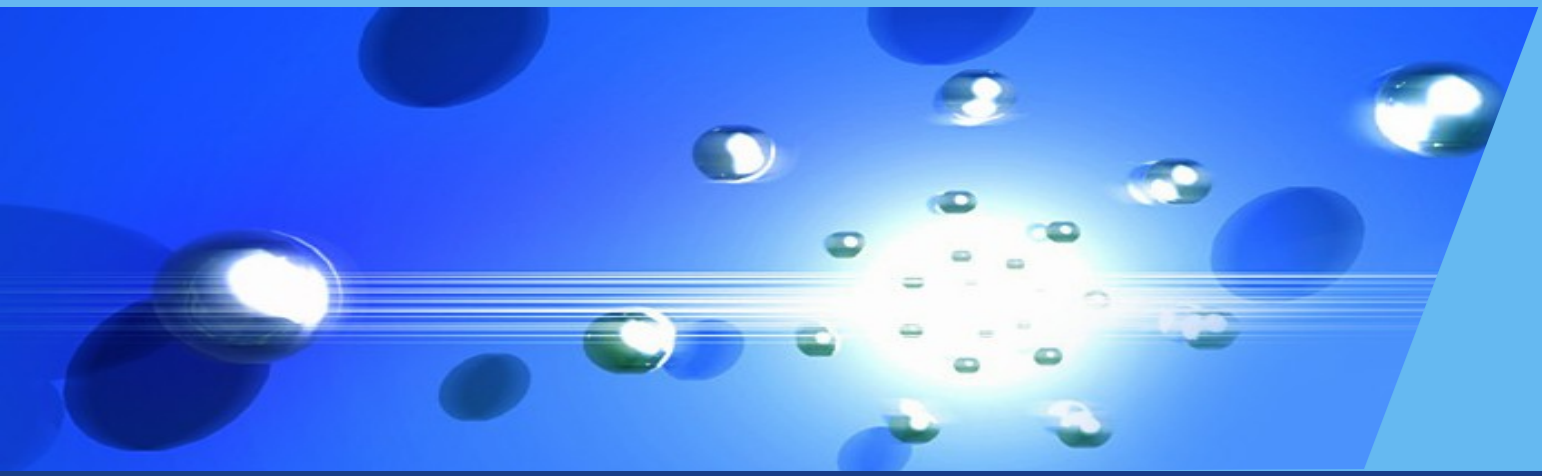


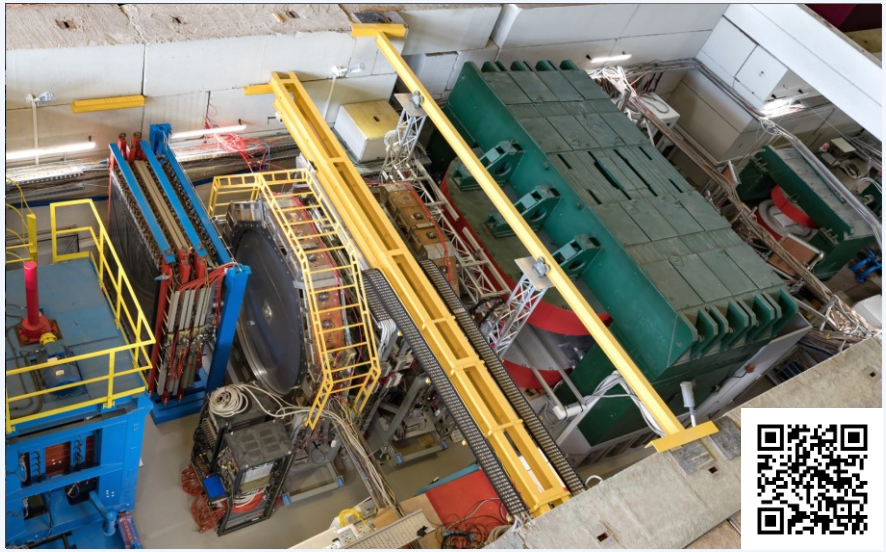
BM@N Software in Run 9 and further development

