# ILC Detector R&D

## Tracking Review – Progress Report

**Chris Damerell**
**RAL**

**On behalf of the ILC Detector R&D Panel**
**(a Panel of the World-Wide Study Organising Committee)**

**(Jean-Claude Brient, Chris Damerell, Ray Frey, Dean Karlen, Wolfgang Lohmann, Hwanbae Park, Yasuhiro Sugimoto, Tohru Takeshita, Harry Weerts)**

# Committee membership

- **Panel members: Chris Damerell, Dean Karlen, Wolfgang Lohmann, Hwanbae Park, Harry Weerts**
- **External consultants: Peter Braun-Munzinger, Ioanis Giomataris, Hideki Hamagaki, Hartmut Sadrozinski, Fabio Sauli, Helmuth Spieler, Mike Tyndel, Yoshinobu Unno**
- **Regional representatives: Jim Brau, Junji Haba, Bing Zhou**
- **RDB chair: Bill Willis – unfortunately could not participate this time**
- **Local tracking experts: Chen Yuanbo, Ouyang Chun**
- **Admin support: Naomi Nagahashi, Maura Barone, Maxine Hronek, Xu Tongzhou**

# Overview of these reviews

- **To be included in every regional workshop from now on:**
  - **Beijing (Feb '07) Tracking**
  - **DESY (LCWS June '07) Calorimetry**
  - **Fermilab (Oct '07) Vertexing**
  - **Asia (tbd 2008) PID, muon trkg, solenoid, beam diagnostics, DAQ**
- **Plans for the reviews were endorsed by the FALC (Funding Agencies for Large Colliders) last November, where they agreed to provide financial support – much appreciated**
- **Detector R&D Panel will transfer responsibility for reviewing R&D (mostly 'D'), at the time when the groups become absorbed in detector collaborations (as happened at LHC)**
- **Our responsibility is to work with the collaborations to ensure that the major R&D goals can be achieved by 2010**
- **This means (for tracking) that experiment collaborations can be confident that the option they choose will satisfy the challenging physics needs**
- **We are currently far from this position, for all tracking options**

# What is at stake

| Tracking technology | Detector A | Detector B |
|---|---|---|
| Gaseous + Silicon | ? | ? |
| All Silicon | ? | ? |

**Could be that both detector tracking systems will work well, or one well and one badly, or both badly. How to achieve the first outcome? (maybe *not* by following the easy compromise of 'one of each technology')**

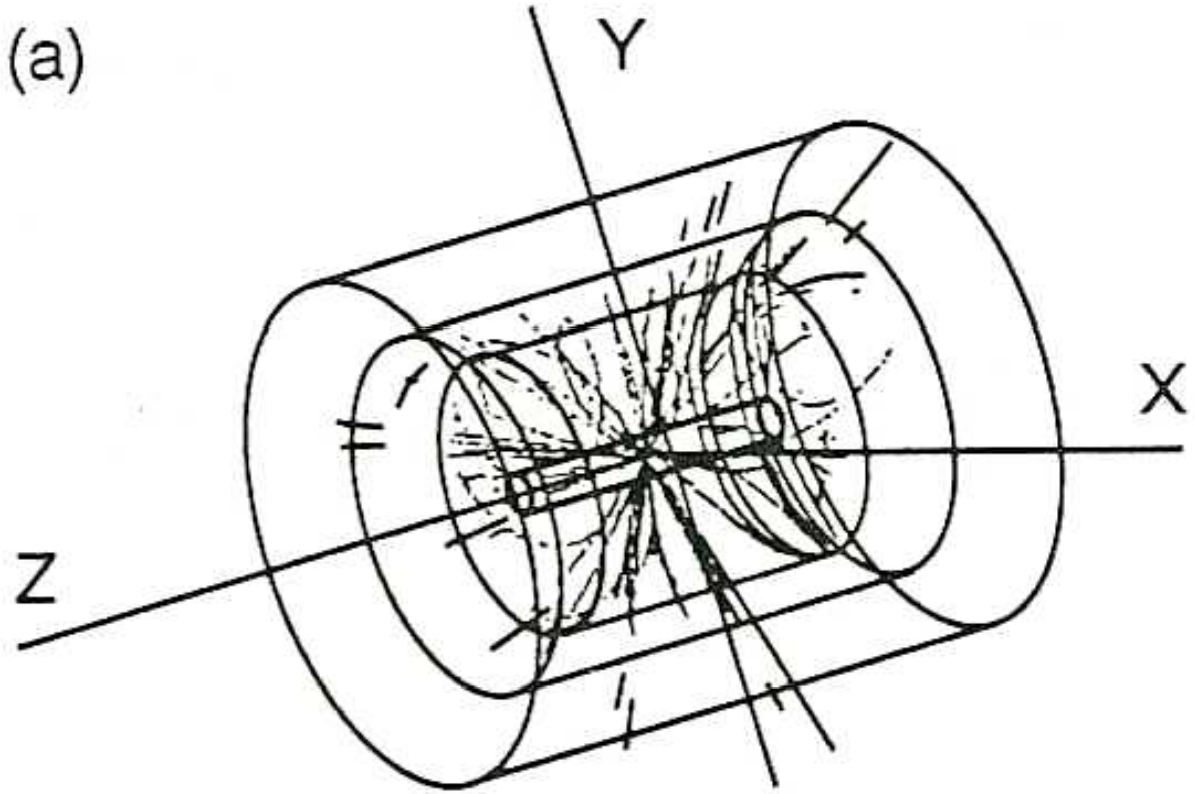
# Purpose of the review

- **Get representatives of all tracking R&D groups together for focused discussions**
- **Engage expert consultants from outside the ILC community, who are providing important insights**
- **Ideally, the collaborations and the committee will converge on a *mutually agreed* extension of the current activities**
- **Good prospects that this will be achieved (will find out tomorrow)**

