Undulator based polarised positron source risk assessment

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Introduction

- This is my personal assessment of the risks for the undulator based polarised positron source
- It is not supposed to be a definitive list
- I hope it will stimulate discussion
- Please contribute further items
- We should prioritise risks to focus resources

Undulator

- Field strength for period & aperture demonstrated

- Electron beam degredation
  - Steering
  - Focussing effects
  - Wakefields
  - Emittance blowup
  - Electron Polarisation loss
- Alignment problems
- Vessel heating
  - Poor vacuum
  - quenches
- Poor photon output
- Insufficient diagnostics

Photon Collimator

- Unable to cope with photon power
- Misalignment
- Poor polarisation control

Target

- Radiation damage
- Knowledge of material properties
- Insufficient cooling
- Thermal and rotational stress
- Magnetic field effect on rotation and heating
- Vacuum failure
- Remote operation

Capture system

- AMD thermal problems
- AMD specified parameters not achieved
- Capture yield insufficient
- Linac heat loads
- Polarisation loss during transport to damping ring

Operational aspects

- Commissioning dependent upon electron linac
- Electron energy not fixed
- Variable positron yield

- Keep alive source ?

Ongoing R & D

- Undulator – Daresbury/Liverpool/RAL/Cornell
- Photon collimators – Liverpool/DESY
- Target – SLAC/Livermore/Liverpool/KEK
- AMD – SLAC/ANL
- Capture RF – SLAC/ANL
- Operational aspects - All ?
- Spin preservation – Liverpool/DESY/Daresbury
- Keep alive source - ?

- E-166 demonstration