Konstantin Gertsenberger

V. Veksler and A. Baldin Laboratory of High Energy Physics
Joint Institute for Nuclear Research

BM@N in Nuclotron Runs (2015 – 2026)

Nuclotron Run 51 (d,C)		*Feb. 22 – Mar. 15,* ***2015***
Nuclotron Run 52 (d)		*June 29 – June 30,* ***2016***
Nuclotron Run 53 (d, d↑)	***Technical*** *interaction rate: 5 k/spill* *event count: ~400 Mevents*	*Dec. 09 – Dec. 23,* ***2016***
Nuclotron Run 54 (C)		*Mar. 07 – Mar. 18,* ***2017***
Nuclotron Run 55 (Ar,Kr)		*Mar. 04 – Apr. 05,* ***2018***
Nuclotron Run 57 (Xe)	***Physics*** *interaction rate: 8 k/spill* *event count: ~630 Mevents*	*Dec. 12 – Feb. 02,* ***2023***
NICA Run 1 (Xe)	*interaction rate: 20 k/spill* *event count: ~2969 MEvents*	*Feb. 12 – Apr. 04,* ***2026***



- Beam: *Xe* (2.2, 1.6, 3.0; 3.8, 3.0 AGeV), previous runs: *Kr* (2.3, 2.6, 3.0 AGeV), *Ar* (3.2 AGeV), C^{12} (3.5–4.5 AGeV), *d* (4, 4.6 AGeV)
- Target: *Sn* and *CsI*

previous runs: *Pb*, *Sn*, *Cu*, *Al*, C_2H_4, *C*

- Integrated DAQ, T_0 and Trigger systems
- Detectors: VSP, FSD, GEM, CSC, ToF-400&700, FHCal, ECal, profilometers…
- Detect min bias beam-target interactions to reconstruct hyperons, strange particles, identify charged particles and nucleus fragments…

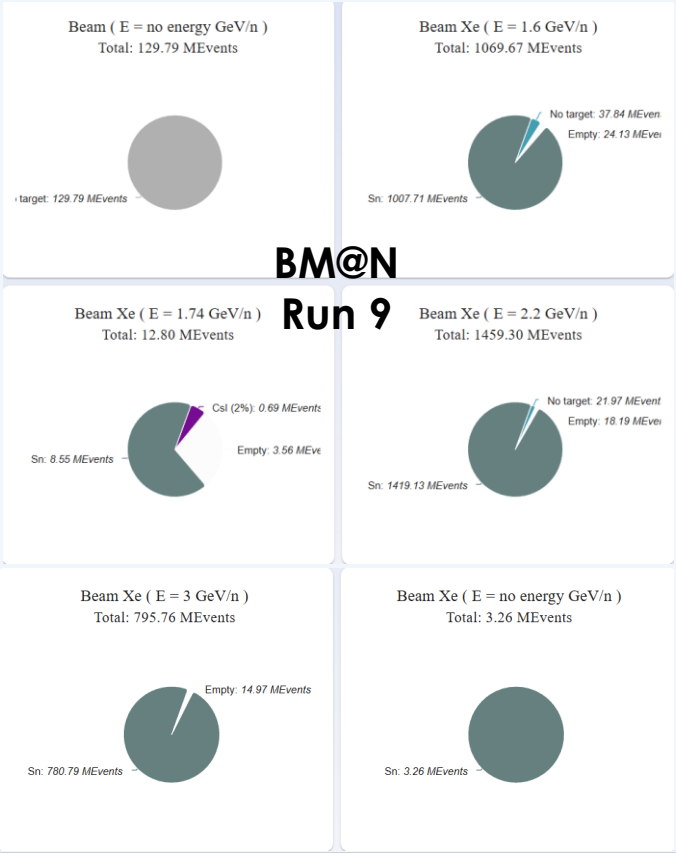
Data Production in the 2nd Physics Run

BM@N Run 9 (2026)

