

Comments on the Programmatic Review from LC-UK

Introduction

This short document explains some of the concerns of the UK groups carrying out research and development for the International Linear Collider (ILC) and its detectors regarding the STFC's recent Delivery Plan and Programmatic Review, performed by the Particle Physics, Astronomy and Nuclear Physics Panel (PPAN). These groups are the LC-ABD (Linear Collider: Accelerator and Beam Delivery), CALICE (Calorimeter for the Linear Collider Experiment) and LCFI (Linear Collider Flavour Identification) Collaborations; together we form LC-UK. Since the LC-ABD Collaboration was excluded from the programmatic review, this document does not refer to the dissatisfaction that Collaboration feels at the current STFC stance on its programme. This dissatisfaction will instead be voiced directly to John Womersely

The Review Procedure

The Review started inauspiciously in that neither LCFI nor CALICE-UK were asked to prepare input for the procedure in early August 2007, when all other UK groups were contacted, and only after clarification was requested by LCFI and CALICE did it become clear, several weeks later, that we were to be included in the Review process. We then asked for, and received, an extension to the deadline for submission of the review documentation.

Following the submission of the documentation, there was no further communication with the PPAN team during the Review, in marked contrast to our previous experience, e.g. with the Projects Peer Review Panel (PPRP), where open and closed sessions allow discussions between the Panel, those under review and indeed the broader Particle Physics community. In our experience, reviewing complex projects, such as those of LCFI and CALICE-UK, requires such communication. Relying on written evidence alone, particularly when that is submitted in response to questions that are not all particularly relevant to the projects concerned, as was the case here, leads all too easily to misunderstanding. In this case, the lack of communication between the reviewers and the reviewed has led, in our opinion, to serious flaws in the outcome of the Review. However, it is difficult, if not impossible, to address in detail the issues that led the PPAN to rate the programmes of the CALICE-UK and LCFI Collaborations as "Lower Priority", as the feedback to these groups was meagre and identical; in both cases it stated (in its entirety):

"The ranking reflects PPAN's assessment of the priority of investing in R&D towards the ILC project. They note that they would have made this recommendation even if the STFC council decision on ILC had not already been taken."

Some further information was provided at the Science Board Town Meeting on March 3, where J. Nash stated that the PPAN decision was based on the cost and perceived timescale of the ILC, not its science programme or the quality of the work currently being done, and J. Thomas showed a single slide listing some of the main issues which led to Science Board's recommendations.

However, all these statements seem to be based on a serious lack of understanding of the objectives of the CALICE-UK and LCFI groups, and indeed of the LC-UK programme as a whole. These objectives, described in more detail in the two PPARC strategy documents appended to this note, relate to the development of technologies and techniques for a high energy linear electron positron collider. We note that there is an international consensus that such a machine should be the next major international Particle Physics project.

Currently, the most developed LC project is the ILC, so this is naturally the framework within which LC-UK has been working. The studies of LC-ABD, CALICE and LCFI are not relevant only to the ILC, however. As outlined in the aforementioned strategy documents, the areas in which we are working have been carefully chosen to be applicable to any LC.

The UK Linear Collider Programme

The goal of our work for the ILC, in common with that of our international colleagues, is to develop a detailed understanding of the physics that can be studied using this machine and the state-of-the-art detectors that will be required for it.

The ILC groups have always aimed to have a fully specified technical design ready by the time of the first LHC results, as we believe that almost any outcome from the LHC is highly likely to indicate that a 500 GeV centre-of-mass machine will be essential to fully characterise any new physics which is discovered. The detector concept groups were formed to steer the work for the detector design reports and so claims that the “final ILC collaborations” were forming too early are based on a fundamental misunderstanding of the situation. Clearly, the definitive science case for a linear collider will be made when LHC results are known. However, one factor which was presented against LC-UK was that funding would be needed for LHC upgrades instead on the same timescale. However, although it is highly likely that such an upgrade will also give a good physics pay-off, there will also be no definite science case for this at least until the first LHC results are seen. Hence, choosing one over the other has no scientific justification at this time.

