Simulation/Analysis Proposal

***Milestones*:**

The detailed milestones will depend on when new staff can be recruited and on availability of test beam facilities. It is expected that all groups will participate in this WP.

1. **DESY test beam**
   1.1. Establish analysis framework
   1.2. Include existing digitisation code to mokka (or post processor?)
   1.3. First MC samples, electrons, ideal conditions (+possible cosmics?)
   1.4. Understand beam environment (profile, energy spread, …)
   1.5. Understand wire chamber behaviour
   1.6. Simple simulation of wire chamber in Mokka
   1.7. MC samples, electrons, realistic conditions, incl. hodoscope
   1.8. Comparison of MC/data, for both electrons and cosmics.

2. **Hadron test beam**
   2.1. Maintain all available hadronic shower codes
   2.2. Report defining requirements (beam energy, type, run schedule) for host lab.
   2.3. **First MC samples of ideal test beam conditions, 1-2 hadronic models**
   2.4. Understand beam environment (profile, energy spread, particle content, …)
   2.5. Simulation of beam line environment
   2.6. Second MC samples, realistic beam conditions, 1-2 hadronic models
   2.7. Understand Cerenkov counters
   2.8. Separation into species specific samples (efficiency, purity), various impact positions
   2.9. Large MC production, full set of models, as above
   2.10. Confront models with data, decide on best model(s), estimate uncertainties
   2.11. **Publish test beam results, impact on detector design**

3. **Common tool development**
   3.1. Familiarise with/evaluate existing tools
   3.2. Understand requirements from community
   3.3. Report on design of required tools
   3.4. First through ECFA and LCWS workshops and their successors. Development of common tools to be used in global detector design studies

4. **Energy flow algorithms**
   4.1. Review of existing work/code
   4.2. Identify factors critical to resolution and relevant physics benchmark processes
   4.3. Controlled comparison of existing codes: single process/detector geometry
   4.4. Continue development and evaluation of different algorithms. Clarify the limiting factors governing resolution. Understand interplay between hadronic modelling uncertainties and energy flow.

5. **Global detector design**
    5.1. Optimization of detector geometry (radius, segmentation, sampling etc). Special consideration of forward region?

6. **Active detector technology**
    6.1. Simulation studies supporting studies of alternative detector technologies (e.g. MAPS).

7. **Physics studies**
    7.1. Define aspects of detector to be tested (resolutions,
    7.2.

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Gantt chart:

BDS WP - Collimator Design	FY'05				FY'06				FY'07			
Quarter	1	2	3	4	1	**2**	3	4	1	**2**	3	4
1. DESY test beam												
2. Hadron test beam												
2.1 Maintain hadronic shower codes	===	===	===	===	===	===	===	===	===	===	===	===
2.2 Report: test beam requirements	===											
2.3 Small MC samples, ideal conditions		===	===									
2.4 Understand beamline environment		===	===									
2.5 Simulate beamline environment			===	===								
2.6 MC samples, realistic conditions												
2.7 Understand Cerenkov counters												
2.8 Species specific samples												
2.9 Production MC samples, all models												
2.10 Compare data/all MC models												
2.11 Publish results, impact on design												
3. Common tool development												
Survey/tool familiarisation	===	===										
4. Energy flow algorithm												
5. Global detector design												
6. Active detector technology												
7. Physics studies												

Deliverables:

The deliverables at end FY07 will include:

1. Published analysis of electron test beam
2. Published analysis of hadron test beam
3. Software tools for global detector design
4. Code for generic energy flow algorithm
5. Contribution to detector CDR and TDR
6. Report on impact of alternative detector technologies
7. Framework for physics benchmarking of detector designs

1.5 Request

Future Effort

Name	**Institution**	**Type**	**FTE** 05	**FTE** 06	**FTE** 07	**Funding**
D.R.Ward	Cambridge	Academic	0.6	0.5	0.5	HEFCE
M.A.Thomson	Cambridge	Academic	0.5	0.5	0.5	HEFCE
N.K.Watson	Birmingham	Acadmic	0.2	0.4	0.4	HEFCE
C.M.Hawkes	Birmingham	Acadmic	0.1	0.1	0.1	HEFCE
A.Other	Manchester	Acadmic	0.1	0.1	0.1	HEFCE
B.Other	Imperial	Acadmic	0.1	0.1	0.1	HEFCE
C.Other	UCL	Acadmic	0.1	0.1	0.1	HEFCE
D.Other	RAL PPD	Staff	0.3	0.3	0.3	CCLRC
F.Salvatore?	RHUL?	Acadmic	0.05	0.05	0.05	HEFCE
RA-1	?	RA	1	1	1	PPARC
RA-2	?	RA	1	1	1	PPARC
Total FTE			4.00	4.10	4.1	
Total new			2	2	2	

Existing Staff

:

- Ward will…
- Watson will ...

New Staff:

- RA-1: Will ….
- RA-2: Will …

Travel

Justification:

Participation in ECFA/LCWS workshops will be essential for much of the work with increased interaction between different regions. *Should bid high here as anticipate travel to other regions will become essential.*

1.6 Risk assessment

Table 1.6a : Definition of risk levels

Risk Level	Meaning
1	Low Risk: minor error might happen, could be easily corrected since no technical challenge is involved. Scope of the project is unchanged. Minor impact on schedule (<3 months) or cost (<5%) might be necessary.
2	Medium Risk: A small downgrading of the final objectives might be required. Alternatively a small delay (<1 year) and cost increase might be necessary (<20%) to maintain the initial objectives.
3	High Risk: Significant downgrading of the objectives might be required. Alternatively more R&D, more time (>1 year) and more money (>20%) would be required.

Table 1.6b : Risk assessment

Task	Risk	Action	Risk Level	Consequence