Three (2.2 & 1.6 & 3.0 AGeV) beam energy available for ***Xe***-beam

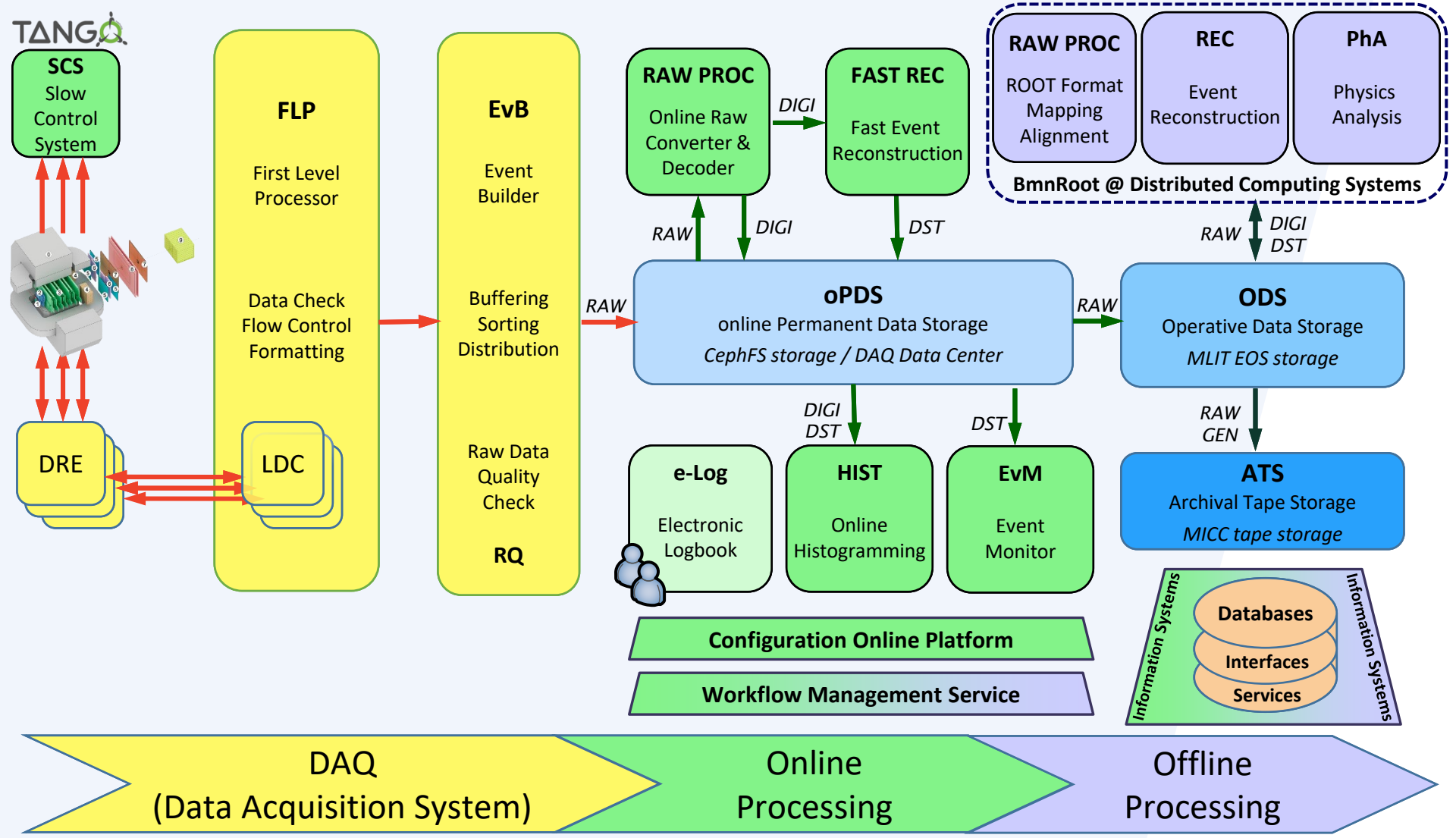
Sn and ***CsI*** targets are used as similar to *Xe*

