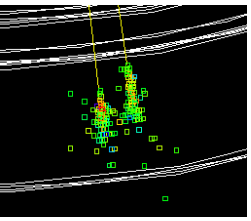


# DBD ECal Report

December 2011:

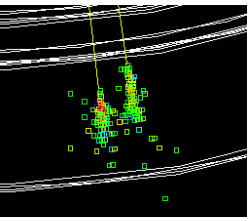
LOI section still a good starting point

Guiding principles based on optimizing physics performance constrained by technological feasibility and cost

- multi-jet final states (PFA)
- tau id and analysis
- photons (4-vector)
- electron id
- Bhabhas and Bhabha acollinearity
- Hermiticity

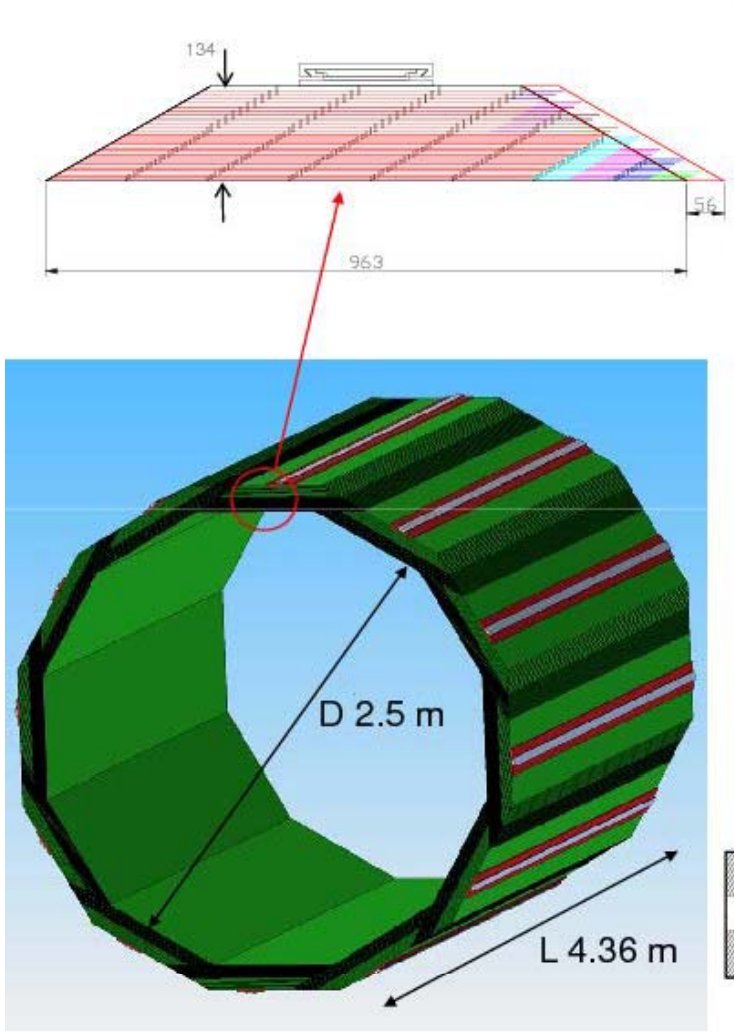
⇒ Imaging ECal

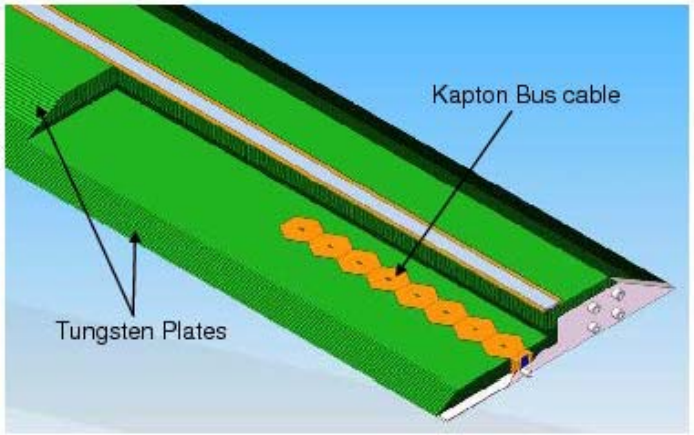
ECal introductory text is updated version from LOI

