

Context for whole CC report- Daresbury, Liverpool and Manchester have all responded to the government's Covid lockdown by imposing work at home regimes which have halted lab-based and hands-on work. However, the CC teams are still working productively from home on aspects of projects which don't require lab work.

Electronics and Software

The Daresbury and Liverpool software and electronics effort consists of Thornhill, Judson, Wells, Coleman-Smith (now retired), Hill (AGATA repair work), Kogimtzis, Pucknell, Lawson, Lazarus and Unsworth. In the period from Nov 2019 to April 2020, they have worked on a range of projects including:

- R3B silicon tracker. Ongoing support to optimise performance of the full system. Synchronisation tests at GSI b/w the R3B Si tracker and AMS DAQs were successful. These were followed by coincidence tests at KVI with a proton beam. Data analysis indicates that Si tracker efficiency is lower than expected. A wiring issue of the external trigger that was discovered after the tests could explain in part for the lower efficiency.
- Ongoing support of AGATA, including electronics repairs and detector characterisation.
- Input provided for the next phase project definition.
- Preliminary work preparing for AGATA next phase EDAQ including attending Valencia AGATA EDAQ meeting,
- ISOL-SRS Installation of Si detector array at CERN
- ISOL-SRS Support of DAQ systems at CERN and GSI and test system in Liverpool.
- AIDA Support for system at RIKEN and work on the system at GSI still ongoing. Software team worked to disable generation of diagnostic output in the MERGER code which significantly improved data throughput and is applicable more widely than AIDA.
- LYCCA, now at Koln. Support for users (alongside expert user, Tom Davinson).
- FATIMA – Support for planned UWS experiment on digital gammasphere including investigation of CAEN CFD algorithm.
- Timepix project to design and build a prototype Timepix3 readout for a pair polarimeter and focal plane microscope experiments for University of Glasgow. Status (Carl/James/Mos): Software: Data transfer and UI development working with the 1 Gbit link only (10Gbit development will restart when working at Daresbury again). Hardware: The FMC card schematic design is complete and layout is under way. The asic pcb card design is also complete and ready for manufacturing.
- JYFL timestamp acquisition system. ZyDF clock module (new timestamping/synchronisation system), planning to build further systems. Manufacturing of the production run is ready to go ahead post-covid.

- Started on MIDAS support for the ZyDF clock module. Also an update to the software for the LyrTech hardware in use by JYFL to bring it into line with other MIDAS based data acquisition systems. This will complete the update of all supported MIDAS systems to the browser based GUI.
- A visit to JYFL to understand their full requirements going forward was a victim of the Covid-19 pandemic.
- MINIBALL DAQ. FEBEX system- in-depth familiarisation with Febex firmware and software. Needed to know more about the hardware design and existing drivers. A 2-day meeting was arranged with Nik and Shizu from GSI but that has been postponed (Covid-19)
- General support of systems and software (including significant work on Windows 7 to 10 upgrades as well as Linux server updates)
- Applied projects –3D gamma imager (IPS) and Molecular Breast Imaging (MBC) project- 121 pixel breakout unit designed and built, cooled light-tight box designed, system testing.
- DAQ support for the four digital systems at Liverpool used for the applied work including the 3D gamma imager, DEPICT Iodine therapy and Ge detector characterisation projects.
- Work with CAEN to understand and resolve software/firmware stability and compatibility issues following CAEN firmware upgrade. Carl updated to support the latest firmware on the 1724 and this fixed the data corruption issues, the modified version has been tested by Dan at Liverpool. Vic has also done a lot of updates to the CAEN MIDAS UI for multiple modules, in particular migrating to HTML5 UI elements, and Carl has done the same changes for the 1724. All of these changes need to go into a new MIDAS release which will happen post-covid after final tests of it back in the lab. Similarly Carl/Dan are waiting to do some post-covid tests regarding the problem of "timestamp corruption" at high data rates.

Mechanical and Technical

The Daresbury, Liverpool and Manchester mechanical effort consists of Grant, Burrows, Seddon and Smith with technical support from Paul Morrall (note: 3 months leave from July to Sept 2019). Over the past year, they have worked on a range of projects including:

- AGATA support for new grant proposal to PPRP, schemes for LNL phase mechanics using axle design similar to that being adopted by GRETA and Gammasphere.
- R3B – design & technician support for ongoing ASIC optimisation/resolution improvement tests which have been carried out at KVI.
- ISOL-SRS:
 - WP2 (storage ring option) at GSI/FAIR completion of design and support for procurement by University of Edinburgh. Vacuum chambers delivered to Daresbury and have undergone baking and passed the outgassing tests. Preparing to install detectors for commissioning.
 - WP4 Base plate returned to DL for motor replacement and some mechanical upgrades. Now re-installed in ISS magnet along with

the Si array. The system is under vacuum ready for commissioning of DAQ system.

- Ongoing liaison with CERN and visits to arrange magnet He filling last fill took place January 2020 along with cold head servicing.
- ISS Recoil Detector (Manchester), part of system at ISOLDE. Work includes design and liaison over fit into overall layout for area. Also insertion/removal support mechanism
- Applied projects –3D gamma imager (IPS)
- Triple Plungers (Miniball and JYFL)
- SHARC2 and MARA Beamline (York)
- FiFI, STEFF, CRIS (Manchester)
- ProSPECTus (Medical imaging device), Cryostat optimisation undertaken.
- IDS design work undertaken. The design is currently being assessed by the physics team (Liverpool)
- NEDA concept design for 393 liquid scintillators based on design successfully used in experiments at GANIL (Liverpool)