EuroTeV
WP4: Polarised Positron Source

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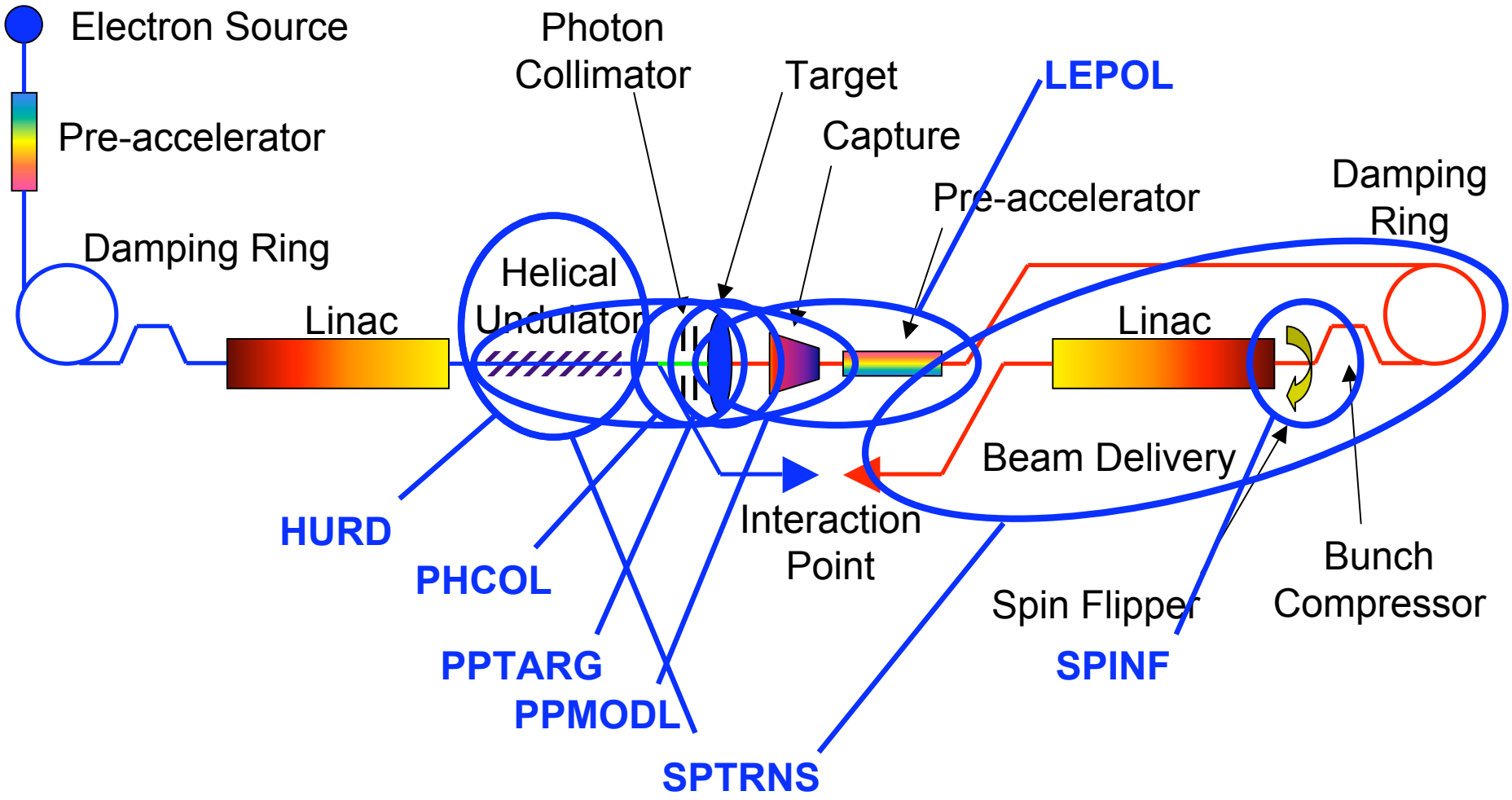
Polarised Positron Source: Overall Goal

- Develop a complete polarised positron source based upon a helical undulator including the design of the photon collimator, capture system, spin rotators and flippers, yield optimisation, target, and the undulator itself.
- The tasks include beam dynamics simulations, understanding of systematic polarisation errors and tuning, target conversion, engineering design and prototyping.

