

Activities of ILC Detector group

宮本彰也

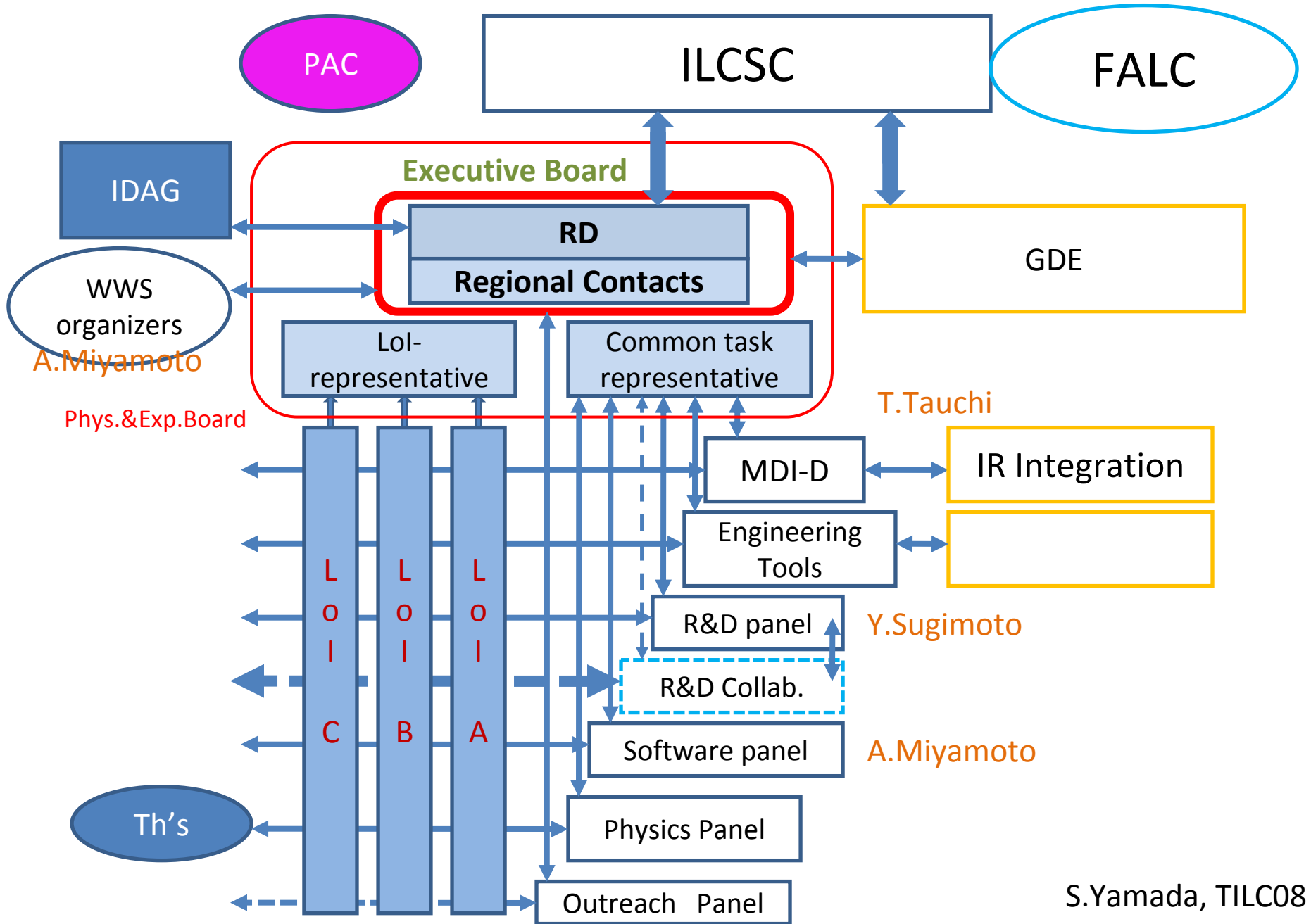
高エネルギー加速器研究機構(KEK)

Topics:

- RD, WWS
- ILD
- (測定器 R&D)

山田さん、F.Richard さん、T.Behnke さん、杉本さん、山本さん
らの皆さんのスライドを借用させていただきました。

Jan.09,2008



S.Yamada, TILC08

New Timeline

- After the budget cut in UK and US, GDE worked out a new stretched timeline.