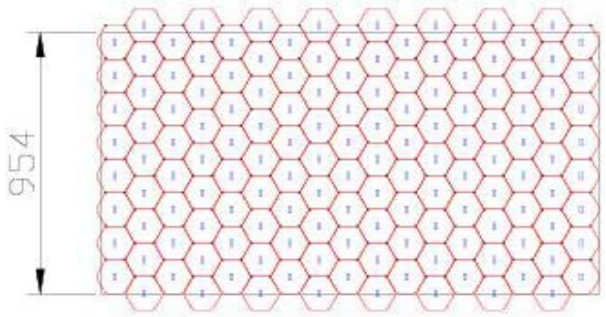


# What is the ECal Baseline?

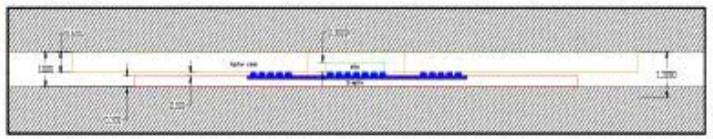
An imaging calorimeter: 30 layers tungsten interleaved with 30 layers pixellated silicon



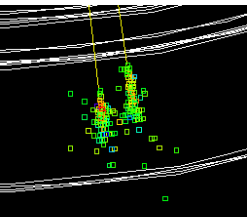

Hexagon sensors arrangement



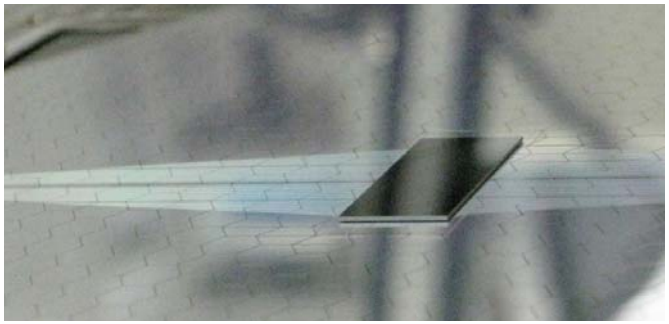
detector module between tungsten plates

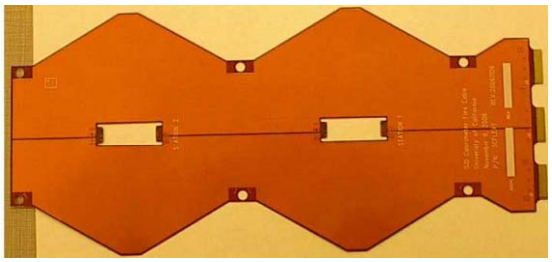
**Baseline configuration:**

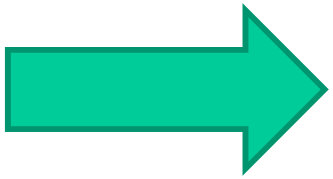
- transverse: 12 mm$^2$ pixels
- longitudinal: (20 x 5/7 $X_0$) + (10 x 10/7 $X_0$) $\Rightarrow$ 17%/sqrt(E)
- 1 mm readout gaps $\Rightarrow$ 13 mm effective Moliere radius