More than **2 900 M** physics events collected



Parameter	Value (approx.)
Data acquisition time (physics)	**609 hours**
Run duration (avg)	30 minutes
Run break (avg)	7 minutes
Beam intensity (2.2 AGeV)	up to 1.6M/6 Xe^{+}/sec D = 6 sec/12 sec
Trigger rate **Trigger rate (average per spill)**	**20K/6 event/sec** **1 700 event/sec**
Raw event size	**540 КБ**
Data rate **Data rate (average per run)**	**up to 2 GB/sec** **800 MB/sec**
RAW file size	**7.8 GiB**
Event count per file (total)	**15 000**
Total events (+test, calibration, pedestal)	**3 480 M**
File count	236 k
Run count (good/bad)	**1 517** / 231
Raw data size	**1.8 PiB**
DIGIT file size (avg)	0.8 GiB (56k/ev)
DST file size (avg)	1.3 GiB (91k/ev)

BM@N Data Processing Flow



Electronic Logbook (e-Log Platform)

create a new run

advanced search

current day records

user cabinet (event subs)

object dictionaries

records per page

SSO account

file attachments

contacts

page

fast search

stats by shifts

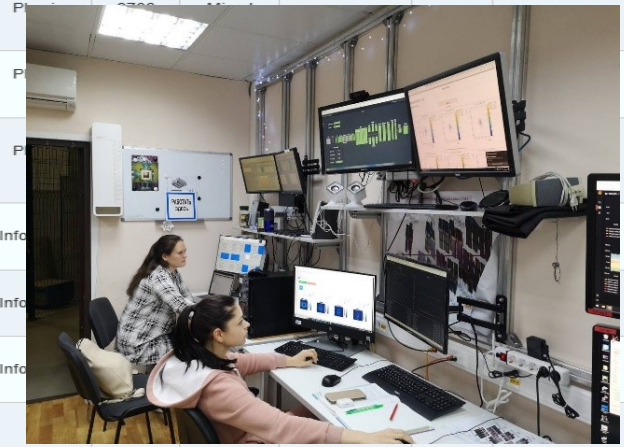
spotlighting

virtual shift assistant (bot)

BM@N Electronic Logbook — Logged in as gertsen

Home | New | Find | Last day | Account | Contacts | Stats | Reference Book — Page: 1 of 579 — Number of items per page: 10 — Logou

Date	Shift Leader	Type	№ Run	Trigger	DAQ Status	Beam	Energy, GeV	Target	SP-41, A	SP-57, A	VKM2, A	Comment	Attachments	
2026-02-25 21:27:56	Sergej Novozhilov	Physics Run	9708 per.9	Mixed trigger				Sn	1040		180	CCT1/100+MBT/200+BT`/2000(before/after=20/20)+nFD; (BD>=3); BC1=1.4e6; BC2/BC1=0.97; VC/BC1=0.029; MBT/BT`=0.067 LBT/BT`=0.024 Nevents = M		Edit
2026-02-25 20:36:31	Sergej Novozhilov	Physics Run	9707 per.9	Mixed trigger	all	Xe	2.2	Sn	1040		180	CCT1/100+MBT/200+BT`/2000(before/after=20/20)+nFD; (BD>=3); BC1=1.4e6; BC2/BC1=0.97; VC/BC1=0.029; MBT/BT`=0.07 LBT/BT`=0.023 Nevents = 5M		Edit
2026-02-25 19:45:14	Sergej Novozhilov							Sn	1040		180	CCT1/100+MBT/200+BT`/2000(before/after=20/20)+nFD; (BD>=3); BC1=1.4e6; BC2/BC1=0.97; VC/BC1=0.027; MBT/BT`=0.07 LBT/BT`=0.023 Nevents = 5M		Edit
2026-02-25 18:53:52	Sergej Novozhilov							Sn	1040		180	CCT1/100+MBT/200+BT`/2000(before/after=20/20)+nFD; (BD>=3); BC1=1.4e6; BC2/BC1=0.97; VC/BC1=0.027; MBT/BT`=0.07 LBT/BT`=0.023 Nevents = 5M		Edit
2026-02-25 18:31:23	Sergej Novozhilov							Sn	1040		180	CCT1/100+MBT/200+BT`/2000(before/after=20/20)+nFD; (BD>=3); BC1=1.5e6; BC2/BC1=0.97; VC/BC1=0.028; MBT/BT`=0.07 LBT/BT`=0.024 Nevents = 1.5M VSP(STS)два модуля не читаются		Edit
2026-02-25 18:16:07	Sergej Novozhilov	Info										Ток ИП-14 - 375А, напряжение FD- 948В. КСК в Рабочем режиме. GEM выводятся на рабочий режим. Работы с ВЧ на Нуклотроне.		Edit
2026-02-25 17:11:56	Sergej Novozhilov	Info										Работы по замене одной из плат датчиков тока источника ИП14 и переключению на резервный источник ИП25		Edit
2026-02-25 17:00:38	Sergej Novozhilov	Info										Остановка на дозаливку		Edit
2026-02-25 16:30:11	Sergej Novozhilov	Information	per.9									Ток ИП-14 поднят на 1А до 337. Напряжение FD уменьшено с 970 до 955В. BC1=1.5e6; BC2/BC1=0.97; VC/BC1=0.027; MBT/BT`=0.036 LBT/BT`=0.02 Улучшено положение пучка. Вето к BC1 улучшилось в 10 раз		Edit