The detector community appreciates GDE's determination to go forward.

- We also wish to keep going forward in synchronization with GDE's new timeline.

- We think it extremely important to maintain the interest and enthusiasm of the community.

How ?

Where are we now ?

- We were about to add to **the ongoing R&D phase** another **technical design phase**, where various integrations are to be studied thoroughly.

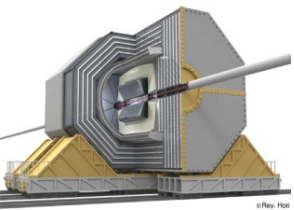
Components & software → optimized system

*In Particular **Machine Detector Interface** to integrate detectors and the machine, which is one of the critical items of the GDE's list.*

- For the desired progress, ILCSC started the LOI procedure, which was timely and began to function effectively **to stimulate and organize detector groups.**

In order to keep the present momentum, we wanted to continue the LOI procedure.

This was approved by ILCSC on Feb 11.



Detector Timeline

- Expression of Interest – due date 31 March, 2008

- Letters of Intent

— due date end March, 2009

Leads to validation of performance by IDAG

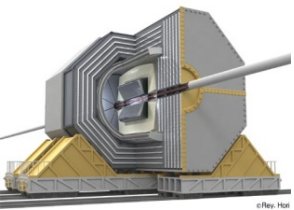
Machine–Detector Interface efforts intensified

- IDAG reviews LOIs, with aim to validate

- Detector Design in 2 phases

Till 2010, Detector Design phase I ---- GDE' s TDP–I

Till 2012, Detector Design Phase II ---- GDE' s TDP–II



Why LOI now ?

- 測定器建設には、加速器建設と同程度の時間がかかる
- ILC Project は物理＋加速器＋測定器。

測定器選択に係るプロセスの Openness を保証する → LOI

cf. RDR : WWS がDOD を呼びかけ、測定器提案を募る → 4 DODs



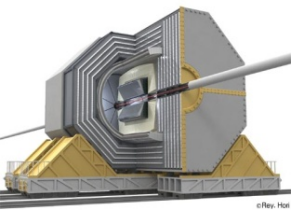
Worldwide Study of
the Physics and Detectors

for Future Linear
e⁺e⁻ Colliders

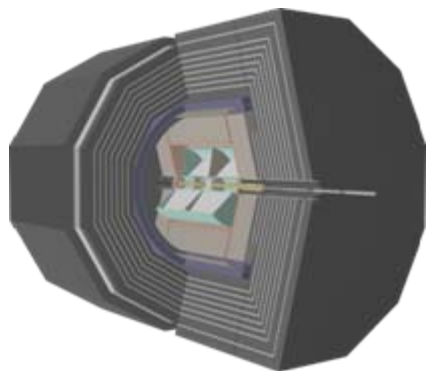
ATLAS (T. Akesson)

ATLAS

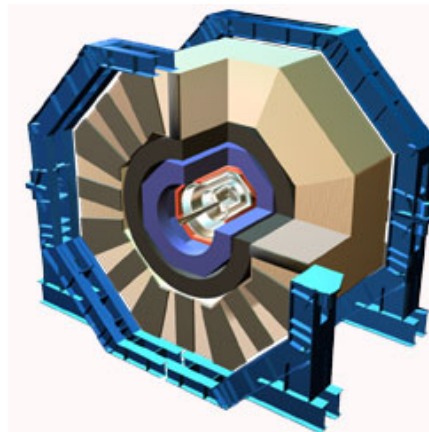
- Around 1989-1990 the collaboration was formed
- 1990 DRDC was set up by CERN as its scientific committee for detector R&D proposals
R&D collaborations were formed
- 1992 LHCC was set up by CERN as its scientific committee for LHC experiments
- 1992 Letter of Intent, 100 pages
Basis for CERN to choose which of the collaborations that should proceed
From this point ATLAS was monitored by an LHCC referee team
- 1994 Technical proposal, 250 pages
Basis for the principal project approval
- 1994 Basic collaboration constitution
 - Spokesperson
 - Collaboration Board
 - Executive Board
- 1995 The Resources Review Board (funding agencies) was formed
Chaired by the CERN director of research. Meets twice a year.



