Report from ECSG & ECE

FAIR Experiments Cost Scrutiny Group

FAIR Expert Committee Experiments

Christos Touramanis, ECSG Chair

11th Meeting of the FAIR RRBs

22 February 2022

Joint ECSG and ECE meetings

- The two committees meet jointly twice each year. In 2021 both meetings were remote:
  - ECSG 5 and ECE 14 on June 4th, with breakout sessions on 31/05 - 01/06
  - ECSG 6 and ECE 15 on November 3rd , with breakout sessions on 27/10 - 01/11
  - Chaired jointly by Jens Dilling (ECE Chair) and C.T.
- Meeting format:
  - Breakout sessions with each collaboration, with follow-ups if needed
  - Joint ECE & ECSG closed session: rapporteur's presentations and discussion
  - Closeout session with FAIR management and Collaborations leadership
  - Recommendations are recorded and followed up in future meetings until they are closed
- In 2022 our meetings will be held:
  - 11-12 May, in person
  - 23 November, remotely

Key points from ECE & ECSG in 2021

General Findings, Comments and Recommendations:

- The ECE and ECSG congratulate FAIR for:
  - Impressive civil construction progress.
  - Production and delivery of key accelerator and detector components.
  - Outstanding COVID-19 management.
  - Completion of the re-baselining, with a solid plan allowing early science exploitation.
  - Delivering fully the planned Phase-0 beamtime for 2021, and re-scheduling in 2021 and 2022 the 30% of planned experiments that could not be performed in 2020 due to COVID-19.
- The committees find the Phase-0 science excellent, already delivering world class results in parallel with important demonstrations of key accelerator and detector technologies for the full FAIR programme.
- Phase-0 is crucial for the community and for the long term success of FAIR, and it offers rich outreach material.
- The committees were pleased to see the progress in the experiments in terms of Day-1: TDRs (>90% approved), funding (89% secured), construction (42%) and commissioning (18%) *[percentages are value-weighted]*.
- The committees fully support and encourage FAIR leadership and the collaborations in their efforts to secure the required funds for the timely completion of the facility and the experiments and the successful delivery of the science programme.
- In line with the projects, the ECE and ECSG are shifting their focus from design (TDRs) to construction, integration and commissioning.

Key points from ECE & ECSG in 2021

General Findings, Comments and Recommendations (continued):

- In line with the projects, the ECE and ECSG are shifting their focus from design (TDRs) to construction, integration and commissioning.
- In the coming years a large number of important activities will be ongoing in parallel to deliver and commission facilities and to complete and commission experiments. This period will be very demanding on the human, financial and technical resources of FAIR and the collaborations. Dependencies, interfaces and sequencing between facility, infrastructure and experiments must be clearly understood.
- The committees recommend that each experimental pillar should identify a dedicated interface coordinator as part of a facility-wide Integration and Installation team.
- The ECE and ECSG note that the timely availability of funding for Common Infrastructure items is critical to maintain the schedule for integration and installation of the experiments, and are pleased to see the progress made on Construction MoUs.

Construction MoUs

- CBM
  - MoU signed by most F.A.s, in execution.
- NUSTAR
  - ECE & ECSG reviews of the relevant TDRs completed.
    - (formal sign-off for LEB Infrastructure TDR 2_01 expected at the May ECE/ECSG meeting)
  - Final draft submitted by collaboration on 07/02/22.
  - F.A.s are invited to do final review (details, language, legal) and provide feedback over the next two months. A remote meeting could be organized if required.
  - The final document will be circulated for signature in May.
- PANDA
  - The Technical Report for the Detector Infrastructure and Installation has been reviewed and approved by ECE and ECSG, as well as the proposed draft MoU.

PANDA

- Excellent progress in various stages (procurements/agreements, prototyping, testing, construction) in most systems: Cluster Target and I.R., Solenoid, HESR Chicane Dipole, MVD-Strips, Luminosity detector, Muon detectors, Forward Tracker, DAQT.
- The missing funding for instrumenting the full Barrel Calorimeter and the production schedule of the crystals are critical items.
- Funds are not fully secured for systems such as MVD-Pix, Barrel ToF, DAQT.
- Retirement of experts in a number of areas (GEM tracker, MVD, Barrell ToF, DCS) would become a concern if not mitigated by recruitment and new partners.
- The committees recommend that the EMCAL Project Team continues to work with FAIR Management to secure the missing funds as soon as possible, and continues to develop a Day-1 plan that utilizes whatever fraction of the detector exists at that time.
- The committees strongly recommend identifying / hiring a safety engineer and other critical support people with the opening of the PANDA hall.
- The committees recommend planning with FAIR to avoid overbooking FAIR personnel and tools during construction and installation.

NUSTAR

- Several of the basic setups required for FAIR Phase 1 have already been commissioned during Phase 0.
- The R3Bm DESPEC, Super-FRS, Ilima and SHE collaborations within NUSTAR are commended for their science results in Phase 0.
- The R3B Si tracker risk has been mitigated by the development of a new detector based on technology from ALICE and funding from STFC.
- The main funding concern has been infrastructure items, and this is being addressed by the Construction MoU which has been submitted to the RRB on February 7.
- The committees recommend that NUSTAR should consider organising a workshop with sub-collaboration and facility representatives to identify and document critical interfaces, and explore the possible existence of further unidentified external risks for NUSTAR readiness for physics.

CBM

- Multiple runs of mCBM with the highest collision rates available were successfully carried out in 2021. The full DAQ readout chain of all systems has been tested with O+Ni collisions at 1 MHz.
- Significant progress has been achieved on R&D activities for MVD, TRD, DAQ, STS, TOF.
- Important progress has been achieved in the design of common infrastructures and preparations for procurements.
- The committees recommend that CBM works on avoiding delays in the STS construction plans.
- The committees recommend that a clear roadmap is developed for TOF R&D.
- The committees recommend that CBM further details the planning for the detector installation and commissioning phase, including the interdependencies with the infrastructures and services of the FAIR facility.

APA

- MAT: successful realisation of all 2021 experiments; many users; big progress in installing and commissioning stations and experiments; very visible COVID-19 related research.
- BIO: large research program; progress with beamline and detectors; collaborations with BioNTech on mRNA cancer vaccine and with ESA in RADNEXT; fascinating activities on radiation effects on tissue and radioprotection; two associated professorships at TU Darmstadt.
- HED: Impressive technical achievements; PRIOR-II beamline progress, proton microscope.
- SPARC: Strong science program, many experiments being carried out. Lack of funding for SIS100 laser cooling system is a concern.
- Many experiments limited by by CRYRING intensity (vacuum system issues).
- Availability of APPA cave is crucial.
- Search for alternative funding for SPARC SIS100 laser cooling would be beneficial.

Committees membership

- A number of new members have been appointed in the ECE in 2021 and are already active.

- On the ECSG we have been discussing with current members and the F.A.s, experience is a priority for this committee in this very busy period of development, construction, integration and installation. A few members will be replaced, new names to be confirmed very soon.

- Alexander Herlert has been appointed as deputy scientific secretary of the committees.

The ECE and ECSG members would like to express our appreciation to the Collaborations for their professional and collegial attitude, constructive approach, and their clear and high quality documentation and presentations.

We thank FAIR staff for their organizational and technical support.