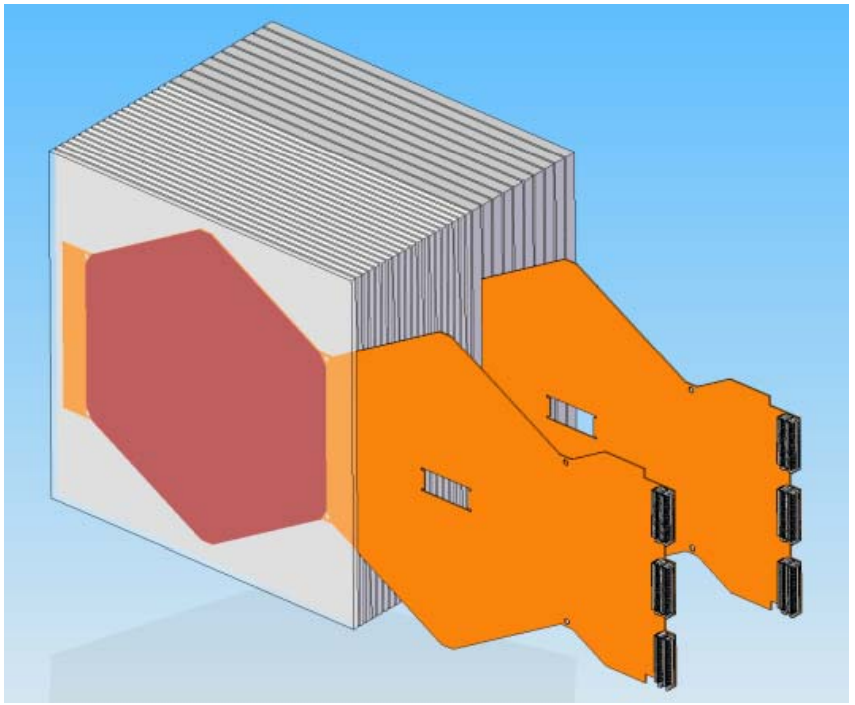


# The biggie for LOI → DBD: Completing the R&D

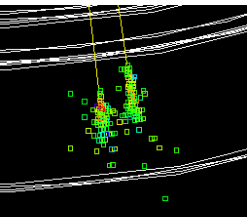








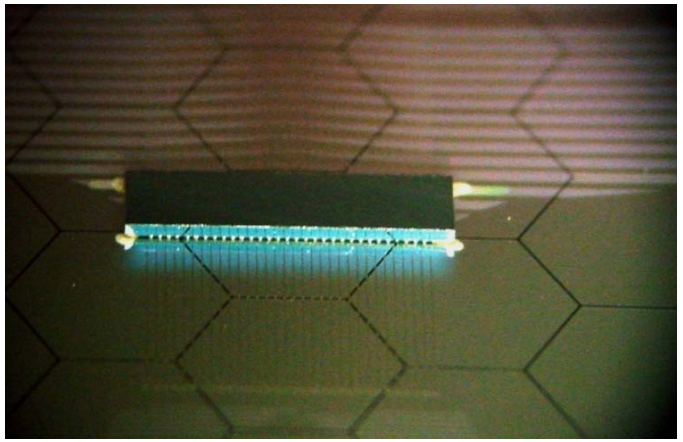
- Recall the R&D goal: Develop the technologies required for a fully functional ECal which meets the physics-driven goals
  - Do not revisit/reinvent techniques which are not practical for a LC Ecal
- Program: Complete the component R&D, build a test stack, and evaluate performance in a test beam.