Participants: CCLRC
DESY Z
DESY H
Uni Berlin
Uni Liverpool
IPPP Durham

Coordinator: Jim Clarke (CCLRC)

Where will WP4 contribute to the ILC?



Deliverables

- Helical Undulator R & D
  - Evaluation of SC and PM technologies
    - Construction of short test modules
    - Report of trials and selection of chosen technology (Warm vs Cold !)
  - Design and testing of prototype of chosen technology
    - Construction of prototype
    - Report of results and recommendations for full device
  - Undulator vacuum system R & D
    - Assessment of alternative options
    - Possible NEG coating trials
    - Design for prototype and recommendations for full device

Deliverables

- Photon Collimator Design
  - Conceptual design of photon collimator
  - Specification of baseline parameters
  - Engineering design
    - Reports detailing conceptual design and engineering design
- Conversion target design
  - Monte Carlo design of target performance
  - Optimisation of target parameters
  - Specification of baseline parameters
  - Engineering design of rotating target system
    - Reports detailing conceptual design and engineering design

Deliverables

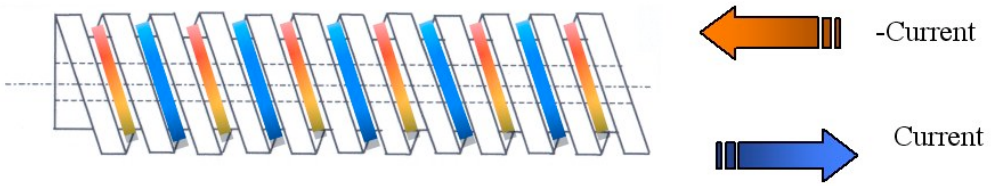
- Source performance modelling
  - Overall source design
  - Capture of positrons
  - Errors and tolerance studies
    - Series of reports for baseline specs of collimator, target, capture section
    - Reports on source performance simulations and recommendations
- Spin rotation and flip system design
  - Conceptual design of tuneable post DR spin rotation and flip system
  - Errors and tolerance studies
  - Mitigation of systematics between spin states
    - Report on spin flipper system design and estimated performance

Deliverables

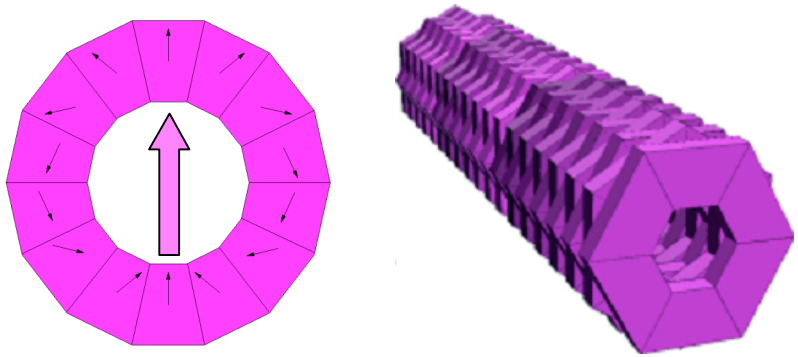
- Spin transport studies
  - Implementation of spin transport into LC modelling codes
  - Studies of spin transport from DR to IP
  - Investigation of spin tuning at IP
    - Report on spin tuning and transport studies
- Low energy polarimeter R & D
  - Monte Carlo studies of performance
  - Conceptual design of low-energy polarimeter for use at the source
    - Prototype construction and possible testing with beam
    - Report evaluting final design and recommendations

Current work in Europe

- Significant european involvement in E-166 polarised positron production experiement at SLAC
- Helical Undulator R & D

