



UK Involvement in SiD

**LCUK Meeting
18/April/2008
Birmingham**

**Marcel Stanitzki
STFC - Rutherford Appleton Laboratory**

Outline

- Why SiD ?
- Current Status of SiD & SiD-UK
- The SiD EoI
- Report from the SiD Meeting this week
- SiD plans for the future
- How to get involved ?

Why SiD ?

- Why SiD (or ILD, 4th) ?
- To quote a modern philosopher ...

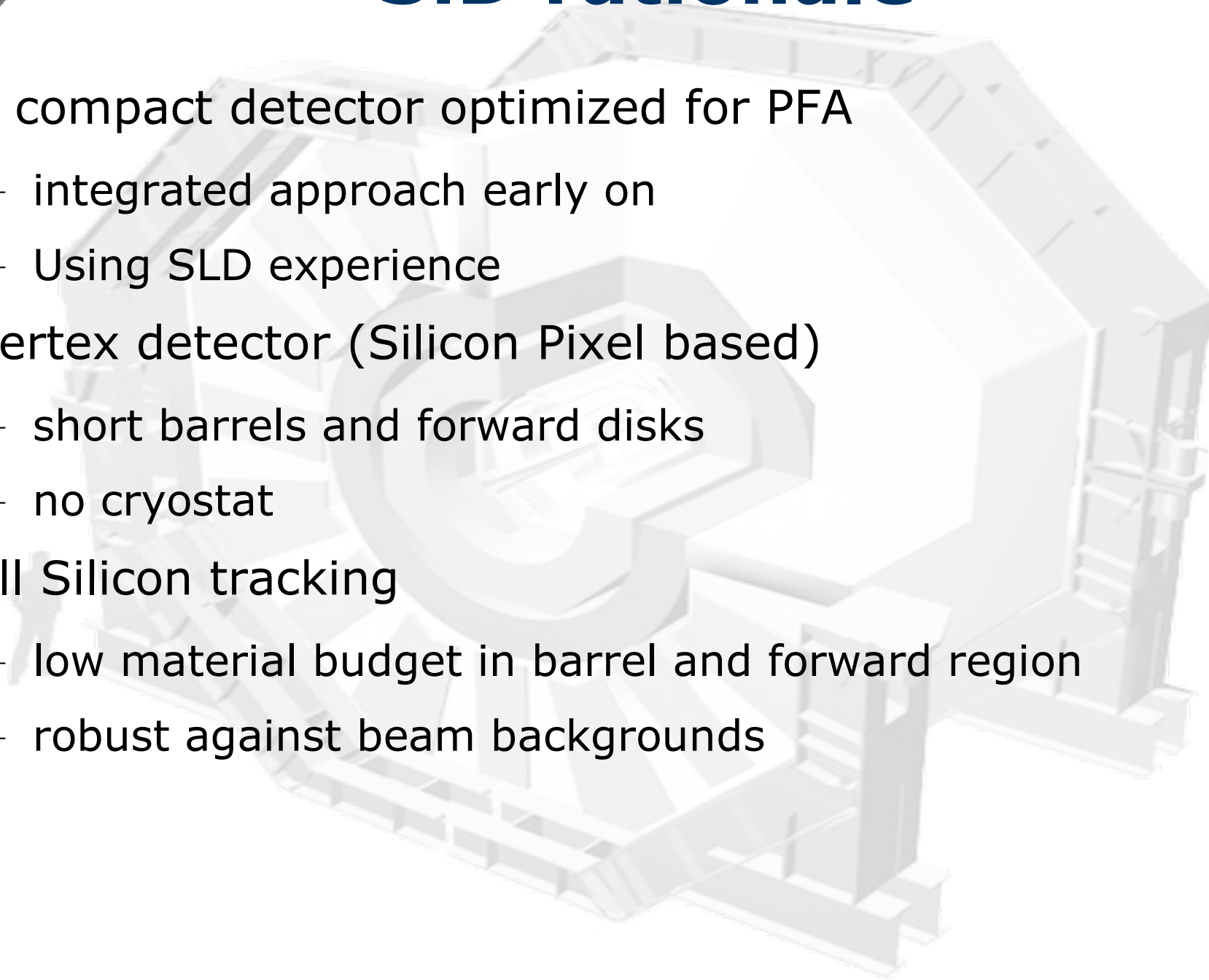
**Everything has been said,
but maybe not by everyone yet**
T. Liu

- Not going to make that mistake ...