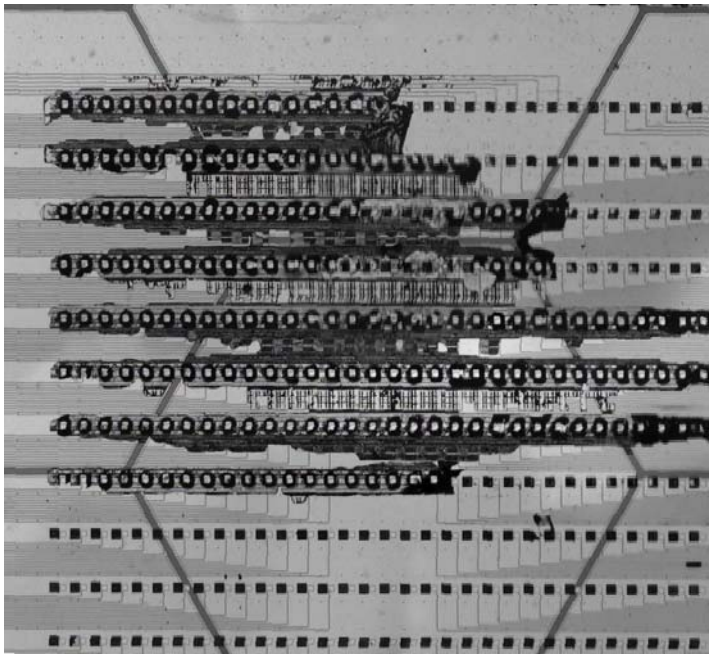


# Brief R&D history/status

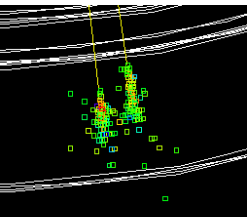
- Silicon sensors at Oregon for >3 years
- SLAC has produced a series of prototype KPiX readout chips 2009-11
- 1024-channel chip ("KPiX-A") at SLAC, Feb 2011

  → Marty's talk





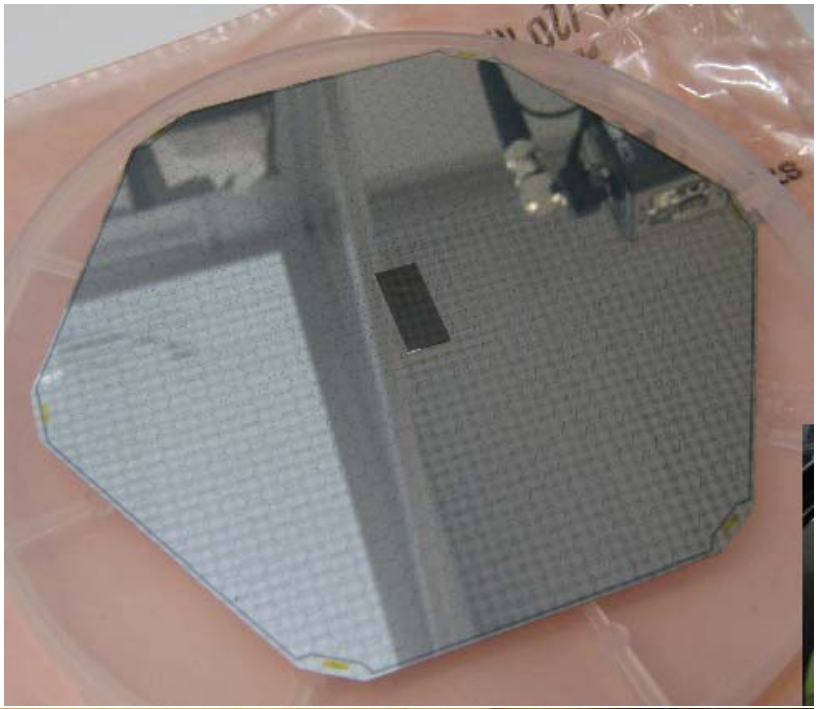
- But… a series of (mis-)adventures with KPiX-sensor interconnects

