

Status of the HeLiCal Contribution to the Polarised Positron Source for the International Linear Collider

G. A. Moortgat-Pick^{1,2,3}

J.A. Clarke, O.B. Malyshev, D.J. Scott^{1,4}

E. Baynham, T. Bradshaw, A. Brummitt, S. Carr, J. Rochford,

Y. Ivanyushenkov⁵

L.I. Malysheva, I.R. Bailey, P. Cooke, J.B. Dainton^{1,6}

D.P. Barber^{1,6,7}

¹*Cockcroft Institute, Daresbury laboratory, Warrington, Cheshire WA4 4AD, U.K.*

²*Physics Department, Theory Division, CERN, CH-1211 Geneva23, Switzerland*

³*Institute of Particle Physics Phenomenology, University of Durham, Durham, DH1 3LE, U.K.*

⁴*CCLRC ASTeC Daresbury Laboratory, Daresbury, Warrington, Cheshire, WA4 4AD, U.K.*

⁵*CCLRC Rutherford Appleton Laboratory, Chilton, Didcot, Oxfordshire OX11 0QX, U.K.*

⁶*Department of Physics, University of Liverpool, Oxford St., Liverpool, L69 7ZE, U.K.*

⁷*DESY, Deutsches Elektronen Synchrotron, Notkestrasse 85, D-22607 Hamburg, Germany*

The baseline design of the positron source for the International Linear Collider (ILC) incorporates a helical undulator and pair-production target in order to generate the unprecedented quantities of positrons required to sustain the intended ILC physics programme. This configuration is challenging but readily achievable by using novel adaptations of existing technologies to avoid problems inherent in conventional positron sources in which the stresses in the target(s) and activation of the target station are both serious problems. In addition, a highly polarized positron beam, essential for realizing the full potential of the ILC, can be produced by a simple upgrade to the baseline design.

A major contribution to the international design effort is being led by the UK-based HeLiCal collaboration. The collaboration takes responsibility for the design and prototyping of the helical undulator itself, which is a short period device with a small aperture, and also

leads development of the start to end simulations of the polarised particles to ensure that high levels of polarization are maintained from the sources, through the beam transport systems and up to the interaction point(s). Members of the collaboration are also involved in the EUROTeV-funded research programme to produce a design for a pair-production target which can operate reliably in the high photon flux of the undulator. This paper will provide an update on the work of the collaboration, focusing on the design, construction and testing of components of the polarized positron source, and will also discuss future plans.