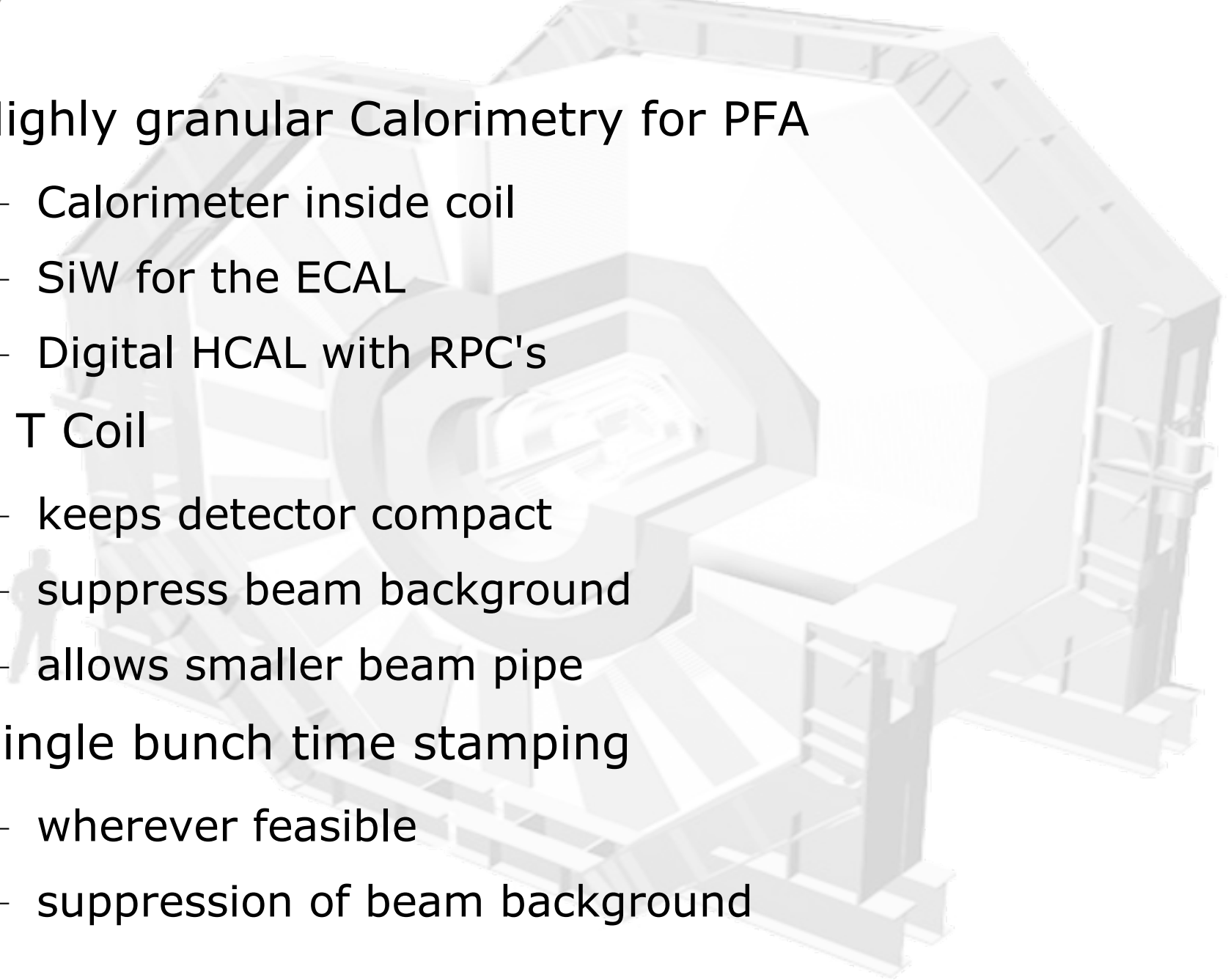
SiD rationale

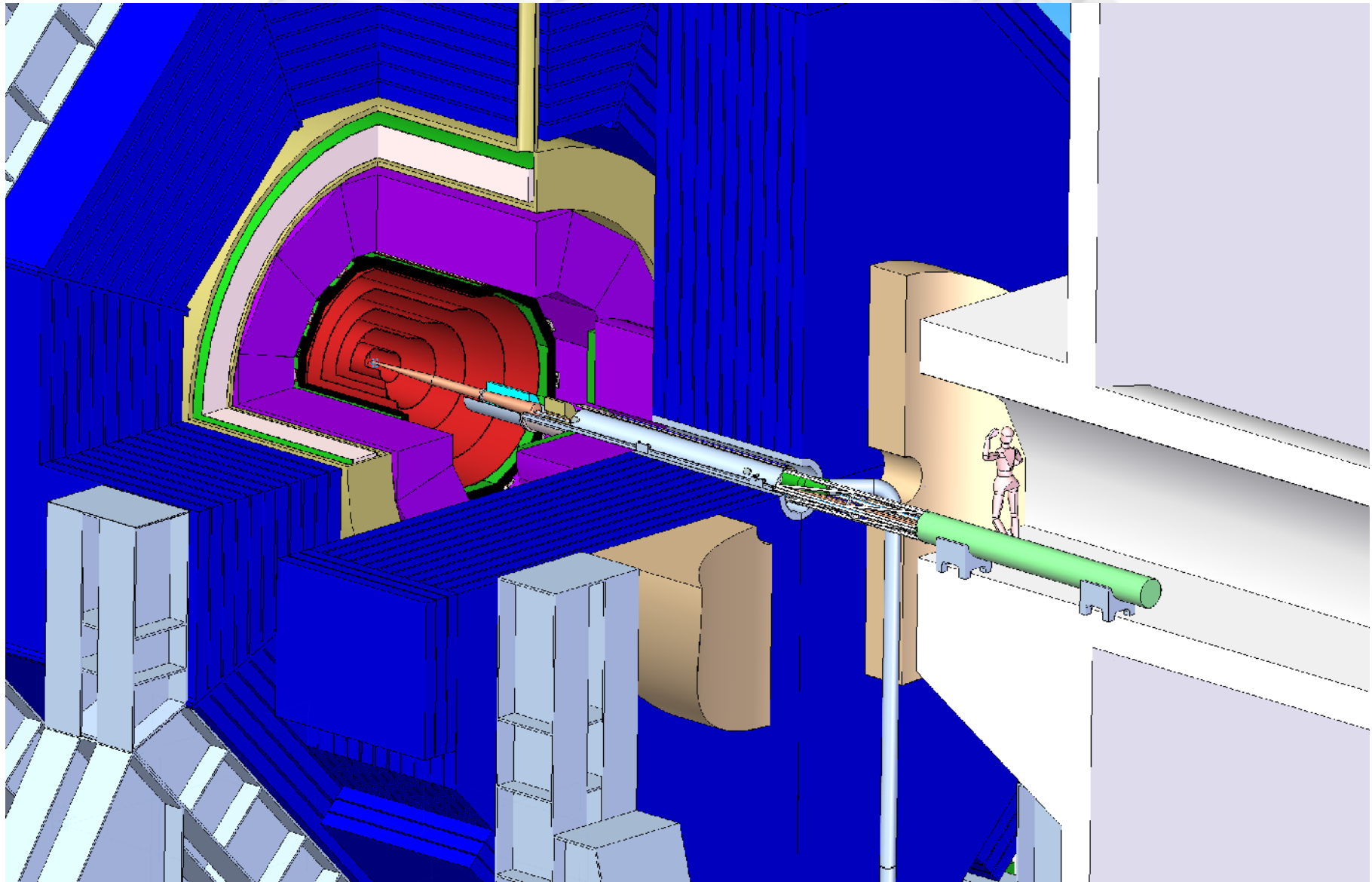
- A compact detector optimized for PFA
 - integrated approach early on
 - Using SLD experience
- Vertex detector (Silicon Pixel based)
 - short barrels and forward disks
 - no cryostat
- All Silicon tracking
 - low material budget in barrel and forward region
 - robust against beam backgrounds



SiD rationale cont'd

- Highly granular Calorimetry for PFA
 - Calorimeter inside coil
 - SiW for the ECAL
 - Digital HCAL with RPC's
- 5 T Coil
 - keeps detector compact
 - suppress beam background
 - allows smaller beam pipe
- Single bunch time stamping
 - wherever feasible
 - suppression of beam background





Current SiD News

- Black December had a major impact on SiD
- SiD meeting at SLAC (End of January)
 - *This has been a sobering meeting, but despite some bad news, we have heard an impressive amount of progress. SiD remains one of the detector concepts for a Linear Collider and we will submit an LOI (Harry Weerts)*
- Lots of progress since Black December and SLAC meeting
- Sendai Meeting: Call for EoI's announced
 - SiD immediately spreads the word

- SiD-UK is committed to keep contributing to SiD
 - MDI
 - Calorimetry &PFA
 - Vertexing
 - Benchmarking
- Core group will stay on-board
- Phil Burrows continues as SiD-UK Contact





The SiD EoI

March 31, 2008

Dear Yamada-san:

We are writing on behalf of the Silicon Detector Design Study to inform you of SiD's intention to submit a Letter of Intent, to pursue a full technical design of the Silicon Detector for ILC, by late March, 2009.

SiD has initiated study of the benchmark reactions selected by the WWS software group to document the physics capability of its design. SiD is also developing a full conceptual engineering design, optimizing detector parameters, evaluating costs, defining a list of needed R&D, and pursuing R&D for many subdetectors.