2026 - software team (contact e-mail: gertsen@jinr.ru)

Shift Assistant Is Here!

bmn-elog.jinr.int

*no connection with DAQ run control information

e-Log Platform Bugs and Features in Run 9





- *person_name* field limit of SSO accounts was disabled because of LDAP issues. *person_id* changed from SERIAL4 to UUID.
- "move dictionary items to archive" function was implemented for *Beams, Targets* and *Triggers* tables
- *data quality* flag ("*system status*" e-Log column) was added: *good*, *medium* or *poor*, where "good" means all detectors are ok or 1 detector station failure, "medium" – 2 detector station failure, "poor" – 1 detector failure
- '*previous geometry*' trigger re-enabled

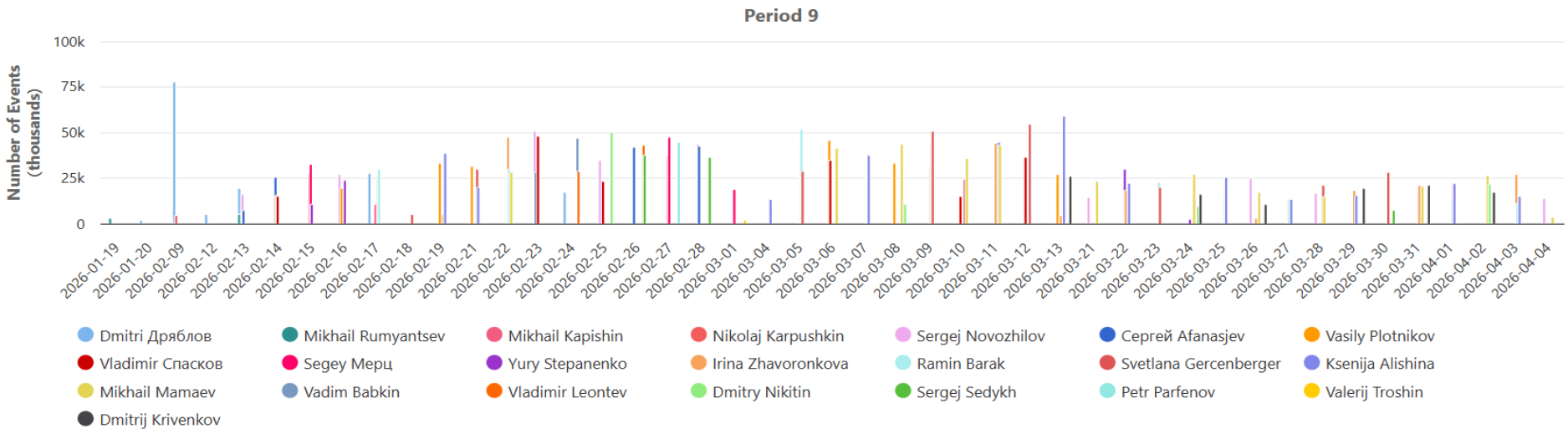


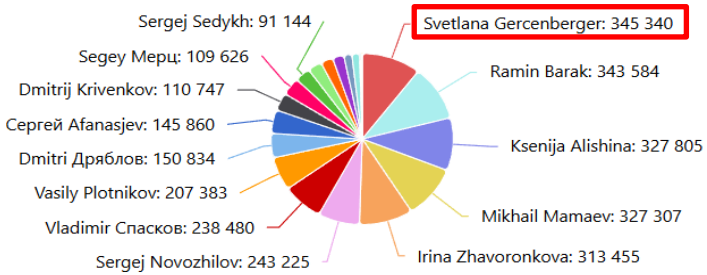
- transfer of magnetic filed to UniConDa corrected
- transfer of run type to UniConDa updated
