
Future proposal possibilities

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Reminder of previous discussion

- Discussed at 8 Feb meeting
- Aim to submit proposal in ~Oct08
 - If approved, funding would come online in Apr09 (i.e. the next FY)
- Proposal would be considered by PPRP in Oct-Dec08 period
- We would aim to have new results during this period
 - Sensor fabrication submitted to 14 Jul shuttle run deadline
 - Returned in ~Sep so first results would be available
 - Ideally would have paper (draft?) available
 - Another beam test with the first sensor (with optimised operating point) was mentioned but marginal for time

Since that time

- Future of LCFI less certain
 - Konstantin leaving effectively shut down CCD development
 - Still interest in ISIS but some groups less involved in this
- Informed that future proposals will be treated as “new” projects
 - Have to get onto STFC Roadmap
 - Requires two-page SoI to be submitted before proposal
- The SoI has to go to the PPAN committee; they meet on 10 Jun and 22 Jul and submissions must be 1 month in advance
 - SoI by 10 May or 22 Jun; if the latter, then a rough budget figure for planning purposes by 10 May would be useful
- Competing for limited funds; O(£1M/year) total
 - LCFI ISIS, LCFI mechanics, CALICE DAQ expected to submit proposals also

Our choices

- Continue with an ECAL-only proposal with the current groups
 - Have been slow on testing; would like more effort here
 - New RAs at Imperial and Birmingham to replace Yoshi and Anne-Marie but would be 100% MAPS this time
 - Extra (ex-LCFI?) effort in RAL/PPD?
- ECAL-only proposal but expand to include new groups
 - Oxford, Bristol are most likely candidates
 - More effort for testing but potential cost increase
- Tracking and ECAL proposal with new groups
 - Extra effort needed in TD engineering and testing
 - Potentially large cost increase
 - Lack of previous UK involvement; may be seen as “new”
 - I assume Marcel will cover this

Consider ECAL-only option

- With current groups, then experience shows a complete design-fabrication-test cycle could take around 18months
 - Three year proposal should include two fabrications
 - These might cost ~£300k plus ~£100k other equipment
- Effort would be 4FTE full time people plus parts of the rest
 - 4 full time are Marcel, Jamie, and two RAs
 - ~6FTE total which would be ~£500k/year, £1500k total
- Travel may be ~£30k/year so ~£100K total
- This gives a total of £2000k, dominated by effort cost
 - Equivalent to ~£700k/year, a significant part of O(£1M/year) but not out of the question

ECAL-only option with extra groups

- Even with only small effort from extra groups, would need at least one extra RA somewhere plus another ~1FTE of other staff
 - Total is then ~£2500k, so ~£800k/year
- With significant increase of effort, could think of speeding up testing to do three development cycles in three years
 - Extra ~£100k for equipment
 - Two extra RAs and ~2FTE (including 0.5FTE of another engineer) so ~4FTEs extra total
 - Increases cost to ~£3100k total or ~£1000k/year
 - Would need a very good case for this...

What could we aim to do?

- Basic ideas on what would be feasible with current groups, plus possibly a small amount of extra effort
- How to convince PPRP that this is needed?
 - Developing technology for “generic” future collider not a good selling point
 - The perception is that the next detector is two decades away; technology will be completely different by then
- The aim would have to be what we tried to achieve in this grant; show the feasibility (or not) of a digital ECAL approach
 - Best proved by actually doing it
- Overall aim could be to put a real calorimeter in beam
 - E.g. $15 \times 15 \text{cm}^2$ per layer for 20 layers $\sim 4000 \text{cm}^2$
 - Sensor cost for this? Too prohibitive?

What would be required for the sensor?

- Sensor changes/improvements could include
 - Enlarged sensor (stitching?)
 - Higher level of clock/control integration
 - Flip-chip bondable
 - Reoptimisation of pixel size and/or diode layout (hexagons?)
 - Pixel uniformity and/or calibration circuitry
 - Multiple thresholds (?)
- Previous issues like power, speed not so important
- Would need simulation studies to show need for some of these before submitting proposal
 - E.g. Multiple thresholds; able to distinguish 1 or 2 MIPS or dominated by 1MIP Landau tail? Payoff vs. memory and tracking space?

What would the schedule look like?

- Assume proposal covers FY09/10 to FY11/12; i.e. Apr 2009 to Mar 2012
- We would need a year after getting big run of production sensors
 - Test, assemble calorimeter, take it to a beam, take data and analyse
 - Hence, production would have to happen by Mar 2011
 - Production sensor design would need to finish by end of 2010
- Assume “other” (prototype?) sensor fabrication is a year earlier
 - Design complete by end 2009, testing during 2010
- This would be 15 months after the next sensor being returned in Sep 2008
 - Seems feasible in terms of design and test effort
 - What could we do with next sensor to help towards this?