The SiD contact persons for your Physics and Detector Board will be John Jaros and Harry Weerts.

Members of SiD are already participating in several of the common task teams you have proposed. SiD's representatives to the common task teams will be as follows:

Machine Detector Interface	Phil Burrows
Engineering Tools	Kurt Krempetz
Detector R&D Panel	Andy White
Software Panel	Norman Graf
Physics Panel	Andrei Nomerotski

The following institutions are currently participating in developing the Silicon Detector Concept...

On behalf of the Silicon Detector Design Study,
Harry Weerts and John Jaros



Some comments

- SiD submitted its EoI on time on 31st of March
- 4 UK groups signed the EoI
 - Rutherford
 - Oxford
 - Bristol
 - Imperial
- 50 institutions signed by 31st of March
 - will provide addendum with groups that signed on afterward



From the spokes

The goal/purpose of is evolving and will continue to do so.

Current thinking in SiD (please challenge):

SiD should help shaping/establishing the LOI process

SiD LOI should:

Describe the status of where & what SiD is

Describe a baseline with options and how we arrived at baseline

Describe performance of the "baseline" configuration

Describe where we want to go, plans & ,milestones (after LOI)

Describe what R&D (with priorities & milestones) and resources (?) are needed to do that

Describe cost of baseline

Questions:

How important is cost at this point ???

How much does cost considerations impact baseline ?

