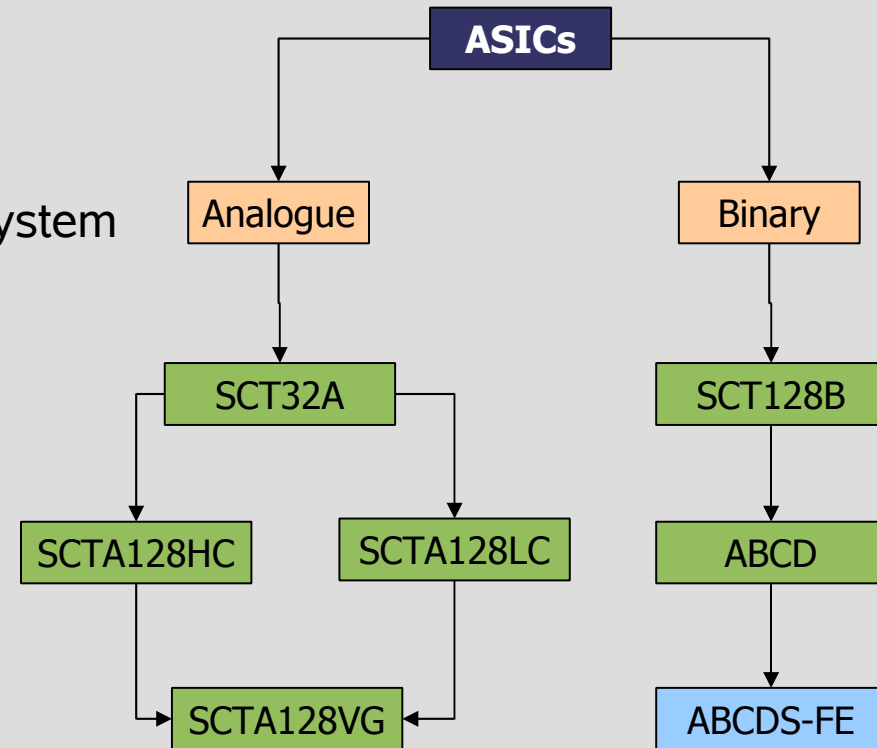
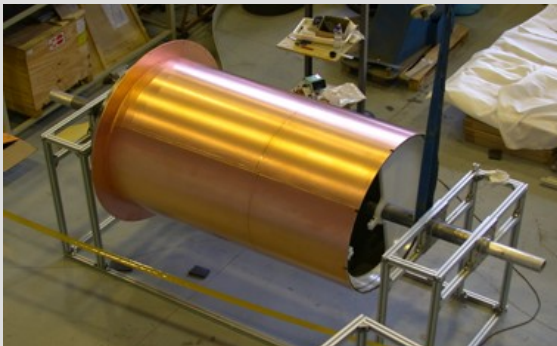
Our group - Main activities

- ✓ ATLAS-SCT
- ✓ RD-50
- ✓ Medical Physics
- ✓ The near future:
 - Tracker for the ATLAS upgrade (SLHC)
 - ILC

ATLAS SCT

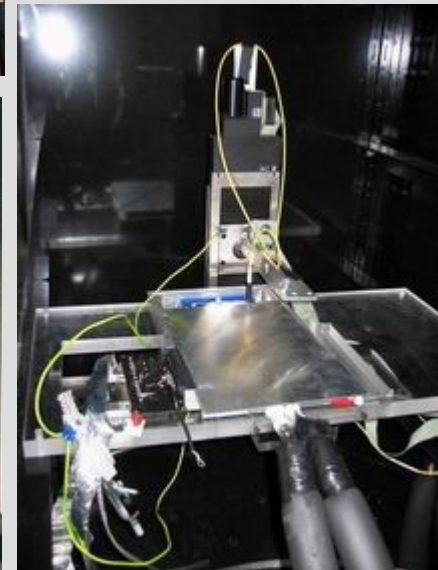


- ✓ Sensor characterization
- ✓ ASIC testing
 - DAQ s/w & h/w
 - Development of wafer screening system
- ✓ Module building
 - Build 10% of EC tracker modules
- ✓ Detector mechanics
 - Outer thermal enclosure