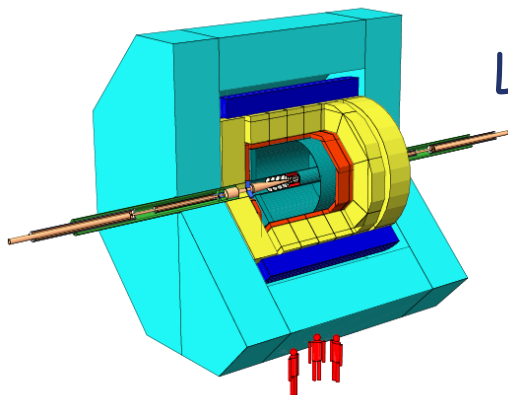
ILC 測定器案



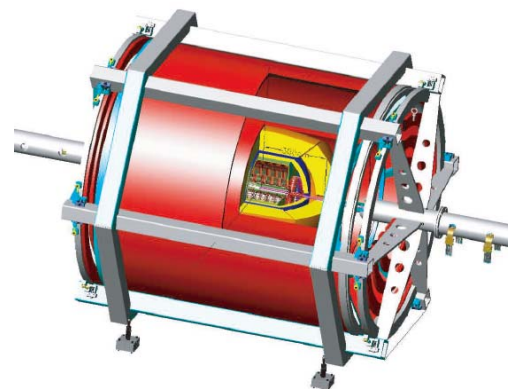
GLD
 PFA CAL
 ガス飛跡検出器
 3T磁場
 アジア起源
 16x16x16m³
 ~1.5万トン



SiD
 PFA CAL.
 半導体飛跡検出器
 5T磁場
 北米起源



LDC
 PFA CAL
 ガス飛跡検出器
 4T磁場
 ヨーロッパ起源



4th
 非PFACAL.
 ガス飛跡検出器
 3.5T磁場(2層磁石)

Purposes of LOI (guideline)

by WWS/WWS Roadmap Panel

- What LOI IS:

- A basis on which ~~two~~ groups will be invited to further develop and detail their plan and eventually submit ~~EDR~~ TDR
- It should enable the readers to judge the potential of the detector concept
- And to judge the capacity and seriousness of the group to carry out the work toward ~~EDR~~ TDR

- What LOI is NOT:

- It will not any formal commitment of the groups to the project or the detector
- It will not exclude any other groups to produce EDRs in time for construction.

Contents of LOI (guideline)

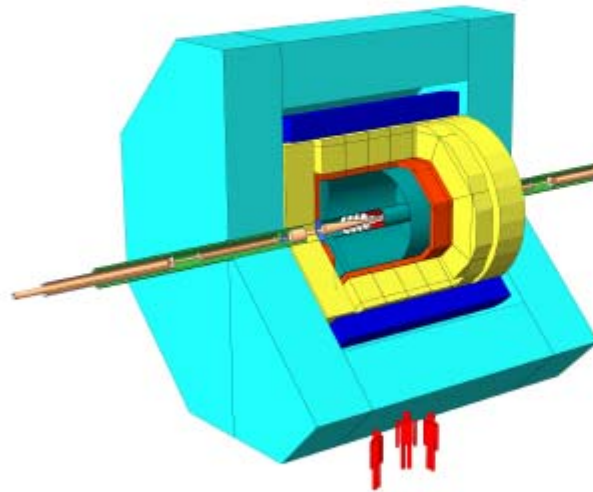
- Overall philosophy
- Subdetectors and alternatives
 - **Technological state**
 - **R&Ds needed and milestones**
- Physics performance
 - **Based on agreed-upon benchmark modes**
 - **How the components will work in concert to address the ILC physics questions**