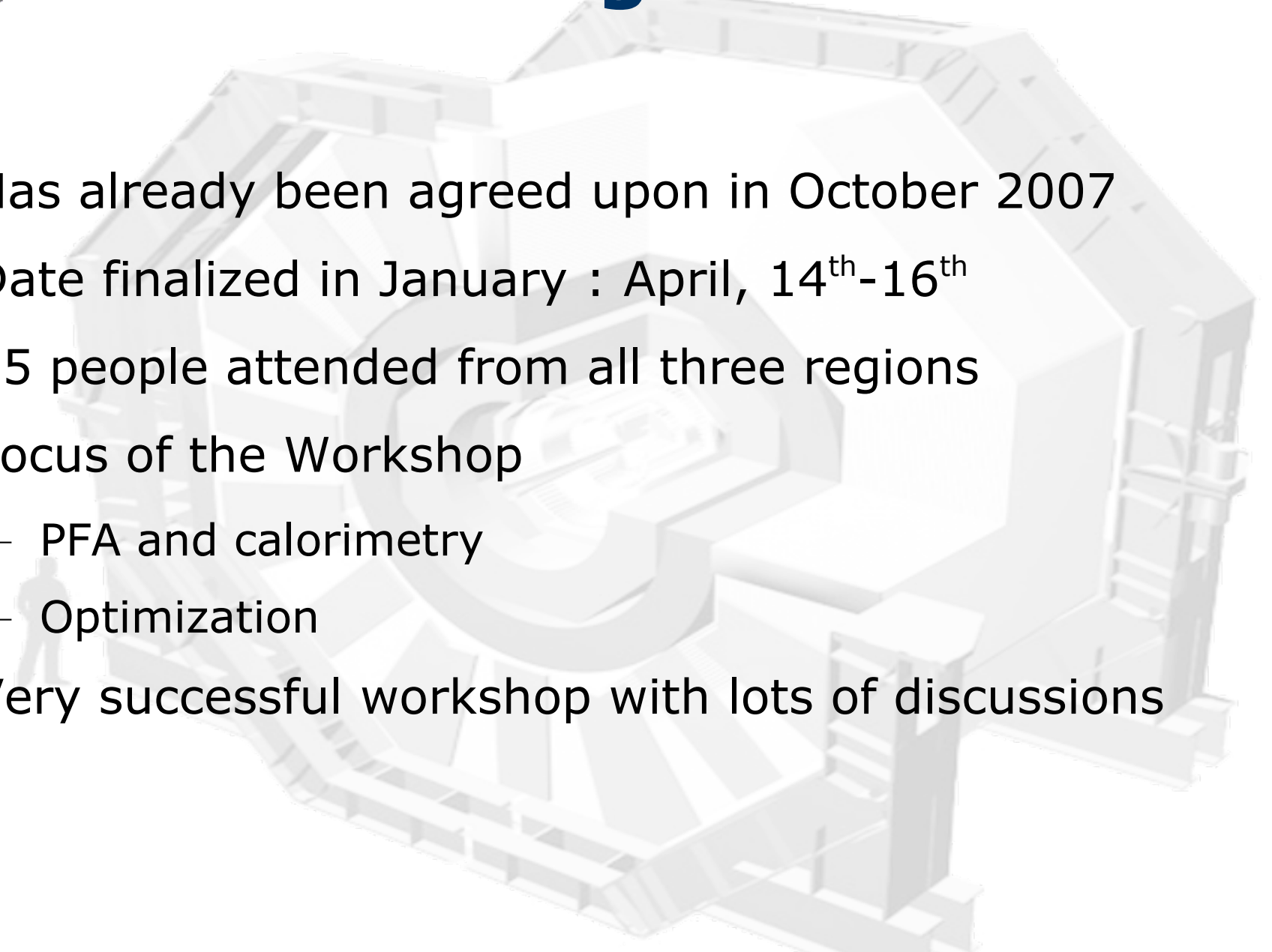
Harry Weerts

Marcel Stanitzki



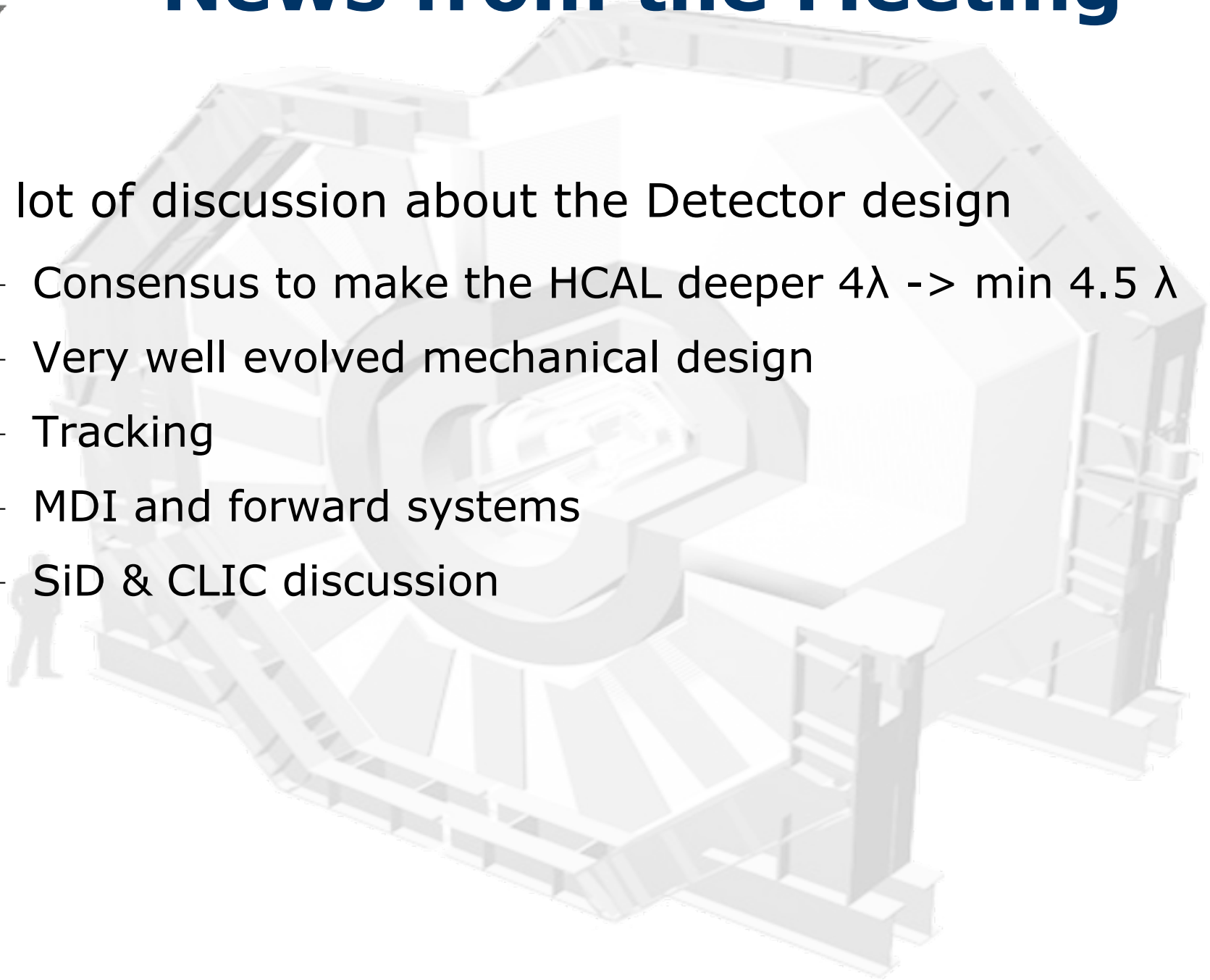
SiD Meeting at Cosener's

- Has already been agreed upon in October 2007
- Date finalized in January : April, 14th-16th
- 65 people attended from all three regions
- Focus of the Workshop
 - PFA and calorimetry
 - Optimization
- Very successful workshop with lots of discussions

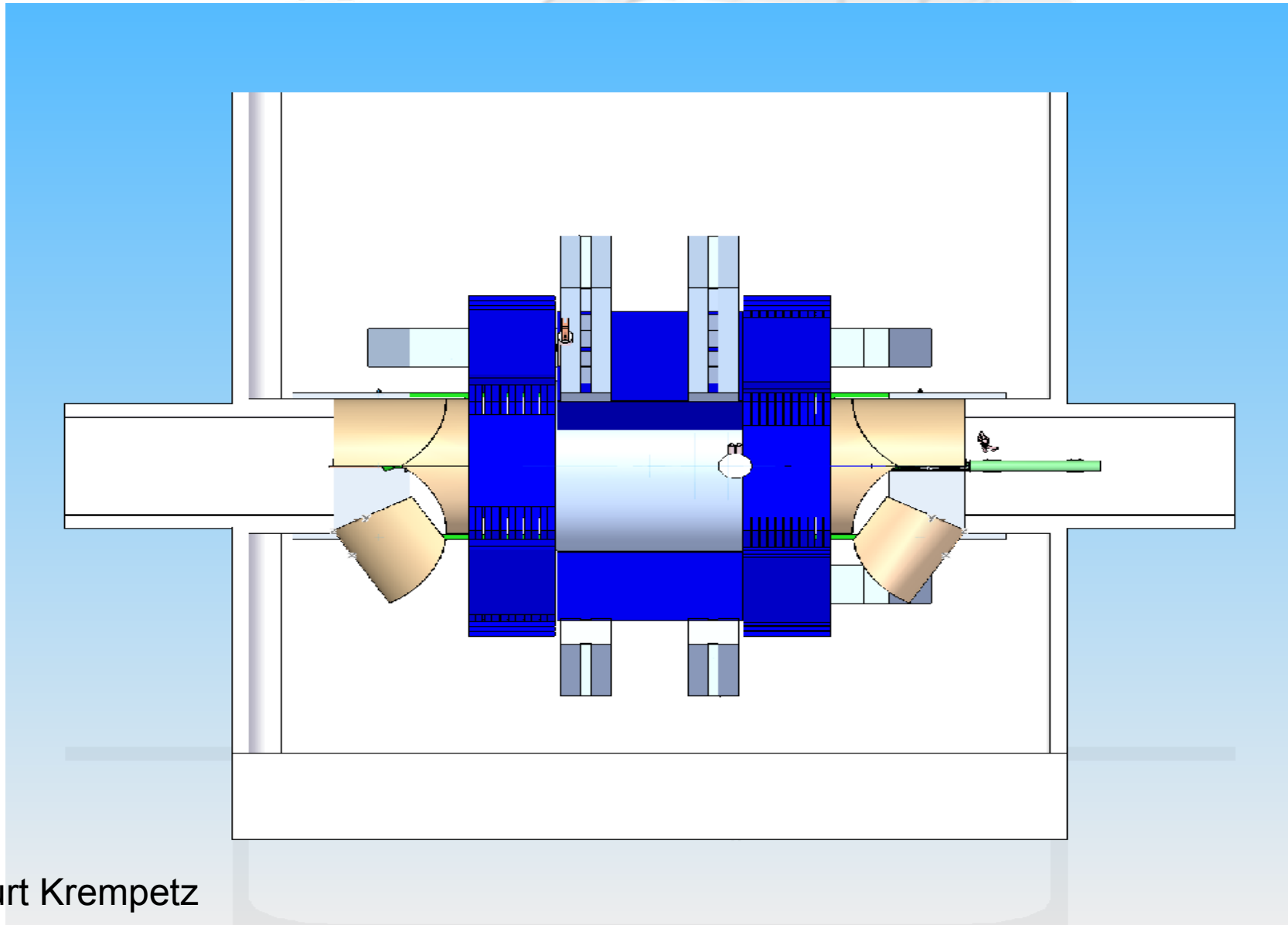


News from the Meeting

- A lot of discussion about the Detector design
 - Consensus to make the HCAL deeper 4λ -> min 4.5λ
 - Very well evolved mechanical design
 - Tracking
 - MDI and forward systems
 - SiD & CLIC discussion



