Proceedings of the

Workshop on the development of future electron-positron colliders: for particle physics studies and for research using free electron lasers

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Foreword

The particle physics community is clearly focussed on the concept of linear electron-positron colliders as the next major step for discovery beyond the LHC. Such a facility also offers the unique opportunity to integrate a high performance facility for synchrotron radiation in the hard X-ray region (Free Electron Laser).

There have been big steps of improvement in accelerating structures for linear accelerators. In Europe both DESY and CERN are very actively pursuing different lines of accelerator studies in order to achieve collision energies in the range 500 to 5000 GeV where the postulated but yet hidden (supersymmetric, Higgs…) particles may be found and studied. The lower energy DESY proposal for TESLA and its FEL is much more advanced than the higher energy CERN studies and we expect a final DESY proposal to be submitted by 2001, including cost and time schedule. A site has already been secured as well as support from the regional authorities. For the long term planning it is important to consider priorities and how and when these new European facilites can be used.

The linear electron-positron accelerators can provide a very intense source of 100 to 10000 eV photons with a peak brilliance more than seven to ten orders of magnitude better than provided by the ESRF today. New synchrotron radiation facilities have been created at many places and found users in many fields - it is however clear that the TESLA-FEL facility at DESY would be unique in its brilliance and short pulse length which would allow studies of, among other things, the dynamics of processes at the atomic level.

The future accelerator based research program in Sweden is heavily focussed on the participation in the Large Hadron Collider project at CERN, and in the exploitation of the synchrotron radiation produced at MAXLAB in Lund. Those two projects actually take the largest share of the investment money provided by FRN. Looking into the far future one has to consider that the experiments for the LHC are supposed to be ready by 2005, and maybe fully financed by 2008, and that the present plans of investments into the facilities at MAXLAB should be completed around this time. So about 2005 new major investments in accelerator based physics might be possible.

An international linear collider meeting was held in Uppsala in April 1996 (NIMRD9 398(1), 1997) with about 100 participants. Since then considerable progress has been made and the Workshop in Lund, during September 23-25, 1999 was more restrictive, with about 50 participants including invited speakers and hopefully prospective users from the Nordic countries. Its aim was to provide a preview of the new possibilites offered and to stimulate the interest among the potential users. The program included the following three topics:

1. The technical progress of linear colliders in Europe
2. Prospects for particle physics
3. Prospects for experiments using FEL

In addition there were short reviews on the ELFE project and on the future plans for BESSY I.

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Lund, November 15, 1999

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