Contribution List

Invited report

21. TAIGA: status, results and perspectives

Prof. Leonid Kuzmichev, SINP MSU

We present the current status of very high-energy cosmic and gamma ray installation TAIGA at the Tunka Astrophysical Center situated at about 50 km from Lake Baikal. The deployment first stage insllation consits of 120 optical staion of HiSCORE array and 3 IACT will be finished in autumn of 2020. The last results of local sources observation during 2019 -2020a and plan for the further...

1. (8)
Data centres in astroparticle physics
Data and metadata management in experimental physics
Large-scale distributed data storages

1. A job management system for utilization of idle supercomputer resources

Elena Fedotova (SINP MSU)

We propose a system for executing low-priority non-parallel jobs on idle supercomputer resources to increase the effective load of the resources. The jobs are executed inside containers so the checkpoint mechanism can be used to save the state of the jobs during the execution and resume it on a different node. Thanks to splitting the execution of the low-priority jobs into separate shorter…

13. Access Pattern Analysis in the EOS Storage System at CERN

Olha Chuchuk (CERN, Taras Shevchenko KNU)

EOS is a CERN-developed storage system that serves several hundred petabytes of data to the scientific community of the Large Hadron Collider (LHC). In particular, it provides services to the four largest LHC particle detectors: LHCb, CMS, ATLAS and ALICE. Each of these collaborations uses differentсти и эффективности заложенных при ее реализации модели управления данными, исследовано поведение в различных условиях эксплуатации, в то workflows to process and analyse its data. EOS has a monitoring system that collects detailed…

6. Access Rights Management in Decentralized Distributed Computing Systems

Dr. Andrey Demichev (SINP MSU)

The paper presents a solution for decentralized management of data access rights in geographically distributed systems with users from different institutions. This implies possible lack of trust between the user groups. The solution is based on the distributed ledger technology (DLT) together with provenance metadata driven data management.

5. AstroDS - A Distributed Storage for Astrophysics of Cosmic Rays. Current Status.

Alexander Kryukov (MSU), Stanislav Polyakov (SINP MSU), Mr. Dmitriy Zhurov (Applied Physics Institute of Irkutsk State University)

The current state of distributed storage for astrophysics of cosmic ray is considered. The main goal of AstroDS is to unite existing astrophysical data storages of a number of existing experimental collaborations, such as TAIGA, TUNKA, CASKADE and others.

2. Comparison of container virtualization tools for utilization of idle supercomputer resources

Julia Dubenskaya (SINP MSU)

We propose a system to increase the effective load of supercomputer resources. The key idea of the system is that when idle supercomputer nodes appear, low-priority non-parallel jobs are started occupying these nodes until a regular job from the main queue of the supercomputer arrives. Upon arrival of the regular job, the low-priority jobs temporarily interrupt their execution and wait for the…

15. Evaluation of the impact of various local data caching configurations at Tier2/Tier3 WLCG sites

Andrey Kiryanov (NRC Kurchatov Institute PNPI)

In this talk we will describe various data caching scenarios and lessons learned. In particular we will talk about local data caches configuration, deployment, and tests. We are using xCache, which is a special type of Xrootd server setup to cache input data for a physics analysis. A relatively large Tier2 storage is used as a primary data source and several geographically distributed smaller…

17. The current design and implementation of the AstroDS Data Aggregation Service

Minh-Duc Nguyen

AstroDS is a distributed storage for Cosmic Ray Astrophysics. The primary goal of Astro DS is to gather data measured by the instruments of various physical experiments such as TAIGA, TUNKA, KASCADE into global storage and provide the users with a standardized user-friendly interface to search for the datasets that match certain conditions. AstroDS consists of a set of distributed…

23. KCDC: status and future perspectives

Juergen Wochele (KIT-IKP)

A few days ago we released the new KCDC version PENTARUS, which contains another DataShop for the first time. A brief outline of the new features will be given here, as well as possible future perspectives.