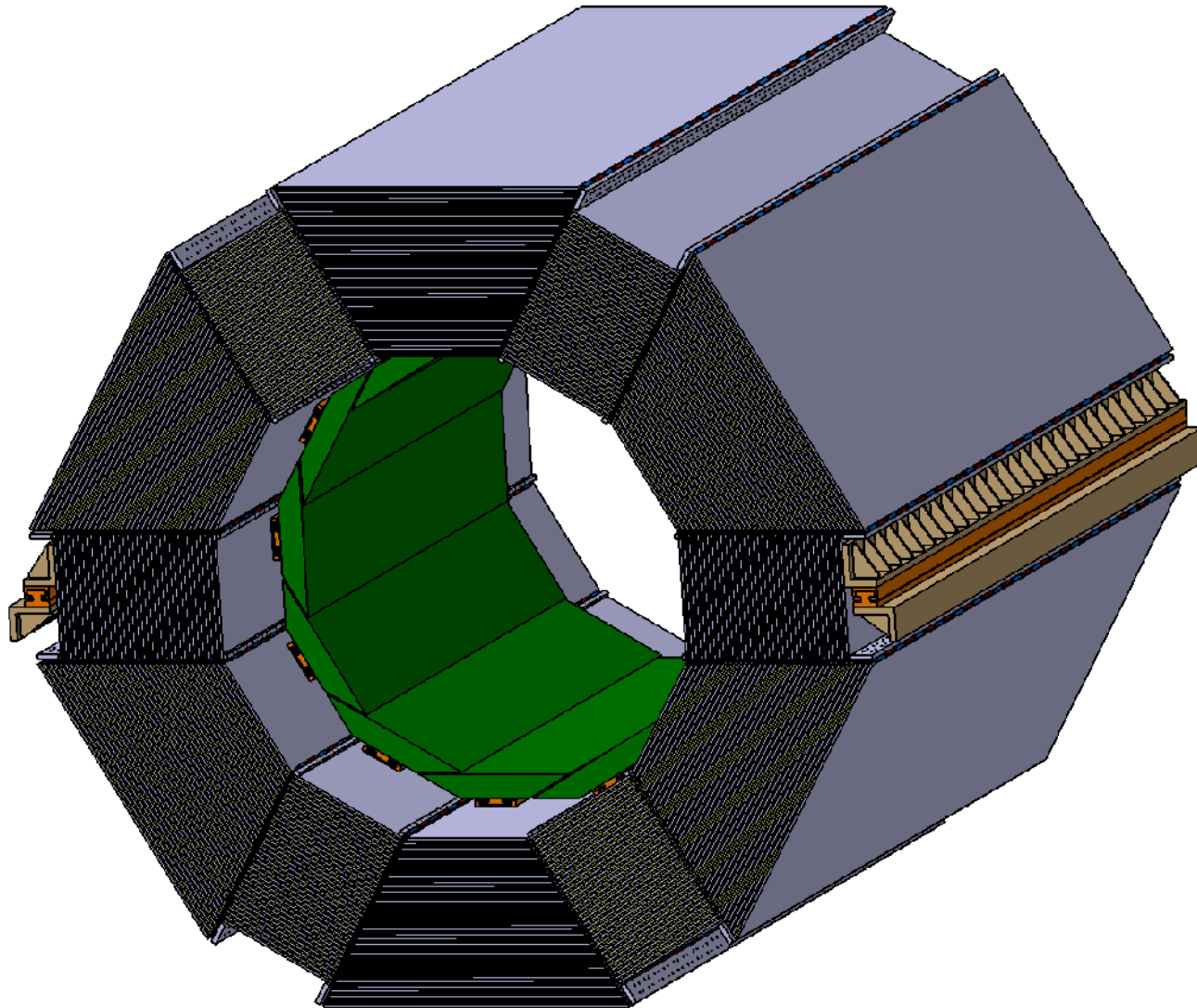
PacMan Shielding



Kurt Krempetz

Calorimeter Design

Global
view of the
structure



Kurt Krempetz

ECAL technology chosen

A.) silicon/tungsten B.) silicon/tungsten

A) "traditional" silicon diodes with integrated readout

Transverse segmentation 3.5 mm (Moliere radius ≈ 13 mm)

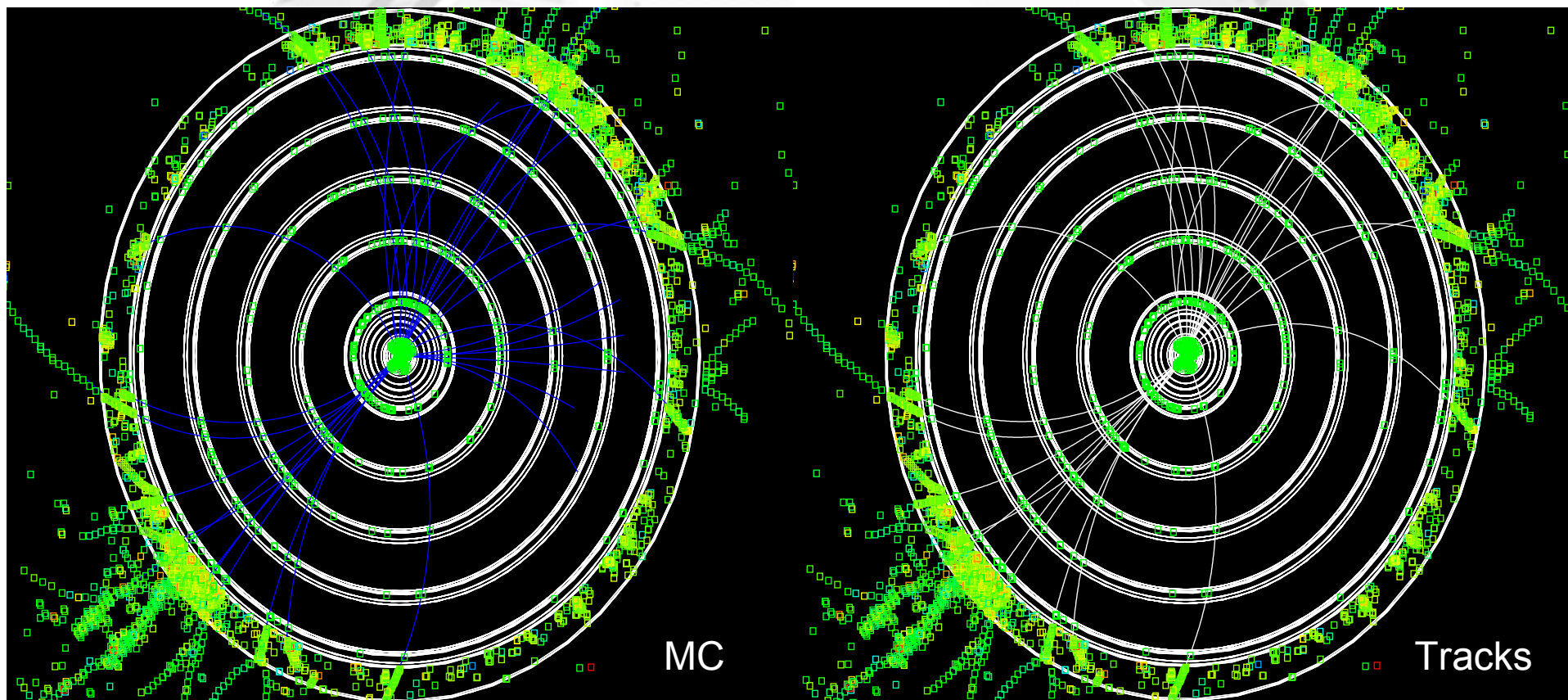
B) MAPS active CMOS pixels (Terapixel option)