Contents of LOI (guideline)

- MDI
 - **Developed enough to allow preliminary assessment of civil engineering issues**
 - Experimental hall, support hall, power needs, water needs, etc.
- Group structure
 - **Management**
 - **wrt the RD's organization (Common tasks)**
- Cost
 - **preliminary**
- Resource needs and time profile
 - **Money and FTE**

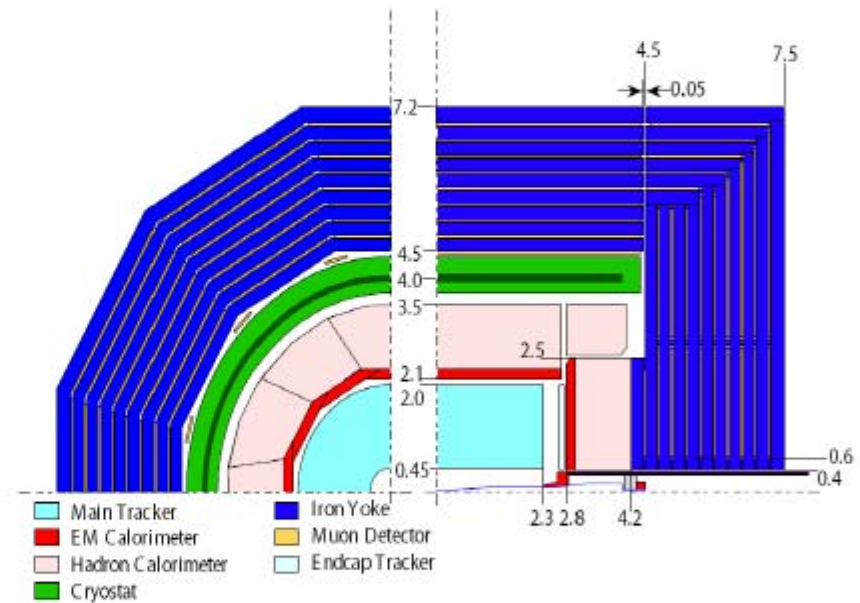
ILD: an Introduction

Ties Behnke, DESY



LDC DOD:
see <http://www.ilcldc.org>

Large Detector Concept



GLD DOD
see [arXiv:physics/0607154v1](https://arxiv.org/abs/physics/0607154v1)