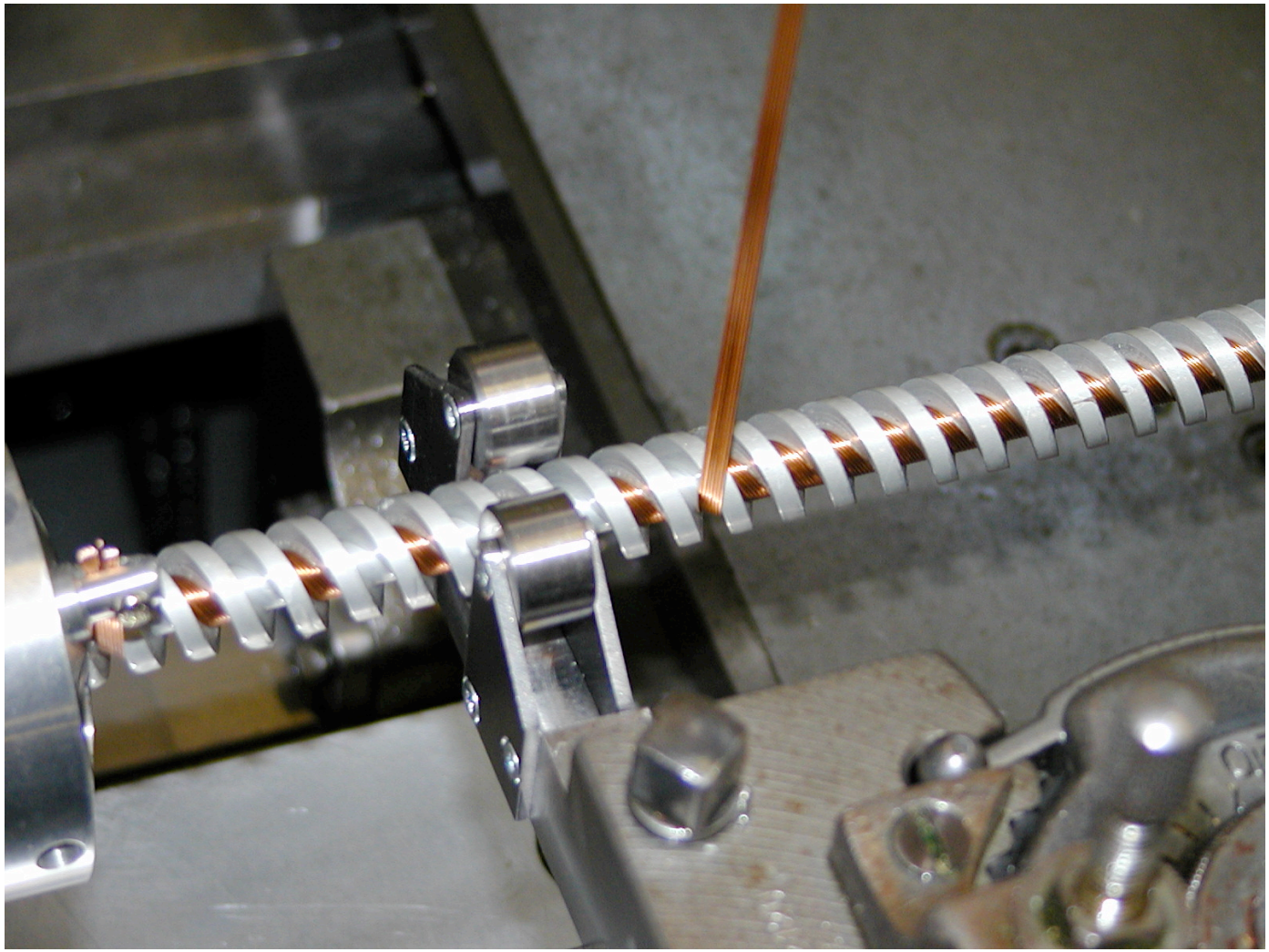


Cold



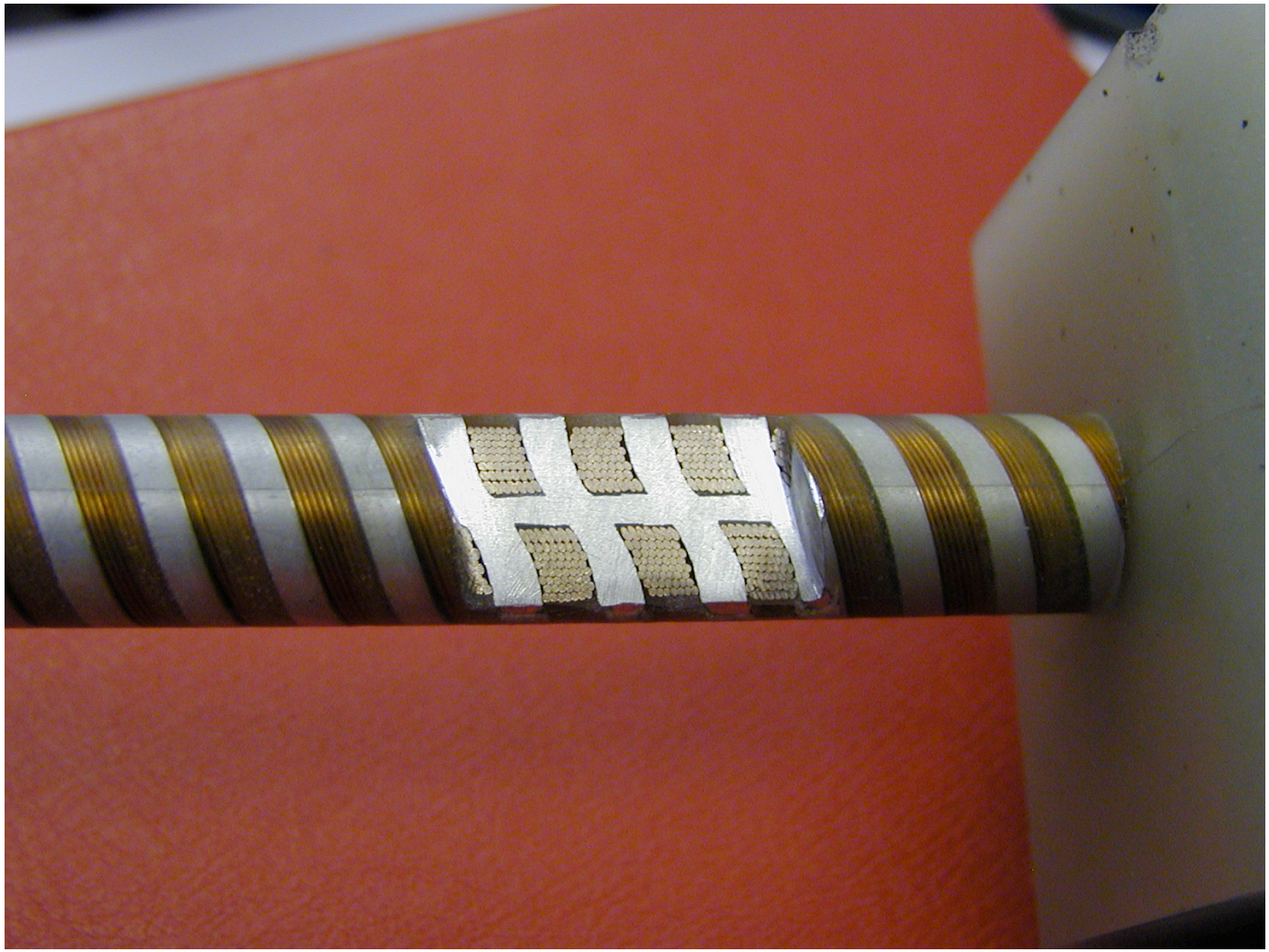
Warm

Winding the Coil …

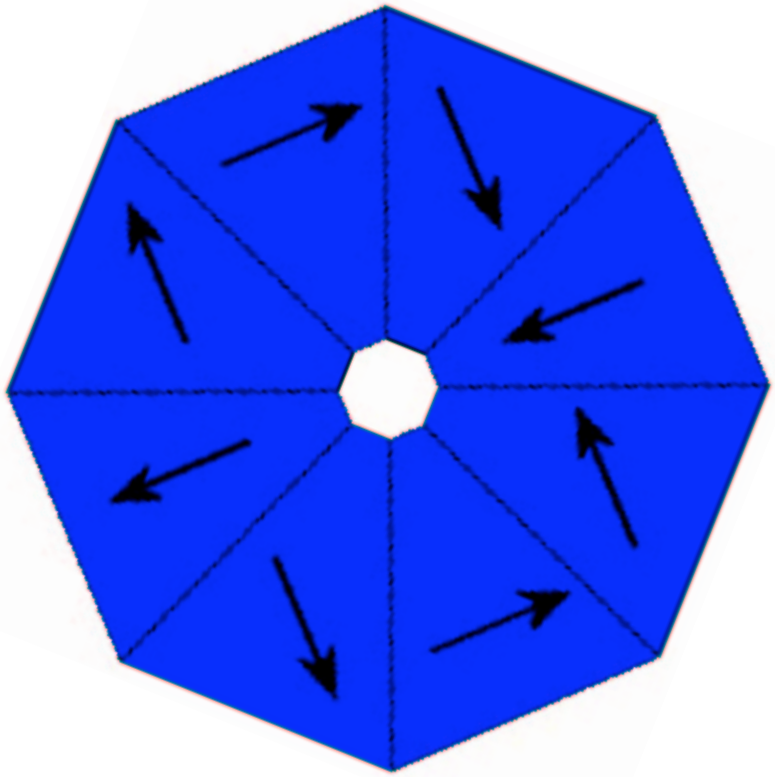