Transverse segmentation 0.05 mm (Moliere radius ≈ 13 mm)

Goal: The same mechanical design should accommodate either option

Ray Frey
Yannis Karyotakis

Tracking



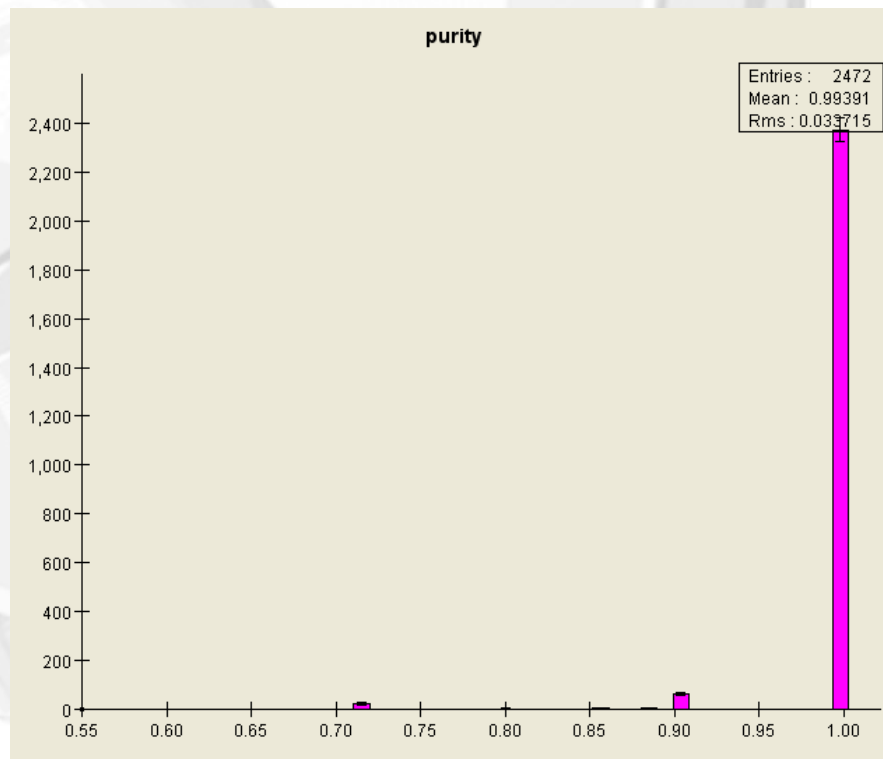
Rich Partridge

More Tracking

- Hits contains a list of MC particles that contributed to the hit
- Track purity is the fraction of hits on the track due to the MC particle with the most hits on the track
 - Purity = 1 if all hits are from the same MC particle

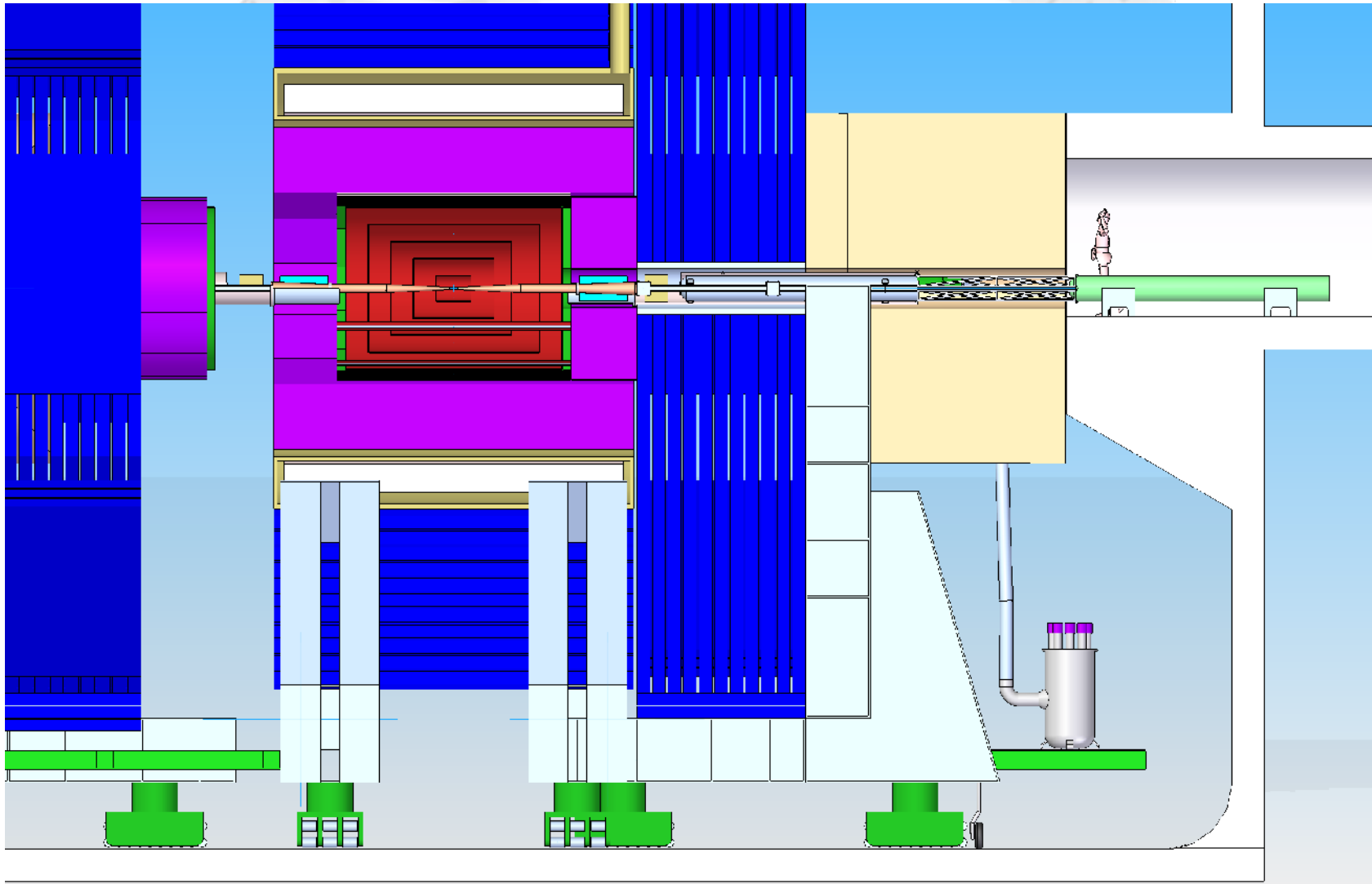
$$e^+e^- \rightarrow t\bar{t} \rightarrow 6 \text{ Jets}$$