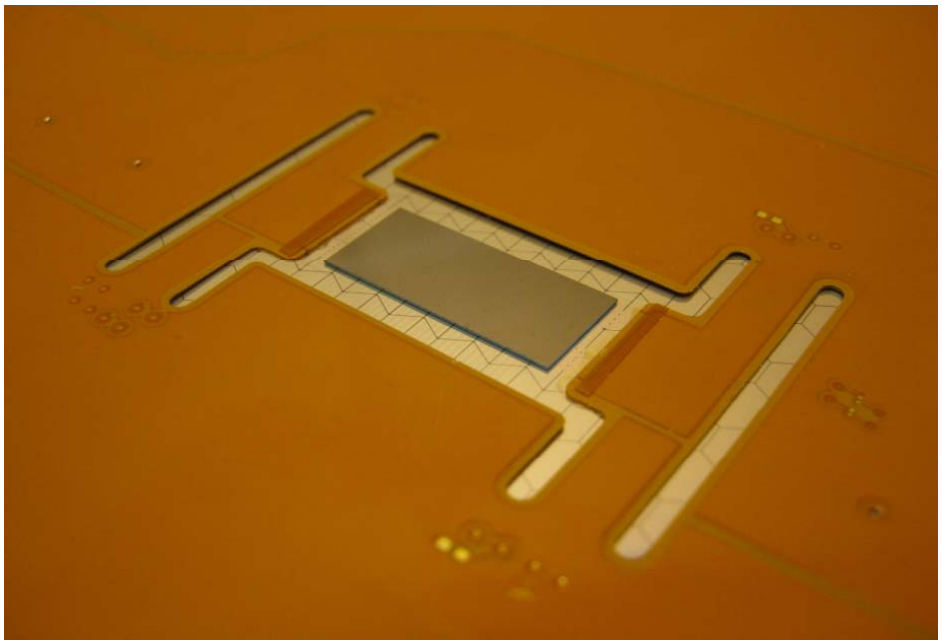


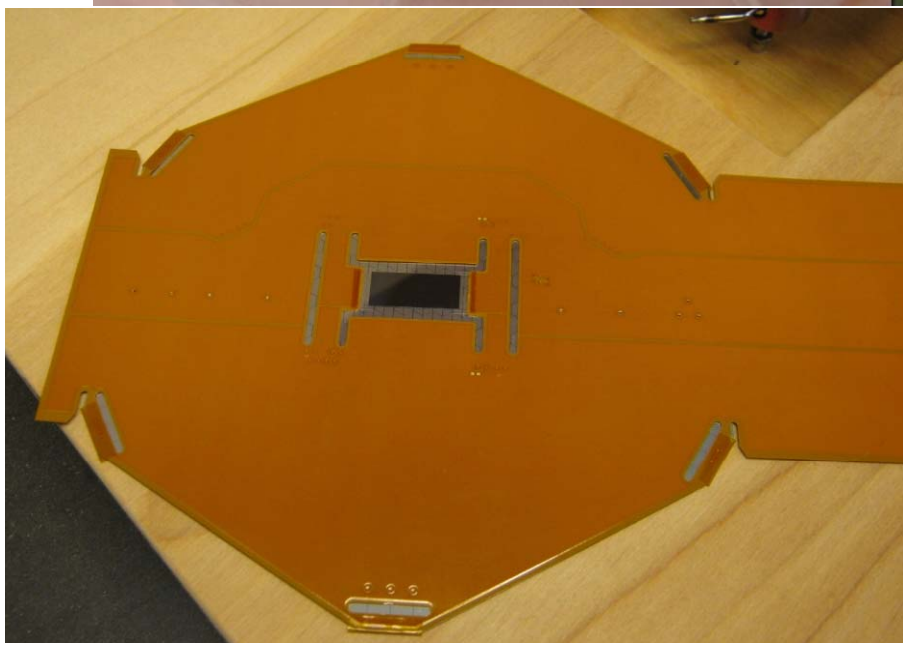
# Breakthrough: Feb 2012

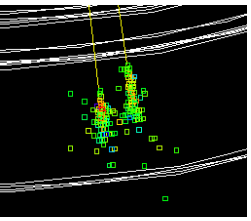
- KPiX-sensor successfully bonded by IZM
- April 2012: Davis attaches flexcable to sensor-KPiX
  - Lower temp. solder bumps
- First full-system results