2.(6)
Organization and maintaining of data life cycles
Open data in physics
Outreach and education in astroparticle physics

16. Big Data Virualization: why and how?

Prof. Alexander Bogdanov (St.Petersburg State University)

The fact that over 2000 programs exist for working with various types of data, including Big Data, makes the issue of flexible storage a quintessential one. Storage can be of various types, including portals, archives, showcases, data bases of different varieties, data clouds and networks. They can have synchronous or asynchronous computer connections. Because the type of data is frequently…

14. Educational and outreach resource for astroparticle physics

Yulia Kazarina (API ISU)

The modern astrophysics is moving towards the consolidation and integration of tools aimed at detecting various channels for recording ultrahigh-energy cosmic radiation. In order to obtain reliable data, the experiments should work on the order of several decades, which means that the data will be obtained and analyzed by several generations of physicists. Thus, for the stability of…

8. Towards a global analysis and data centre for multi-messenger astroparticle physics

Andreas Haungs (KIT)

7. Astroparticle data agregation

Victoria Tokareva (KIT)

The extension of KCDC (KASCADE Cosmic-ray Data Center, https://kcdc.ikp.kit.edu/) project, which allows the user to access the data of the KASCADE, Tunka-133 and Tunka-Rex astrophysical experiments, has been deployed in the framework of German Russian Astroparticle Data Life Cycle Initiative. The report will describe the organization of this service, its interaction with storages and…

19. Tunka-Rex Virtual Observatory

Dmitriy Kostunin (DESY)

The Tunka Radio Extension (Tunka-Rex) is a cosmic-ray detector operating since 2012. The detection principle of Tunka-Rex is based on the radio technique, which impacts data acquisition and storage. We present the Tunka-Rex Virtual Observatory (TRVO), a framework for open access to the Tunka-Rex data, which currently is prepared for the first release.

24. Outreach activities in astroparticle physics at KIT

Katrin Link

With various outreach activities, KIT - in particular KCETA - aims to make astroparticle physics more accessible for everyone, not only high-school students and their teachers but also a broader public.

A wide range of activities, from public lectures, internships and practical activities for students to art meets science projects are therefore part of the repertory.

Some of these activities are also embedded in the programme of national (Netzwerk Teilchenwelt) and global institutions (International Particle Physics Outreach Group / Global Cosmic Group). There are also close links at European level with the APPEC Functional Centre being in Karlsruhe.

In this talk we present an overview of our outreach programme.

3. (6)
Combined data analysis in astroparticle physics
Modern methods of data analysis for combined datasets

4. A review of methods of resolution estimation for 3D reconstructions for nanoscale biological objects from experiments data on super-bright X-ray free electron lasers (XFELs)

Ms. Kseniia Ikonnikova (National Research Center «Kurchatov Institute»)

The ability to investigate 3D structure of biomolecules, such as proteins and viruses, is essential in biology and medicine. With the invention of super-bright X-ray free electron lasers (XFELs) the Single Particle Imaging (SPI) approach allows to reconstruct 3D structures from many 2D diffraction images produced in the experiment by X-rays scattered on the biomolecule exposed in different…

18. Development self-trigger algorithms for radio detection of air-showers

Oleg Fedorov (ISU)

The detection of extensive air-showers with radio method is a relatively young, but promising branch in experimental astrophysics of ultrahigh energies. This method allows one to carry out observations regardless of weather conditions and time of day, and the precision of reconstruction of the properties of primary particles is comparable to the classical methods. The main disadvantage of this…

20. Fast Simulation of Electromagnetic Calorimeter using Deep Learning

Mrs. Jubna Irakkathil Jabbar

The simulation of particle showers in electromagnetic calorimeters with high precision is a computationally expensive and time consuming process. Fast simulation of particle showers using generative models have been suggested to significantly save computational resources. The objective of studies is to perform a fast simulation of particle showers in the Belle II calorimeters using deep…

12. KCDC Analysis Extension

Frank Polgart (KIT)

We will introduce a data analysis extension for the KASCADE Cosmic-ray Data Center (KCDC), based on the Jupyterhub/notebook ecosystem. A user-friendly interface, easy access to data from KCDC, and modern analysis software are of special interest.

This contribution will discuss the service architecture, followed by a brief usage example.

3. Modifications to the EMC algorithm for orientation recovery in Single Particle Imaging experiments on X-ray free electron lasers

Mr. Sergei Zolotarev (National Research Center "Kurchatov Institute")

The emergence of super-bright light sources - X-ray free electron lasers(XFELs) combined with Single Particle Imaging(SPI) method, makes it possible to obtain nanometer resolution 3D structure

of biological particles such as proteins or viruses without needing to freeze them. SPI relies on the “diffraction before destruction” principle, meaning that each sample only produces a single…

22. Reconstruction radio signals from air-showers with autoencoder

Pavel Bezyazeekov

One of the main challenges related to the measurements of air-shower radio emission is the high background. Plenty of natural and anthropogenic RFI as well as stationary background distort air-shower pulse. Standard methods based on signal-to-noise ratio lead to increasing the threshold of air-shower detection. For extending the energy range towards lower energies we perform data denoising...