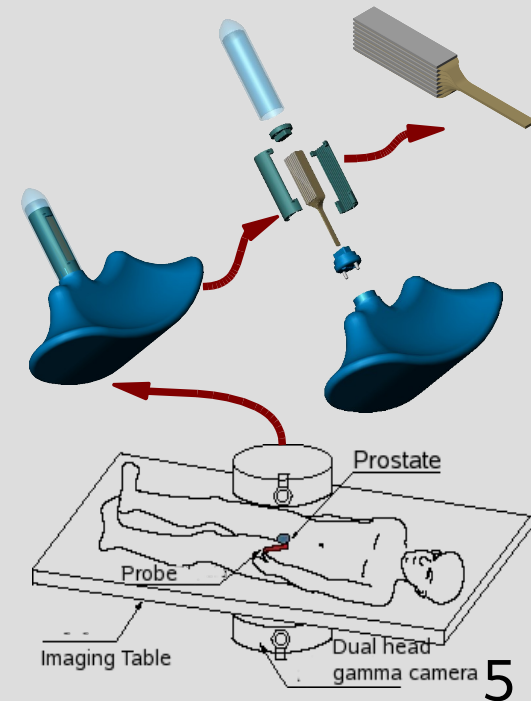
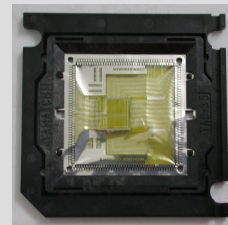
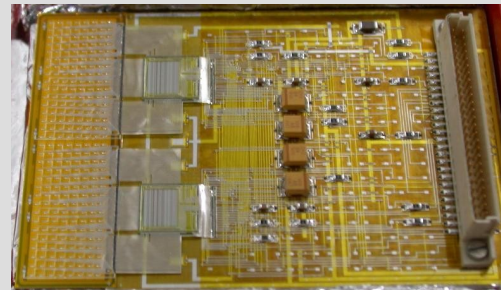
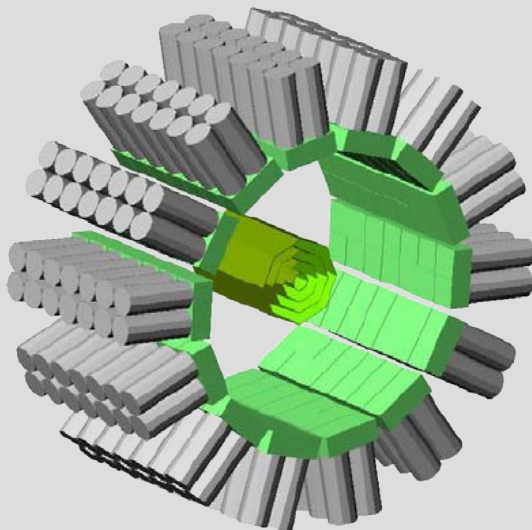
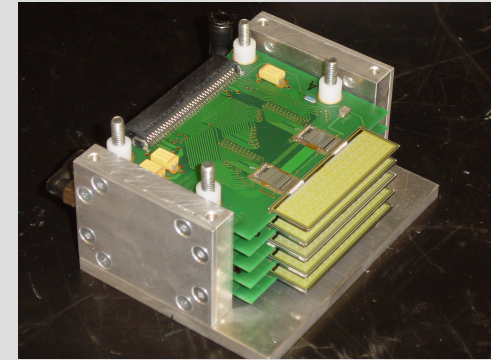
RD-50

- ✓ Studying effects of annealing on irradiated sensors
 - Laser + source setup
- ✓ Coll. With CNM-Barcelona



Nuclear Medicine

- ✓ Compton Imaging with silicon:
 - CIMA collaboration
- ✓ Prostate probe:
 - A stack of 1mm thick Si pad sensors
 - Packaging a big issue: TAB
- ✓ High resolution small animal PET:
 - Several stacks surrounding the *animal*
 - Sub-millimeter resolution
- ✓ High speed DAQ h/w and s/w