  → Marty's talk

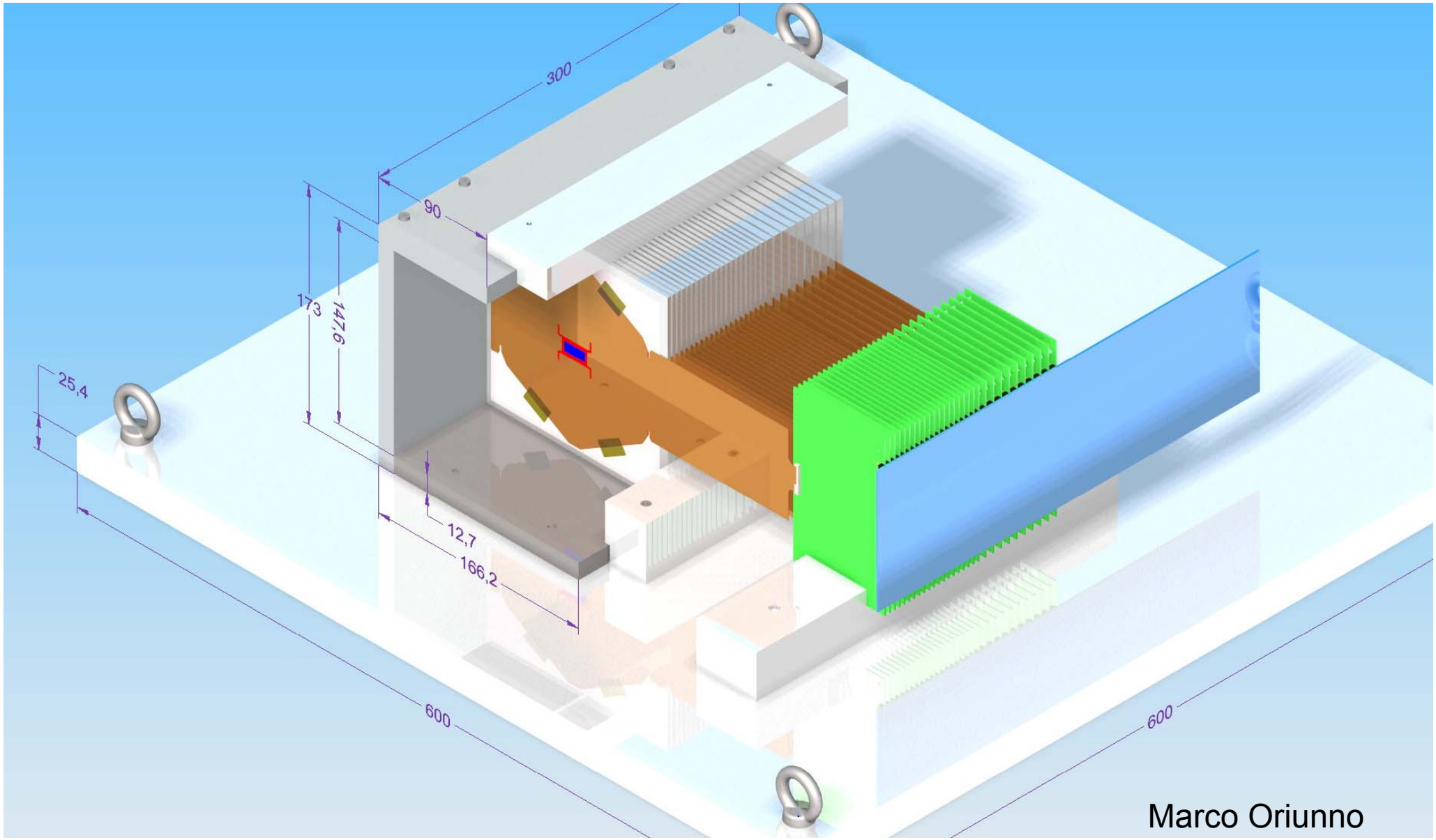


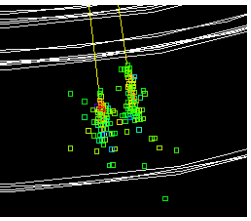






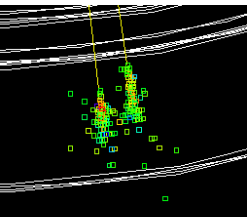
# On to the test beam…





# … provisionally

- Only 2 bonded (NG) sensors so far
- Next batch of 15 in queue at IZM
  - Expected mid-September
- There are unexplained bad channels in first sample
  - due to NG sensors?
- SLAC test beam not available until ~March 2013 ⇒ not for DBD
- DBD can report positive trajectory and latest bench results



# DBD lost and found

- Basic text is in place
- Have default figures – to be added ~few days
  - Will include cosmic ray results from full bonded sensor
  - Place holder for a last minute performance plot
- Missing:
  - Endcaps!
    - Need sensor layout, mechanical design
    - Some preliminary work by Marco – what to say in DBD?
  - Calibration and alignment
    - Should add some text – no detailed studies beyond KPiX internal cal.
  - MAPS as technological option – Marcel S. will add some words
  - Performance studies – a number of possibilities have been discussed (e.g. photon vertexing, tau id); nothing carried out (to my knowledge)