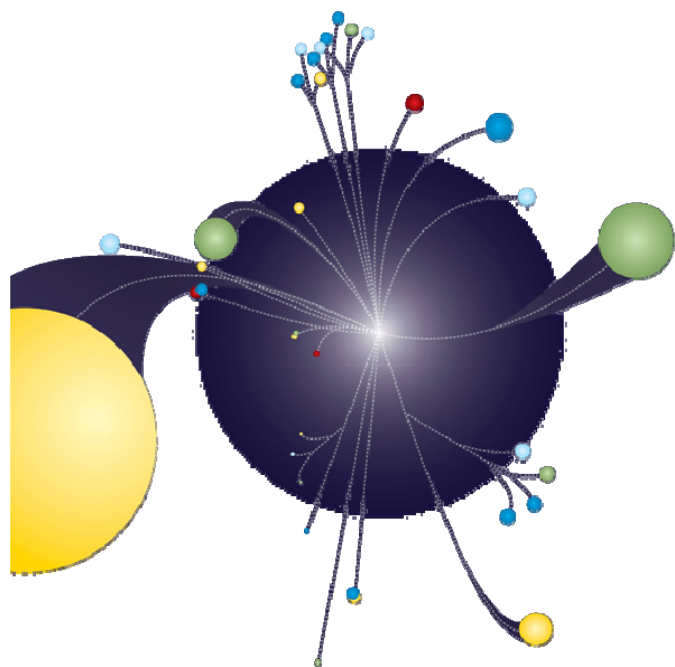

R&D on Monolithic and Vertically Integrated Pixel Detectors

Special Focus Meeting

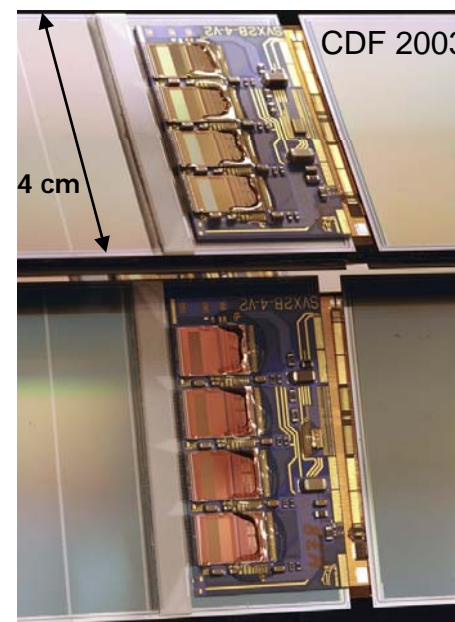
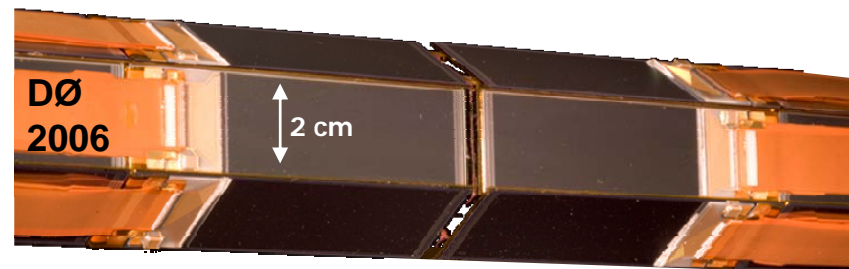
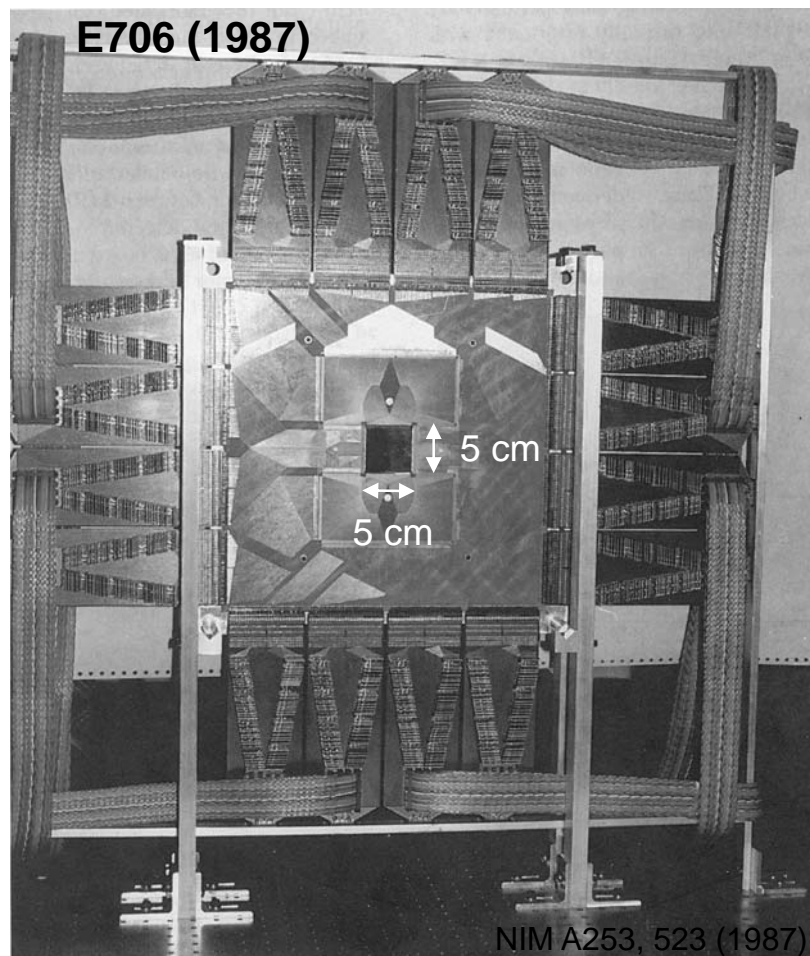