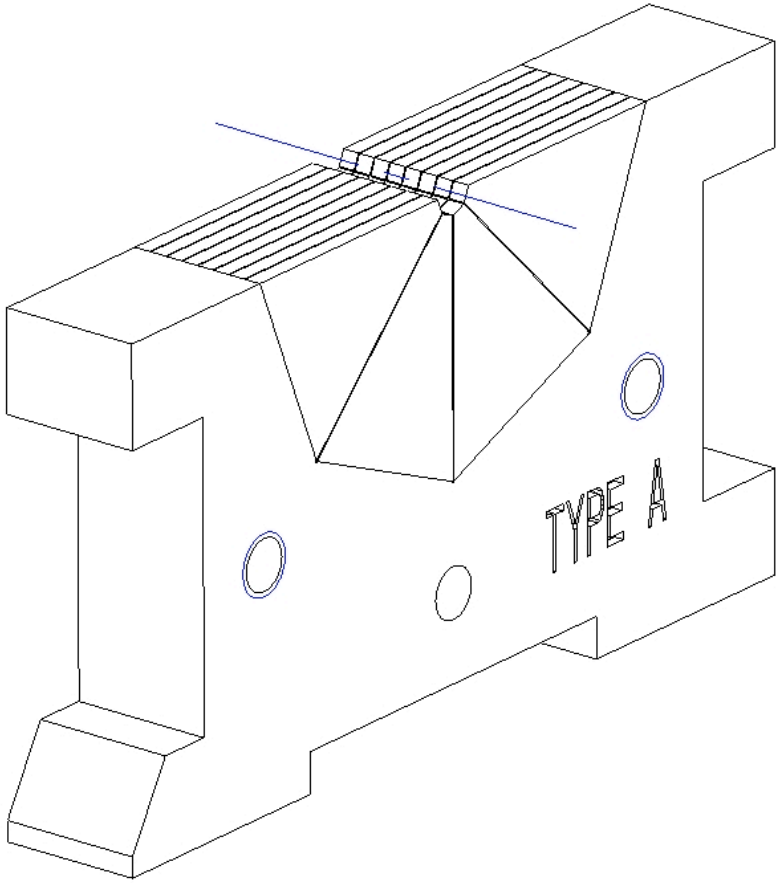
End of Magnet

Cut Away of Winding

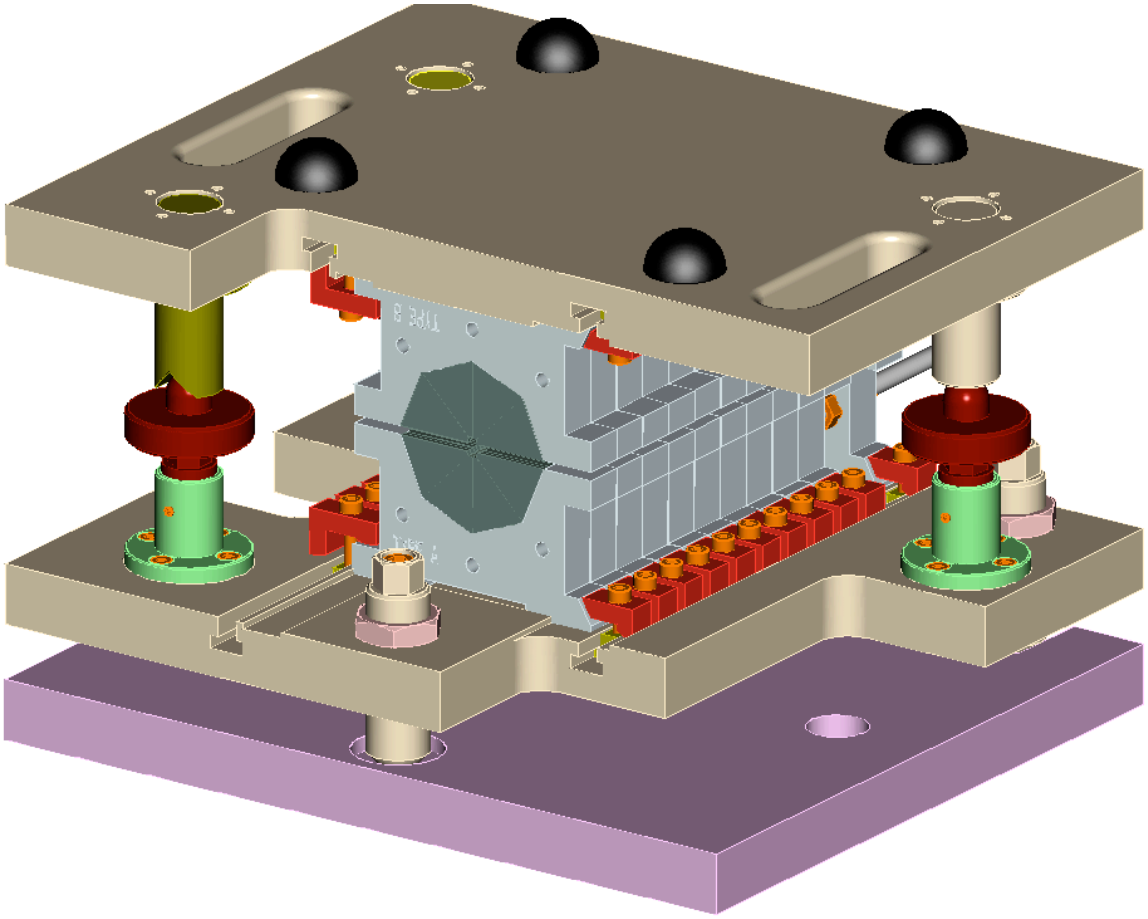


Permanent Magnet Design





Permanent Magnet Test Module



Summary

- 446 person-months of effort (130 from EU funding)
- EuroTeV WP4 contains a **large fraction** of world polarised positron production team.
- **Photon based positron source very likely for Cold ILC.**
- Workshop on Positron Sources for ILC proposed to be held at Daresbury March/April 2005.