Hits	Fraction	Ave Purity
7	1.3%	76.3%
8	0.2%	96.9%
9	7.7%	99.6%
10	90.9%	99.7%
All	100%	99.4%



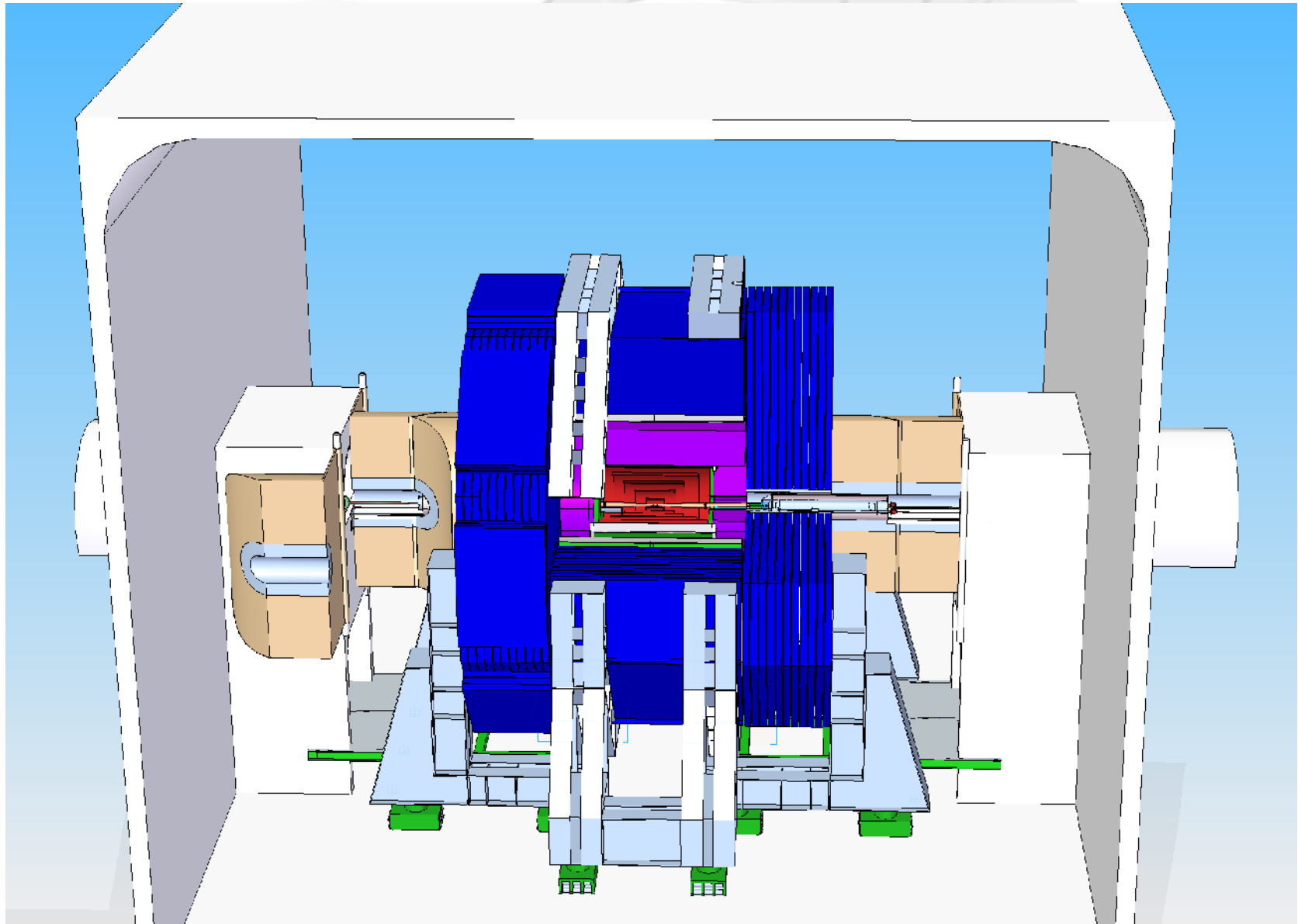
Rich Partridge

MDI



Tom Markiewicz

MDI (II)



Summary from Dieter Schlatter:

- Good exchange with ILC experts, possible basis for future collaborations?
 - There are certainly commonalities with the ILC detectors
 - ILC detector studies: R&D and discussions/optimization still ongoing
- Work is needed for CLIC on detector studies
 - Some benchmark channels started (taking SiD)
 - Need to discuss MDI with machine group (e.g. Mask upgrade/forward region instrumentation)
 - How well does particle flow (Energy flow) work at CLIC?
- R&D detector proposals being prepared
 - Good prospects for adequate time stamping at CLIC
 - Novel calorimeter concepts

Status Summary

- Engineering is well advanced
- Clear idea how SiD should look like
- “Freeze” of detector parameters soon
- Starting to select baseline technology and options
- Software is slowly coming along
- Benchmarking has started, strong UK participation
- We know what we need to do for the LoI
- Established ties with CLIC