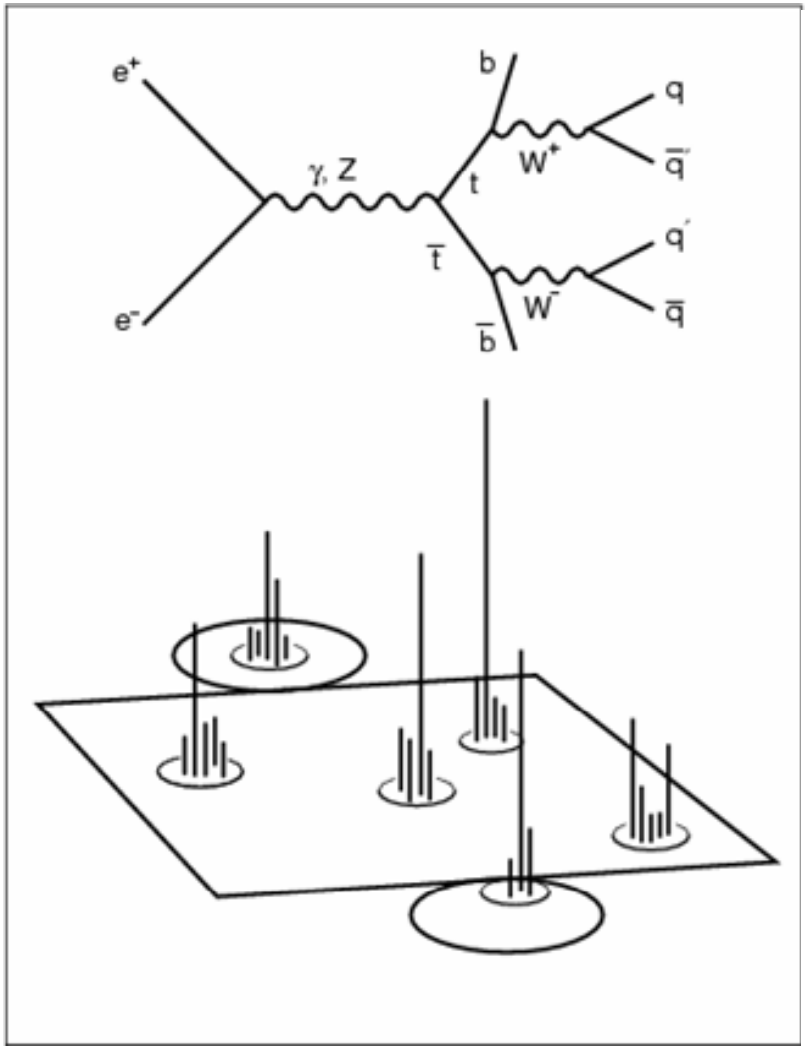
# Structure of this review

- **Originally (Valencia, last November) we had 7 disconnected groups to deal with, as well as the tracking collaborations**
- **One positive aspect already is that these groups have 'taken shelter' within the collaborations – an example of 'spontaneous self-organisation'**
- **Collaboration reports provide an overview of the projects through to 'completion' of R&D, meaning 'ready for design and construction'**
- **Open session presentations provided summaries of current status and plans**
- **Closed session yesterday was used mainly to clarify technical and strategic issues**
- **Closeout session: Committee will inform collaborations of our draft recommendations, and seek agreement with these or some compromise plans**
- **Draft report will be sent initially to WWS-OC chairs, who will deal with wider distribution**

# Forward tracking: a 'missing topic'?




**$e^+ e^-$ → t tbar, LCWS 1991. At first sight, a confusing spray of particles …**




**The miracle of PFA (or equivalent) reveals the flow of energy from the quarks of the primary process**

**But 2 out of 6 jets depend entirely on forward trkg. How good is this?**

***Previous achievements with forward trkg?***

**For vertex charge determination, *any* of the 6 jets may have essential low-Pt tracks curled into the forward silicon system**

**A chain is as strong as its weakest link**

# Possible review outcome

- **Work will need to be ramped up (and maybe re-focused in some cases) in order to achieve the goals in time**
- **Just as for the accelerator ED phase, we have to assume that resources will be found to achieve these goals**
- **Realistically, the ramp-up will be progressive, as these resources become available. We cannot ask the R&D groups to work miracles with their current funding levels**
- **We see an opportunity (and a necessity) for enhanced coordination between the groups engaged in tracking R&D. We will aim to reach agreement between the collaborations as to how to achieve this (further Exec Session today, and Closeout Session tomorrow)**
- **Encourage groups to submit drafts of their future R&D proposals to this committee for advice, *before* submitting to national funding agencies (following current practices by the ILC accelerator community)**
- **Aim to complete committee report within 2 weeks**

# Conclusions and Hopes

- **This review provides an opportunity to optimise the world-wide R&D for ILC tracking detectors**
- **Progress can only be made by agreement - if people don't buy in to our recommendations, they won't happen**
- **Shortcomings in design of detectors and MDI systems at LEP and SLD did reduce the physics output – maybe dramatically … Were any of these avoidable, other than with hindsight?**
- **Given our powerful world-wide R&D community, we can aim for unprecedented detector performance at ILC, matched to the complex physics challenges**
- **We are very grateful for the participation of our external consultants – they are giving us much valuable advice and clearly expressed opinions**
- ***This review can help us to achieve our ambitious goal of two detectors each with excellent, nearly 4-pi tracking systems***