Global Detector Concept

ILD: International Large Detector

LCWS2007: plan to merge LDC and GLD has been formulated

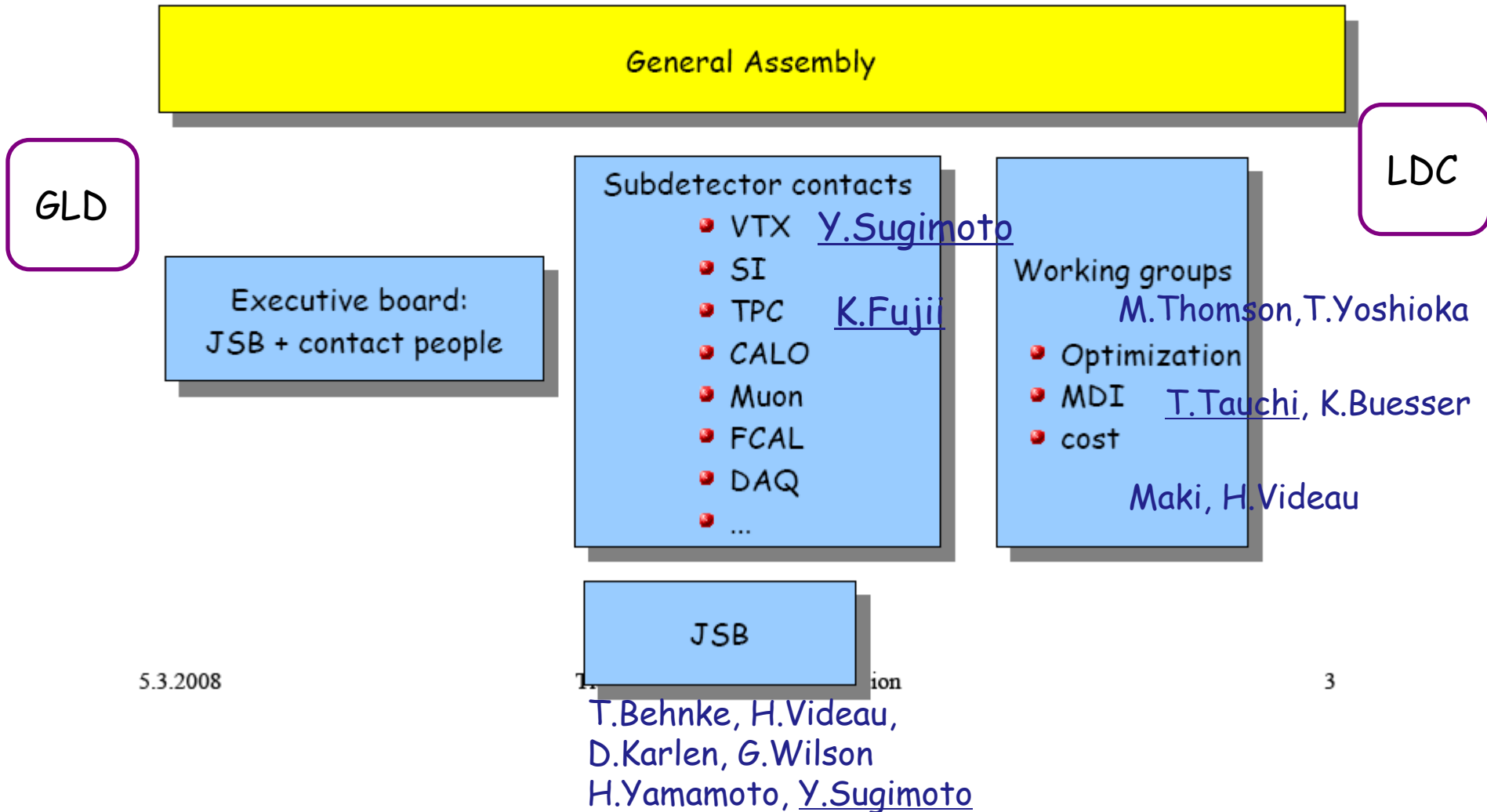
Summer 2007: discussions between LDC and GLD management on how to proceed

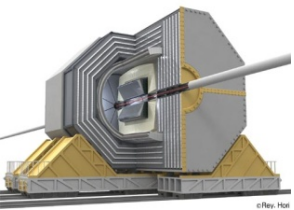
September 2007: Joint Steering Board for ILD established

November 2007: ILD meeting at ALCPG in Chicago

January 2008: ILD workshop in DESY Zeuthen

Structure of ILD





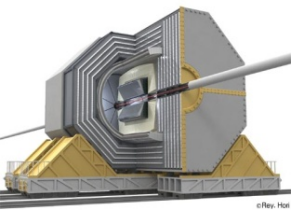
ILD goal: near term → LOI

■ Optimization:

- ◆ Establish a unified detector model based on the optimization
 - Bfield: 3T vs 4T
 - ECAL Rmin: 2.1m vs 1.6m
 - TPC inner radius: 0.3m vs 0.45m
 - Barrel Si Layers: 4 layers vs 2 layers
 - VTX inner radius: 20 mm vs 16 mm
 - Forward system: beam pipe shape, FCAL design, FHCAL
- ◆ Make a convincing physics case for the ILD detector

■ MDI and Integration

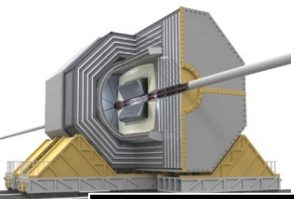
- ◆ Establish a consistent detector integration scenario, responding to the GDE's MDI issues (push-pull, exp. hall, etc.)



