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LIVERPOOL PP GROUP MEETING

LSDC Report

Tim Jones

(May ‘23)

Liverpool Semiconductor Detector Centre

- Located on ground floor of OL

- Goal is to support the delivery of detector sub-systems to major national and international programmes and our local generic detector development
  - Staff: Mike Lockwood, Tom Lee, Paul Cook, Alan Taylor (PhD)
  - Facilities: 100 m^2 of Class 5 (100) and 250 m^2 Class 7 (10,000) clean rooms

- Major Activities
  - Mu3e, ATLAS ITk, Darkside20k SiPM array assembly, Generic Detector R&D, &c

Tom Mike

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Operations

- Extension of Paxton Access Control system to 1st floor plant-room
  - Increases robustness against un-authorised access to plant room areas
- BMS Controls Upgrade
  - Replacement of aged PLC controllers & associated software systems
- Recommissioning of Cold Room
  - Required for ATLAS ITk
- Change of garment supplier/laundry
  - Current supplier's charges increased.
    - Still providing laundry services
  - Alternative supplier found – significantly cheaper
    - Too good to be true ? Contract still not up & running despite >9m efforts
    - Currently seeking formal clarification of status of 'order'
- Space ….
  - Still an issue but ….
    - Two (defunct) H&K 710Ms removed
    - Last of LHCb remnants being removed to make way for ATLAS Itk
    - Imminent removal of Wenzel LS1010 (defunct) and ALICIA (removal to DL)

Equipment

- New Equipment (22-23)
  - Dage 4000+ Wire-pull tester (University funded)
    - Benefits ATLAS ITk
  - Nordson gantry glue robot (LSDC/PP CG)
    - Benefits DarkSide 20k

- PPCG22-25 Equipment
  - As part of the PP CG we bid (and received funding for) an Aerotech Gantry Positioning System
    - Likely to have a 15yr life-span (2038)
  - Discussions started to firm up use-case & define specifications
    - HV-CMOS tile assembly for LHCb MT (25-30)
    - What next ??

Equipment #2

- Failed Equipment ☹
  - Wenzel LS1010 – 2m x 1m x 1m Coordinate Measurement Machine (~ £180k)
    - Extensively used on ATLAS, ATLAS ITk, LHCb Velo (1, 2 and pix)
  - This is a major loss in capability – only partially offset by
    - FARO Vantage Laser Tracker (>15yrs old)
    - V-Starts/N Photogrammetry (not so useful for holes!)
  - Expect to remove late summer/autumn
  - Remaining LH87 CMM is 23 yrs old. Controllers from LS1010 will be kept for use as 'spares'. Should plan for an immediate replacement of LH87 (1 x 0.8 x 0.7m) with something slightly larger (1.6 x 1 x 0.8). Notified to Monica and SoPS
  - Need to maintain access to FARO Vantage laser tracker for large-scale metrology & invest in target artefacts (eg dowel-pin location retro-reflector cradles) – likely to be pricey!

- Resurrections ☺ - (XP/W7 upgrades to W10, re-commissioning)
  - INSTRON 30kN (Universal Materials tester)
    - Tensile testing of CFRP laminates & highly-loaded fastenings
  - NETZSCH DSC200 F3 Maia (Differential Scanning Calorimeter)
    - Qualification of adhesives & cure schedules

Challenges

- Space
  - Construction of ATLAS ITk Barrel Strip & Endcap Pixel
    - 40% of LSDC at peak production (2024-25)
- Equipment
  - Ageing equipment (some now > 20y old) – replace or move on ?
    - Interconnect technology (wire / bump → laser ?)
    - Metrology
  - Commissioning new equipment takes time and effort – best if there is a clear project 'need'
    - Have >£0.6M investment in SET Accµra flip-chip bonder & SemiProbe SA8 wafer prober – never used.
- Funding (LSDC / DDMF / AML):
  - 1 facility-day for LSDC + Workshop 'costs' £6k so for 230 days total = £1.4M
  - We are never 'fully-funded' - most grants were issued when facility-day costs 50% less. Income for 22-23 ~ £400k – beginning to decline after completion of LHCb VeLoPix
  - Income only just about matches necessary spend
- New Projects (CG25-28):
  - We submit CG25-28 in < 1 year
  - Need to have new projects bringing in new funding to enable LSDC/DDMF/AML to continue to evolve.