Report on activities performed by CP&IT division during the year 2020.

Traditionally the activities were shared between two directions:

- IT hardware/software functionality support/updates/upgrades,
- physics analysis of data collected by international collaborations (mainly Belle2, partly Hermes).

IT hardware/software functionality support/updates/upgrades

- Monitoring, alerting and logging system have been set up including metrics for temperature, users command history and all other metrics available for services and OS for our servers.
- several new WiFi points were installed at different places of AANL
- on computing servers like "**compute**", "**belle2**" necessary updates of system and applied software were performed

IT hardware/software functionality support/updates/upgrades

- In order to increase information and data safety, the specific software was installed to detect and block attacks and unauthorized access to our servers.
- automatization for switching between “Academy” and “RosTelecom” Internet lines was realized, thus we have almost no essential interruptions with the external connections

IT hardware/software functionality support/updates/upgrades

- continuation with the electronic library updates, many new YerPhI preprints, also short PhD and doctoral thesis versions are added (scanned files) to the “Invenio” database; regular cleaning of the old library rooms, refresh of the journals and books catalog, started with the electronic catalog creation.
- necessary technical support for still developing AANL WEB-site was done; after the work on design of AANL main WEB-site will be completed, all existing local (departments related) WEB sites will be realized as sub-pages into the main site with the same format (safety requirements)

Physics analysis of data collected by international collaborations (mainly Belle2, partly Hermes)

- The members of physics analysis group were working mainly on Belle2 data analysis and detectors performance optimization, also small part of activities was still related to the Hermes data analysis.
- With the collected Belle2 data the performance of one of the particle identification detectors, namely ARICH (based on Cherenkov radiation) were studied. Such performance studies are usually done with the data on decays channels for various well-known resonances: Λ, D^*, D^0, π^0, K_S etc.

Physics analysis of data collected by international collaborations (mainly Belle2, partly Hermes)

- The massive Monte Carlo production to make data/MC comparison for different decays mode were done via the GRID (shared system of calculations with combined computing resources over the world).
- Another important direction of studies was the tuning of Pythia generator parameters using modern tools like “Professor” package intended for multi-correlation analysis in multi-parameters space. The aim of these studies is to use a large statistics sample of B-meson decays obtained in BelleII experiment, in order to determine precisely the parameters in PYTHIA model, and perform the detailed study of hadronization mechanism in B meson decays.

Physics analysis of data collected by international collaborations (mainly Belle2, partly Hermes)

- More than **10 talks** were presented by group members on regular and main Belle2/Hermes collaboration meetings (via ZOOM).
- More than **30 remote Data Production, Data Quality and ARICH performance shifts** were taken.
- **Five papers** were published with the authors from AANL (see the list of publications). The **detailed comments** for all published papers during the wide review period has been provided by Yerevan group members.
- The project related to the Belle2 activities was prepared and sent to SCS (**grant 20TTCG- 1C010**), which has been accepted for financial support.

Physics analysis of data collected by international collaborations (mainly Belle2, partly Hermes)

- **Two master-students** successfully defended their master diploma with excellent scores and after passing the exams were accepted as PhD students of AANL (supervisors: N. Akopov and G. Karyan). **One (+one) new master-students** started to work with our group.
- **Papers published by physics analysis group members during the year 2020:**
- F. Abudin´en, I. Adachi, H. Aihara, N. Akopov et al., "Search for Axionlike Particles Produced in e+e− Collisions at Belle II", **PRL, 125,161806 (2020).**
- Adachi, P. Ahlburg, H. Aihara, N. Akopov et al., "Search for an Invisibly Decaying Z0 Boson at Belle II in $e^+e^- \rightarrow \mu^+\mu^-(e^\pm\mu^\mp)$ Plus Missing Energy Final States", **PRL, 124 (2020) 14, 141801**.

Physics analysis of data collected by international collaborations (mainly Belle2, partly Hermes)

- F. Abudinén, I. Adachi, P. Ahlburg, H. Aihara, N. Akopov et al., “Measurement of the integrated luminosity of the Phase 2data of the Belle II experiment”, **Chinese Physics C Vol. 44, No. 2 (2020) 02100**
- M. Yonenaga et al., “Performance evaluation of the aerogel RICHcounter for the Belle II spectrometer using early beam collision data”, ***PTEP* 2020 (2020) 9, 093H01**
- A. Airapetian, N. Akopov, Z. Akopov et al., “Azimuthal single- and double-spin asymmetries insemi-inclusive deep-inelastic lepton scattering by transversely polarized protons”, **e-Print: 2007.07755 [hep-ex], accepted to be published in JHEP**