ILD schedule (after TILC08)

- Regular phone meetings:
 - ◆ Optimization group: weekly
 - ◆ MDI group: ~bi-weekly
- Warsaw (June): ECFA meeting, 1 day ?
- A dedicated ILD meeting(?) in summer, to fix the ILD layout.
- LCWS2008, Chicago, 16–20 Nov.
 - ◆ Editorial board in place and function
- Jan 2009: LOI Draft version ready for circulation
- Feb 2009: LOI reviewed version ready

- Then
 - ◆ respond to IDAG
 - ◆ Technical design phase



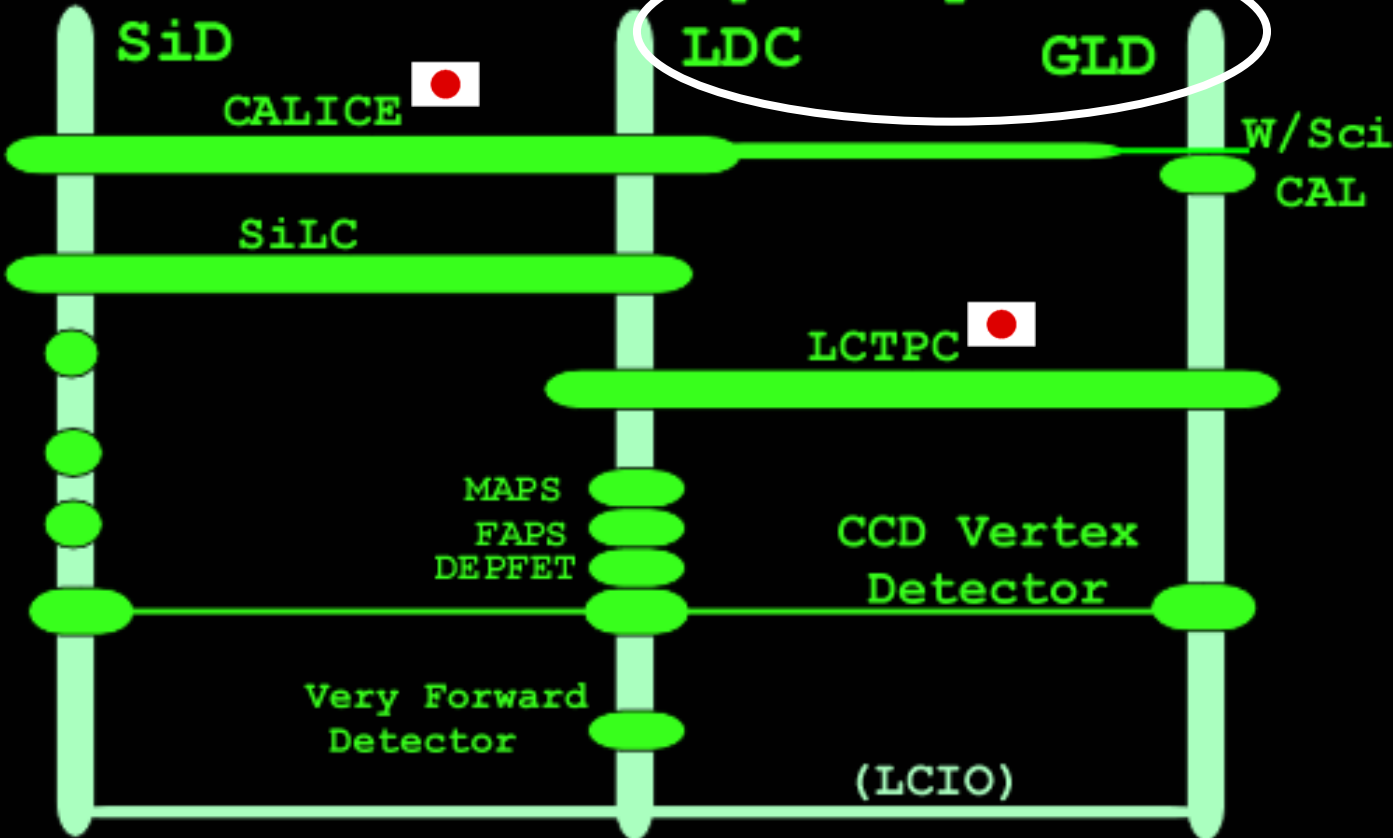
ILC測定器研究の縦糸と横糸

THE MATRIX

ILD

Detector Concept Study

Horizontal
Detector
Component
R&D