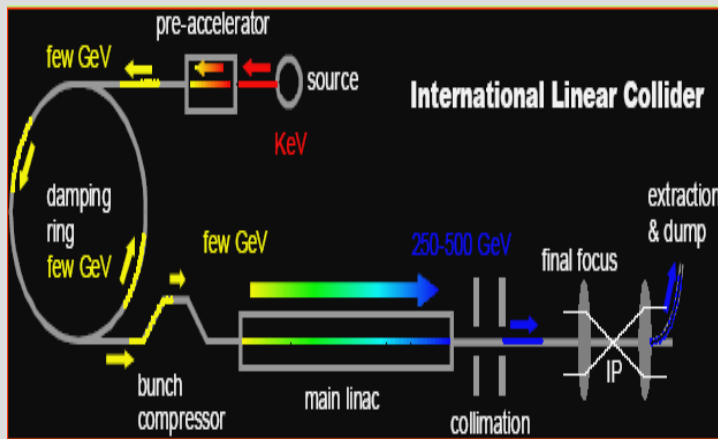
The near Future: ATLAS upgrade

- ✓ Various routes to explore in collaboration with CNM and L'pool
 - Short strip high rad. Hard silicon sensors for the tracker
 - ↘ Successfully started by L'pool and CNM
 - N-on-p MCZ sensors: still “usable” up to fluences of 10^{15} neutron eq. cm^{-2}
 - New BiCMOS SiGe technology for the front-end
 - New CMOS 0.13 μm technologies
 - Detector mechanics
 - ...

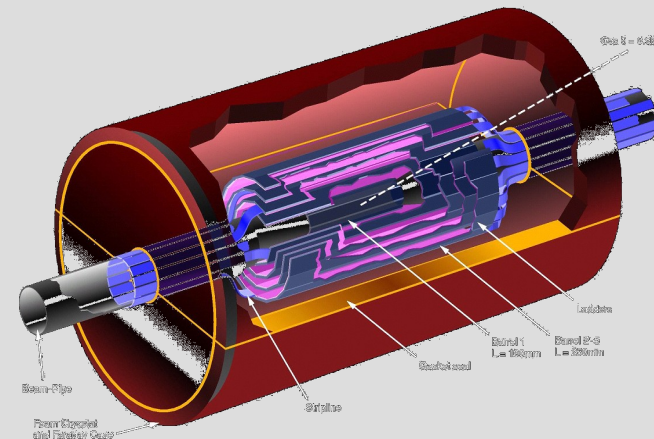
The ILC

Our present proposal pretends to initiate/consolidate the participation of the **IFIC** to the **ILC** effort in both aspects:

Machine



Detector



Machine Detector Interface

Accelerator

- ✓ IFIC participation has already started at
 - A feasibility study of a non-linear collimation system for CLIC in 2002 in collaboration with CERN. A doctoral thesis started in 2004: "*Design and Performance Evaluation of a Non-linear Collimation system for CLIC and LHC*" (CERN doctoral students program)

- Participation in the European Project of 2004



in the beginning

- Participation in the specific design study

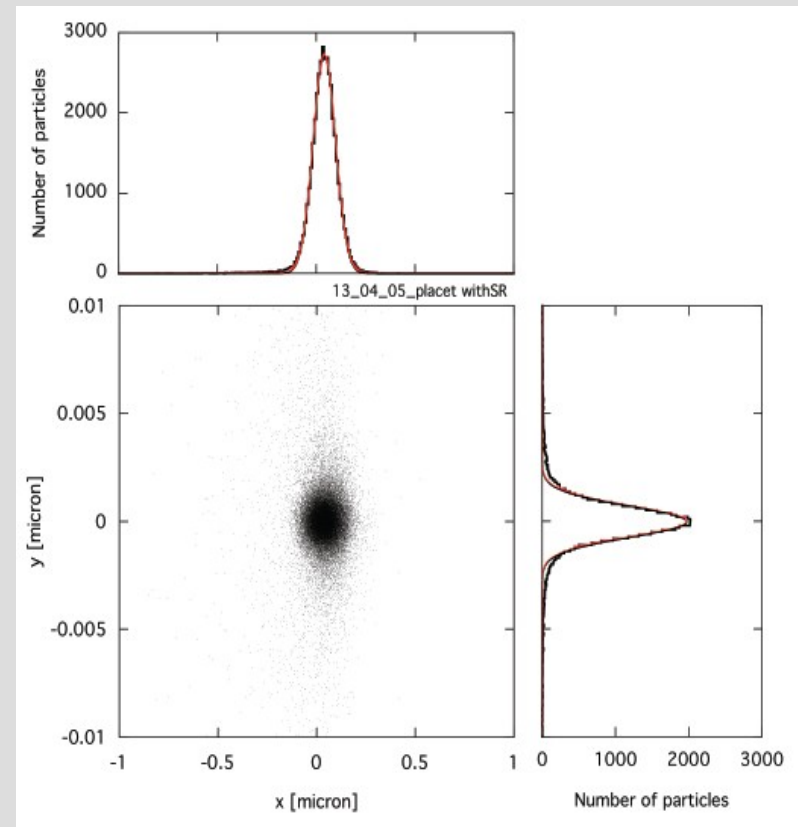
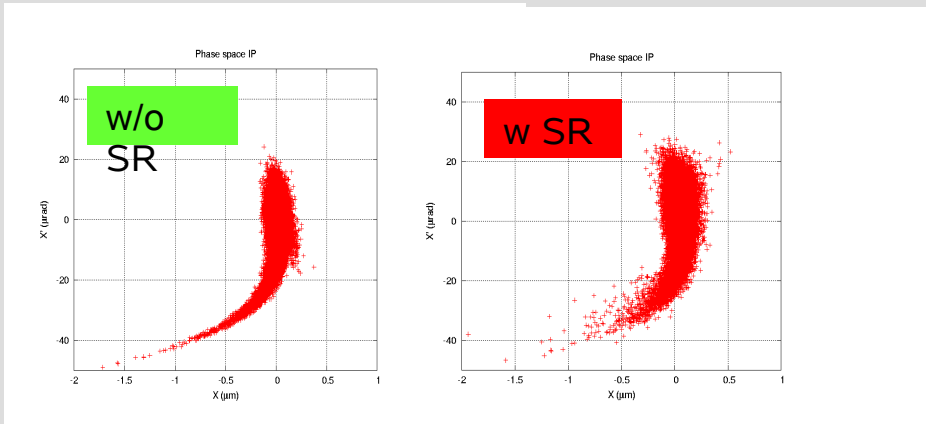