Marcel Demarteau

LCWS08
November 17, 2008
Chicago

Detector R&D

- An example



Please note: the LHC was proposed in 1987!

Much more functionality integrated in much smaller volume

Preamble

- Although this discussion is taking place at an ILC meeting, the topic is of course of much broader interest
- It is fair to say, though, that many of the recent promising ideas arose out of the work carried out within the ILC community
- That said, this discussion is not within the context of the ILC detector common task group, but will certainly be valuable input to them

- Today's discussion is mainly motivated by
 - **A series of workshops – parallel to the VERTEX-nn and Pixel-nn workshops – on 3D vertically integrated technologies and the nascent collaboration on 3D integrated technologies**
 - First 3D integrated circuit for HEP presented at TWEPP06, Valencia, October 2006
 - 3D Integration Technology Perspectives – First Workshop on LHC – ILC Prospects, Ecole Polytechnique, Palaiseau, France. November 29-30, 2007
 - Vertical Integration Technologies for HEP and Imaging Sensors Meeting held at Ringberg Castle, Tegernsee, Germany, April 2008
 - **A suggestion by Chris Damerell on September 5, 2008 for the formation of a r&d group on monolithic and vertically integrated silicon pixel detectors**

New Technologies

- Many new detector technologies and their implementations have grown out of the linear collider community
- The potential impact of the development of new technologies and the role they can play in opening up new areas of physics – areas that were before inaccessible – cannot be underestimated
- However, technologies being pursued are exceedingly demanding in many respects and resources are becoming more and more limited
- An obvious step, for those areas where there is a common interest, is to combine resources with a shared mission:
 - To develop advanced detector technologies driven by the needs of projects in the long term strategic plan of the community

Advantages

- There are many obvious advantages for a collaborative effort, if setup correctly:
 - Shared, common mission: “Tous pour un et un pour tous”
 - Provide a mechanism for groups with common interest to focus their individual efforts
 - Enable scale which is out of reach for individual institutions through shared resources
 - Provide a mechanism for single design review, recognized by all regions
 - Provide a mechanism for joint funding approval and aid in securing that funding
 - Streamline interactions with commercial vendors
 - Define common testing procedures and hardware.
 - Shared common infrastructure for test facilities such as test beams
 - Provides a forum for sharing of information
 - ...

Implementation

- The initial scope of the R&D effort needs to be well defined
- A clear charge needs to be formulated to initiate a coherent coordination of the effort
- The formation (formalization) of an R&D group should built on existing efforts
- The three regional directors suggested the creation of a “Coordination Board” with two members from each region

Goals for Today

- Receive input from the community on how to self-organize the R&D effort
- Hopefully we can come with suggestions for:
 - The initial scope of the R&D effort; the broader the scope, the more difficult it is to find common ground
 - Deciding on an expedient path for choosing at least three regional board members, one of each region
 - Deciding on an initial strategy for the R&D effort
- Hopefully that will obviate the need for the directors of National Laboratories to be involved in the mundane issues of organizing an R&D effort
- Note: minutes of this meeting will be distributed to the whole community so everyone can provide feedback; no final decisions will be taken

Discussion Topics

- What is the mission of the group ?
- What should the breadth of topics be ?
- What should be the framework of the effort: ILC, LHC, ...
- Should effort be limited to particle physics applications
- How do we gauge the level of interest ?
- How do we go about selecting regional representatives ?
-

Organization

CERN
Fermilab
KEK

Regional Coordinators

Vertical
Integration

MAPS

SOI ?