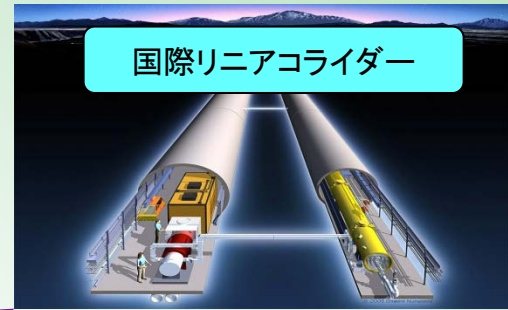
学術創成研究
「国際リニアコライダーの
ための革新的測定器の
開発研究」(5年で4億円)

(2006年～2010年)

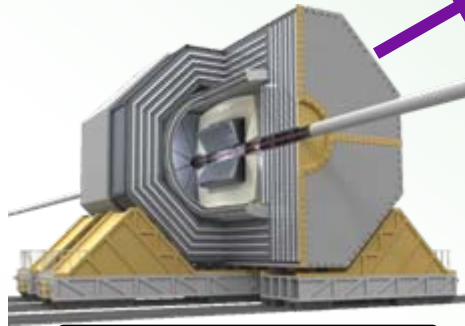
今年春:中間評価

新しい物理原理の解明

- * 真空の本質
- * ダークマター
- * 超対称性原理
- * 余剰時空の構造



- * 日本のリーダーシップ
- * 国際的な若手の養成



高分解能測定器

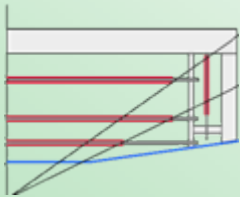
要素開発

最適化

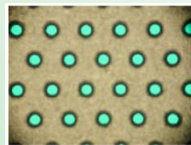
反応点測定

飛跡測定

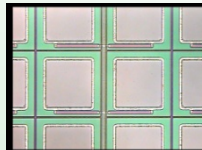
シャワー測定



FPCCD



MPGD

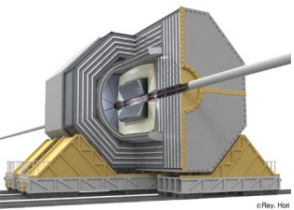


MPPC

最新鋭検出素子の開発・実用化

学術創成研究
「国際リニアコライダーの
ための革新的測定器の開発研究」

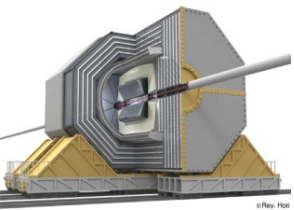
- * 他分野への波及
医療、光通信、
X線結晶学、...