in late 2004



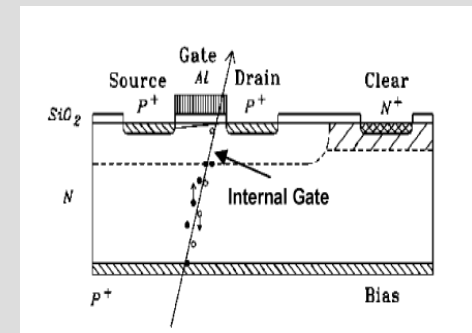
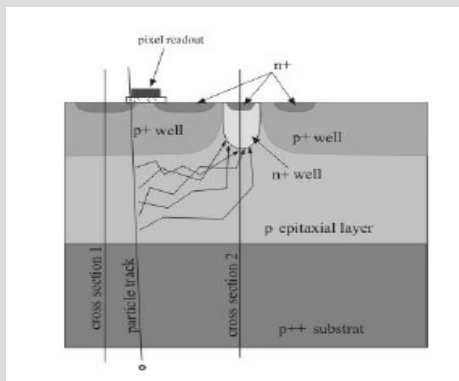
Accelerator

- ✓ Particle tracking along the BDS
 - Tools for tracking
 - ✦ (MAD, Placet, SAD)
 - Impact in beam core and luminosity
 - ✦ (GuineaPig)