Some impressions



some more shots

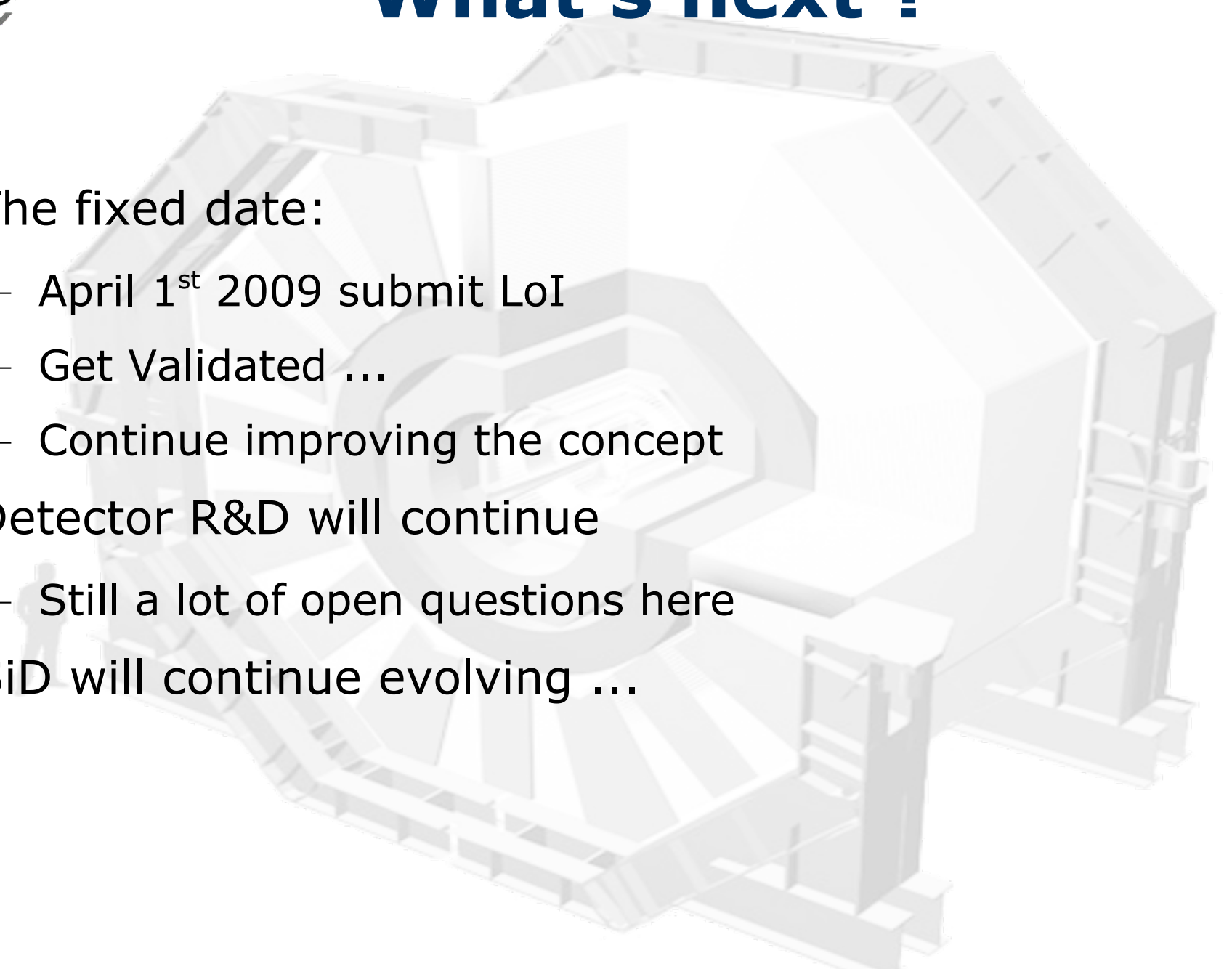


Some felt a bit confused



What's next ?

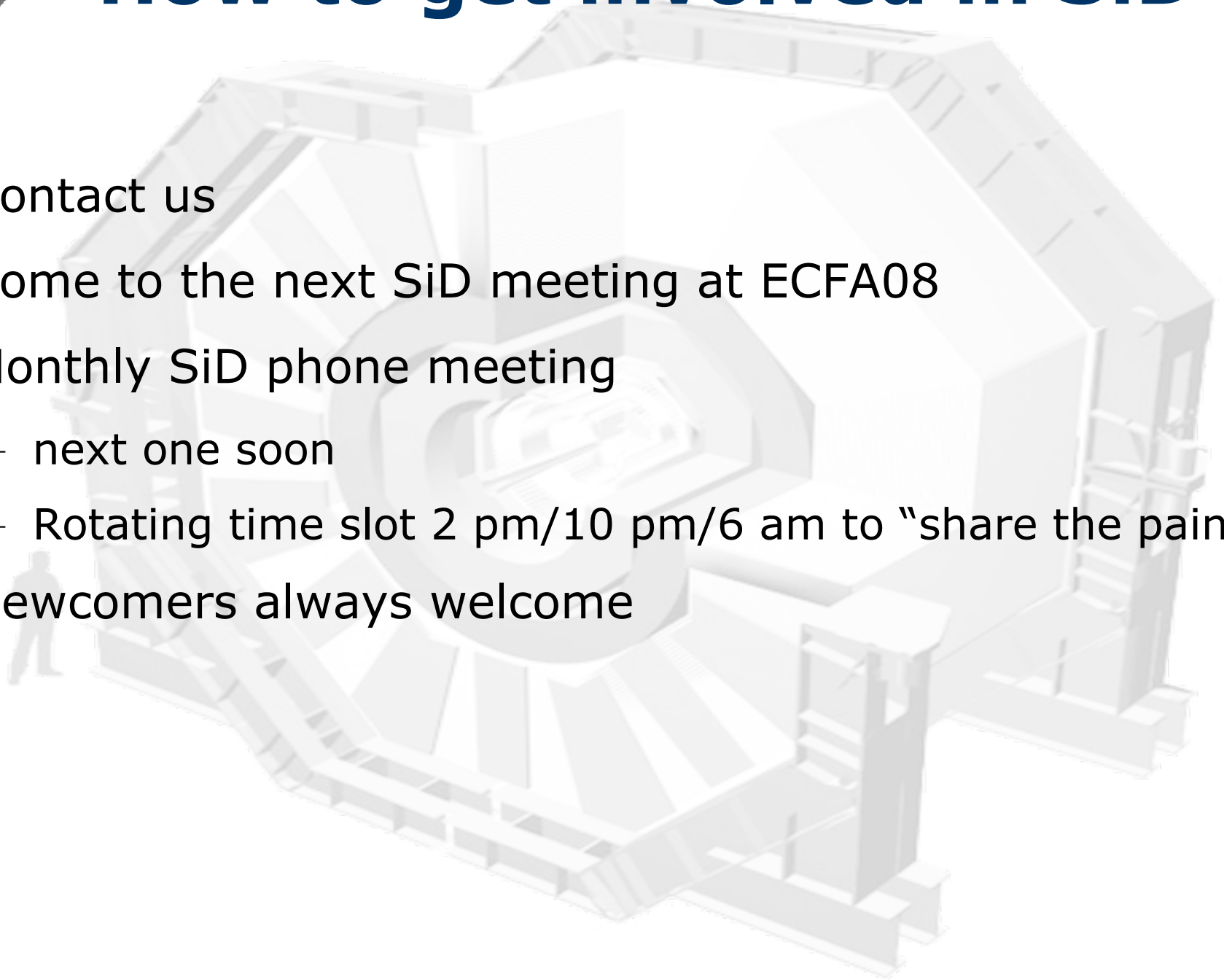
- The fixed date:
 - April 1st 2009 submit LoI
 - Get Validated ...
 - Continue improving the concept
- Detector R&D will continue
 - Still a lot of open questions here
- SiD will continue evolving ...





How to get involved in SiD

- Contact us
- Come to the next SiD meeting at ECFA08
- Monthly SiD phone meeting
 - next one soon
 - Rotating time slot 2 pm/10 pm/6 am to “share the pain”
- Newcomers always welcome



Summary

A photograph of a man with a beard, wearing a dark suit and a blue tie, standing in a room with dark wood paneling. He is holding a piece of paper and appears to be speaking. The room has several framed portraits on the wall. A large white speech bubble is overlaid on the image, containing the text: "The fool who persists in his folly will become wise (William Blake)".

**The fool who persists in his
folly will become wise**
(William Blake)

**As pointed out by our
After Dinner speaker
Ken Peach**