Blackett Laboratory,
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Prince Consort Road,
London SW7 2BW.

January 14, 2002

Dear Neville,

I am writing to you on behalf of the five UK groups who wish to become involved in the linear collider electromagnetic calorimeter studies as part of the CALICE collaboration. This was recently flagged up as a potential interest for UK groups in the "Blair Report", which estimated that approximately £500k would be required for this effort. We understand further information on potential costs would be useful for planning purposes and we try to supply this below. However, we emphasise these figures are very uncertain at this time.

As you may know, the CALICE collaboration consists of around 110 physicists from 21 institutes in 7 countries. The aim of the collaboration is to build prototypes of both electromagnetic and hadronic calorimeters which might be used in a future linear collider experiment. There are difficult technical and cost-optimisation issues with the TESLA TDR-proposed calorimeters and the aim of this collaboration is to investigate these. CALICE have set a schedule for the equipment to be ready to run in a beam test by the end of 2003, although this date is not completely rigid.

Five UK groups are interested in joining this collaboration, in particular through working on the silicon-tungsten electromagnetic calorimeter. We regard this work as an investment for the future, as it would be an important first step towards becoming involved in the calorimeter for a future linear collider detector collaboration. We have discussed potential areas of collaboration with CALICE and we would like to bid to build the readout electronics and data acquisition for the beam test electromagnetic calorimeter.

Although this is a beam test prototype, the system required is still quite substantial. The prototype electromagnetic calorimeter will be a cube of approximately 18 cm on each side. However, this will contain 30 layers of silicon wafers, with 324 diode pads per layer, making a total of over 9000 channels. Each channel needs to be digitised to 8 or 10 bits at a rate of around 10 MHz. We have made enquiries about existing systems which might fulfill these requirements but have (so far) not been successful. Therefore, we are assuming we will request funds for a purpose-built system which will be prototyped during FY02/03, followed by production and the beam test itself in FY03/04. The beam test would take place around the end of 2003 and then analysis of the data might be expected to take another six months to a year. Hence the total project will cover the three years FY02/03 to FY04/05, although almost all the spend will be in the first two years.

The costs for this project can be divided into equipment, CLRC Technology Division (TD) effort, PPARC-funded personnel effort and travel. We are in the process of getting reasonable estimates for these and so cannot give final figures at this time. However, we understand some approximate values might be useful for planning purposes and so we make some rough estimates here for FY02/03 and FY03/04.

- The total equipment cost is thought to be around £250k. This is roughly £50k for prototype boards and the infrastructure (crates, power supplies, etc.) and £200k for the production. The £50k would be required in FY02/03 and the £200k in FY03/04.

- The total engineering effort required is thought to be around two engineers for the duration (18 months) of the construction part of the project, i.e. 3SY in total. However, we hope to supply a significant fraction of this from University staff. The main TD effort required will be a system-level engineer to oversee the project, and drawing office effort to lay out the PCB's. Together, this is estimated to be around 1.5SY. Of this, 1.0SY would be needed in the prototype phase in FY02/03 and the remaining 0.5SY in FY03/04.
- The rest of the engineering effort from the Universities will hopefully be from personnel on the rolling grant and so will be PPARC funded. This is 1.0SY in FY02/03 and 0.5SY in FY03/04. We might also hope to get around one FTE of a rolling grant PDRA, probably from fractions of existing posts spread over the five groups concerned, which would therefore also be PPARC funded.
- Travel costs are very uncertain. We do not know how often the CALICE collaboration as a whole will meet. Also, the location and duration of the beam test itself are not yet decided. The following is therefore a very rough outline of what might be required for the 15 people in the 5 UK groups. UK travel for CALICE-UK meetings and LC-UK meetings will be around £10k per year. Outside the UK, general CALICE meetings may cost around £25k per year and the ECFA/DESY workshops would be around £15k per year. This gives a total of £50k per year for each of FY02/03 and FY03/04. However, the beam test itself will require major extra travel funds for FY03/04. Assuming, for example, a two month (60 days) beam test with five people at DESY during this period, then the cost would be around £6k per person, or £30k for all. In addition, it is possible there will be costs associated with the setup and running of the test beam itself, for which the UK share might be around £10k.

With engineering effort (both for TD and University rolling grant) costed at around £70k per SY, then the total cost of all the above for FY02/03 and FY03/04 is around £650k.

The short timescale for this work (construction to be complete within two years) means we need to bid for support for this project as soon as possible. It is clear that, even with the large uncertainties on the above figures, the total project cost is well under the £1M threshold for direct consideration by Science Committee and so we feel it is most appropriate to put forward a proposal to the PPRP.

Therefore, we wish to submit a bid to the PPRP for consideration at the 25 March meeting when we will have a detailed proposal with firmer figures for the costs involved. We would therefore be very grateful if you could add this item to the agenda for that meeting. We assume it is very likely we will also be required to give a presentation of this proposal at that meeting and so would be grateful if you would confirm this.

Yours sincerely,

Paul Dauncey,
on behalf of the CALICE-UK groups