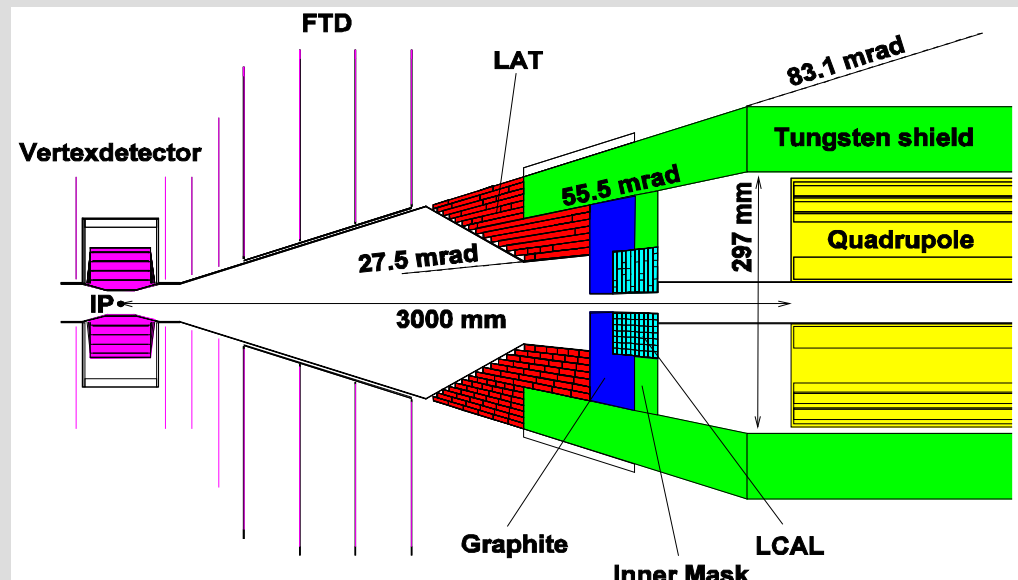
Sensors

- ✓ Natural step forward: from tracker to vertex detector
 - Acquire experience and *know-how* in new Si detector technologies
 - Active pixels.
- ✓ Many challenges at all levels imposed by low mass and granularity
 - Sensor
 - Mechanical support
 - Services: connectivity
- ✓ Explore different sensor technologies available:
 - MAPS: *Monolithic Active Pixel Sensors*
 - DEPFET: *Depleted Field Effect Transistor*
- ✓ Current collaborations:
 - L'pool, RAL: MAPS
 - MPI HLL, CNM: DEPFETS... starting



ILC: Detector layout

- ✓ Participation in the design of the tracking system
 - Layout (related Physics)
 - ↘ Simulations, etc.
 - Mechanics
 - ↘ A step forward: from module to system
 - Coll. LPNHE-Paris + ...

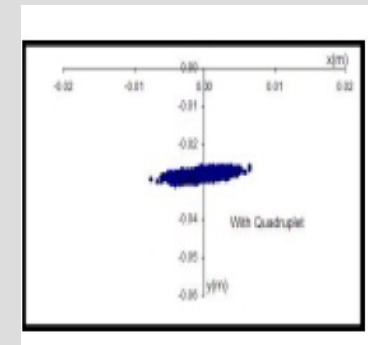
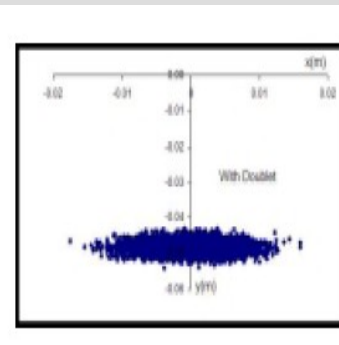
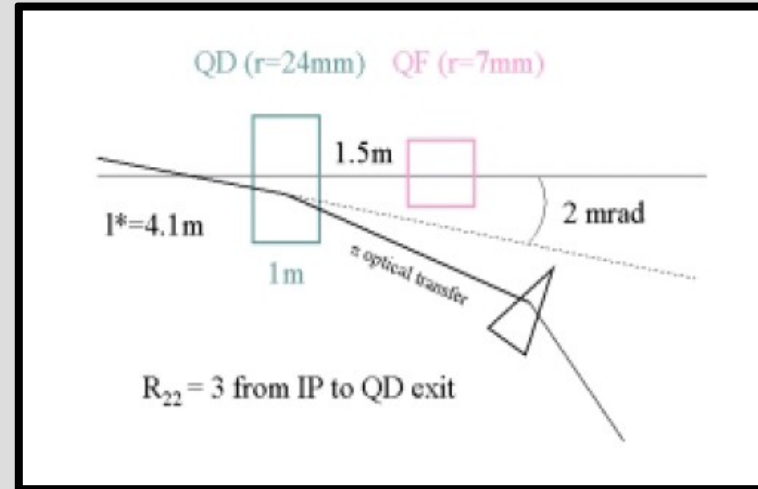


Machine-Detector Interface

Design study of the disrupted and energy degraded beam after the IP. Impact in the tracking performance. Simulations based on realistic beam conditions including the halo:

- identify and estimate losses in the spent beam transport line
- study of installation of relevant post-IP beam diagnostic (luminosity, energy and energy spread and polarisation monitors)

Collaboration:



Conclusions

- ✓ A long way ahead...
- ✓ First steps made in defining our interests and in establishing possible collaborations.
- ✓ R&D based approach
 - ➔ Putting our hands on new sensor technologies for vertexing
 - ➔ Explore other aspects (like supports and services) taking advantage of our experience not only in sensors but in building a full detector system