PPAN and SB seem not to have realised that the current effort would only proceed beyond 2012 if the science case will by then have become obvious. In the unlikely event that LHC results suggest that a higher initial energy than 500 GeV is required, it may be necessary to re-evaluate the proposals being developed by the Global Design Effort. This may well build further on the already deepening collaboration with the Compact Linear Collider (CLIC) development at CERN. The CLIC technology is much less mature than that of the ILC but, if it can be proven, promises a significantly higher energy reach. Our strategy has always been to position the UK optimally in all eventualities by ensuring that the areas in which we are working are equally applicable to any LC. For example, the detector developments of the CALICE and LCFI Collaborations are as relevant to CLIC as they are to the ILC. The same applies to the work of the LC-ABD group. The Damping Ring development that members of LC-ABD are leading is applicable to both colliders, as is the work on beam diagnostics and beam delivery. The decision of STFC, apparently associated with concerns about the ILC project as currently formulated, therefore misguidedly terminates UK research not just on the ILC and its detectors, but our entire future linear collider programme. The UK is most ill advised to unilaterally terminate its interest in the next facility to be built in particle physics as this demonstrates a lack of vision and an unwillingness to invest in the future of HEP.

The main factors considered by PPAN were the timescale and cost. For the former, the statement by R Orbach has been raised. This has been widely misinterpreted as a lack of commitment and enthusiasm for the ILC inside the US government, Dr Orbach himself has clarified this; “There was never – never – a suggestion in my comments or my actions that we were somehow moving away from the ILC. In fact, just the opposite.” [ScienceNow, 15 Jan]. As regards the cost, it is clear a linear collider will not be cheap, but neither was the LHC; taking the existing CERN infrastructure into account, the two projects are comparable in cost, as has been recognised by the Director General of CERN. The LHC is currently considered to be the highest priority programme and funding was found on this basis; a linear collider should be seen in a similar context. Indeed, the LHC, and the UK’s outstanding contribution to it, is the result of a long programme over the last two decades to build up the expertise and technology required. A linear collider will require a similar programme and

shutting down the ability of the UK to contribute, without regard to the quality of the work being done, sends a very negative statement about our commitment to particle physics.

The STFC decision has been taken despite the demonstrable success of the research programmes of CALICE, LCFI and LC-ABD. This is witnessed both by the international leadership achieved by members of LC-UK as well as the comments of the Oversight Committees of these Collaborations. As evidence, we cite some sections from the minutes of the latest Oversight Committee meetings:

“Excellent progress had been made [by LC-ADB], positioning the UK in a world leading position... The Collaboration had attracted world leaders back to the UK. Members were impressed with the achievements considering the relatively small amount of funding which had been awarded.”

“Overall, the Committee was extremely impressed with the progress which had been made, and believed that the [LCFI] Collaboration was in a strong position to complete most of the milestones by December 2008 and that the project would have succeeded if the STFC funding crisis had not happened... The LCFI group was world-leading in this area and members did not want the expertise to be lost from the UK.”

“Overall, the Committee was impressed with the work the [CALICE] Collaboration had achieved so far... The technology was important and generic, and Members noted that the use of deep p-well development technology was to their knowledge unique to the UK. This was an asset which should be nurtured.”

These strong statements make it clear that the STFC had no grounds for its low prioritisation of LC-UK based on the quality of the work of the LC-ABD, CALICE-UK and LCFI Collaborations and indeed they did not attempt to do so. The priorities were based on strategic considerations and, as such, they are profoundly misguided and lacking in vision, as discussed above.

Summary

Internationally, there is a consensus that a linear electron positron collider should be the next major international Particle Physics project. UK physicists are playing leading rôles in the studies for the most developed of the proposals for a linear collider, the ILC project. The LC-UK groups have, however, taken pains to ensure that their studies are not ILC specific, but are applicable to any future linear collider. Terminating the work of LCFI and CALICE-UK and restricting significantly that of LC-ABD, as proposed by the STFC following their Delivery Plan and Programmatic Review, will result in the loss not only of our leadership in the ILC project, but of our opportunities to contribute in a significant way to the next major development of Particle Physics experiments, whether that be the ILC or another linear collider such as CLIC. We hope that this will be addressed by the forthcoming consultations and addressed rapidly. Crucial personnel in all three collaborations risk being lost due to the STFC's actions; in some collaborations this is already happening.