ILD Japan 体制

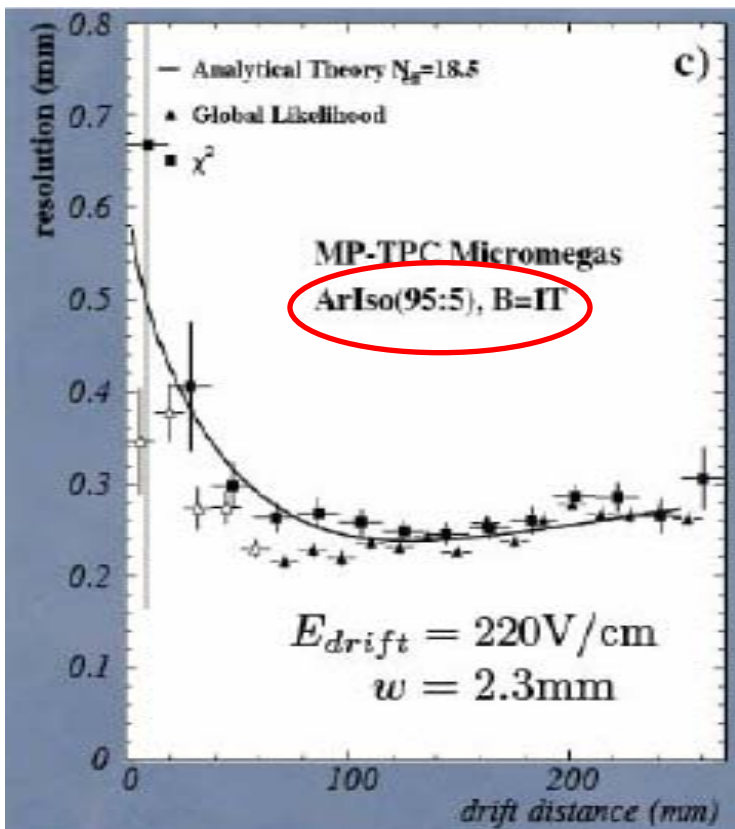
- GLD としての活動: 休眠中 (日本以外アジアのILD活動への参加不十分)
- 国内での測定器に関する会議 - 学術創成研究を軸にして
 - ◆ ~1か月毎にILC測定器一般会議と年会
 - <http://kds.kek.jp/categoryDisplay.py?categId=70>
 - 測定器要素技術開発研究進行状況の確認とILDに関する議論
 - ◆ 学術創成EB会議 (weekly)
- サブグループ:
 - ◆ Vertex, TPC, Calorimeter, MDI, Soft-Optimization, Physics

BACKUP SLIDES



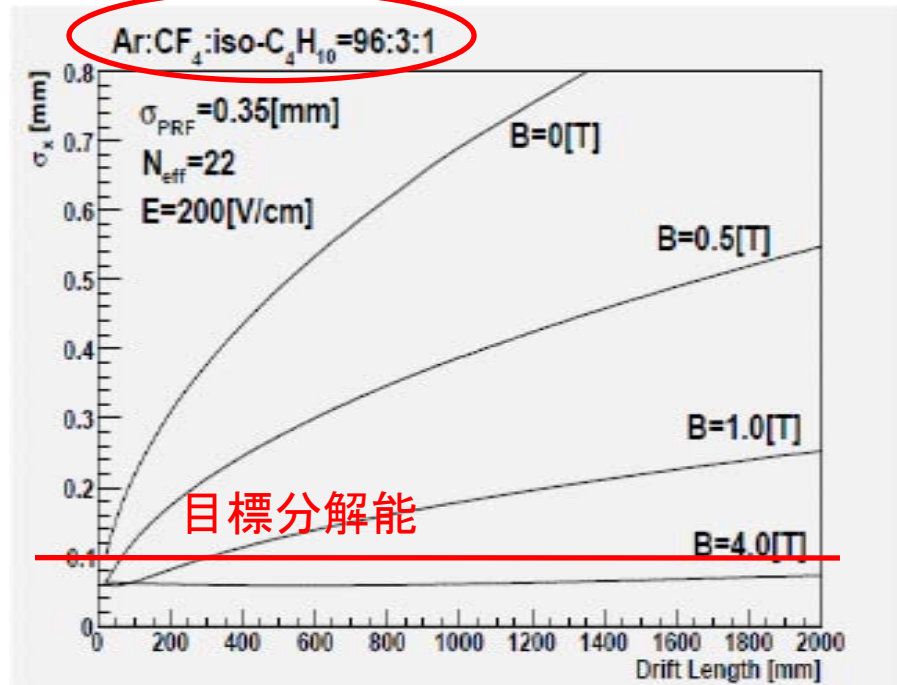
TPC研究の現状

MPGD 読み出しTPCの位置分解能
 ビームテスト vs モデル



Beam test at KEK PS

ILD TPCに適用すると...



ILD TPCは性能目標を達成できそう
 だが、実証が必要！