- *beam* is optional now (as the *target* field), but the both are NOT NULL now
- *run number* field is optional for INFO now
- changing *record type* does not clear fields except grayed
- [**bold**] and [red] options have been added to comments

thanks to Alexander Chebotov for his support and development

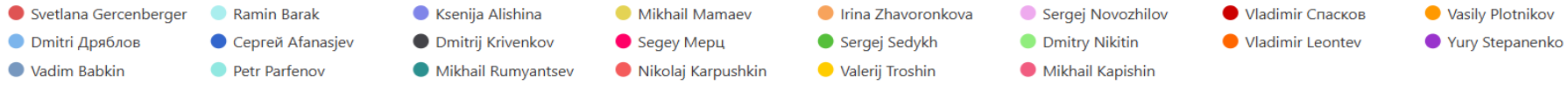
e-Log Statistics by Shift Leaders

9011 per.9: 2026-01-18 11:24:39 – 10775 per.9: 2026-04-04 09:30:48 → 1332 runs

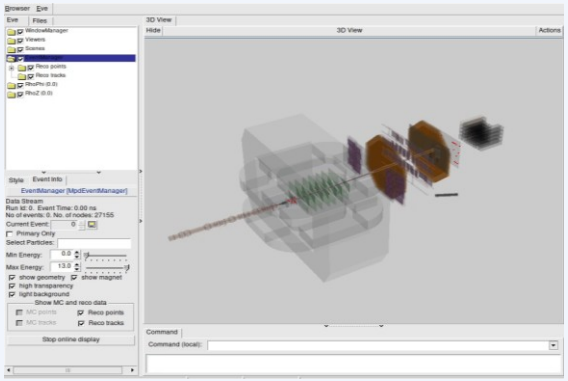








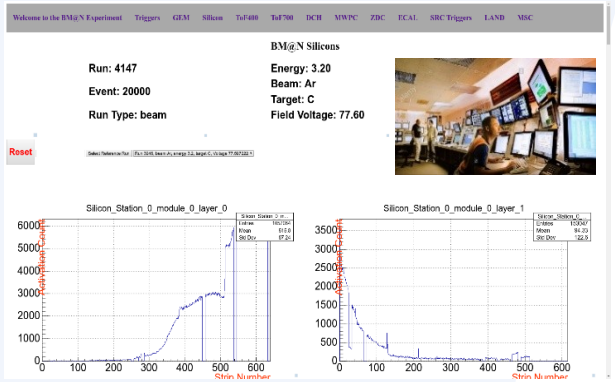
Run & Raw File Metadata for BM@N Processing



DAQ system

EvB

Raw Event Builder



Online Raw

ROOT Format Digit Decoder

EvM

Event Monitor

HIST

Online Histogramming

run metadata

period, run
approximate start & end time, event count



e-Log platform

run metadata

period, run
run type, beam, energy, target, approximate magnetic field



Condition Database

raw file metadata

Offline RAW

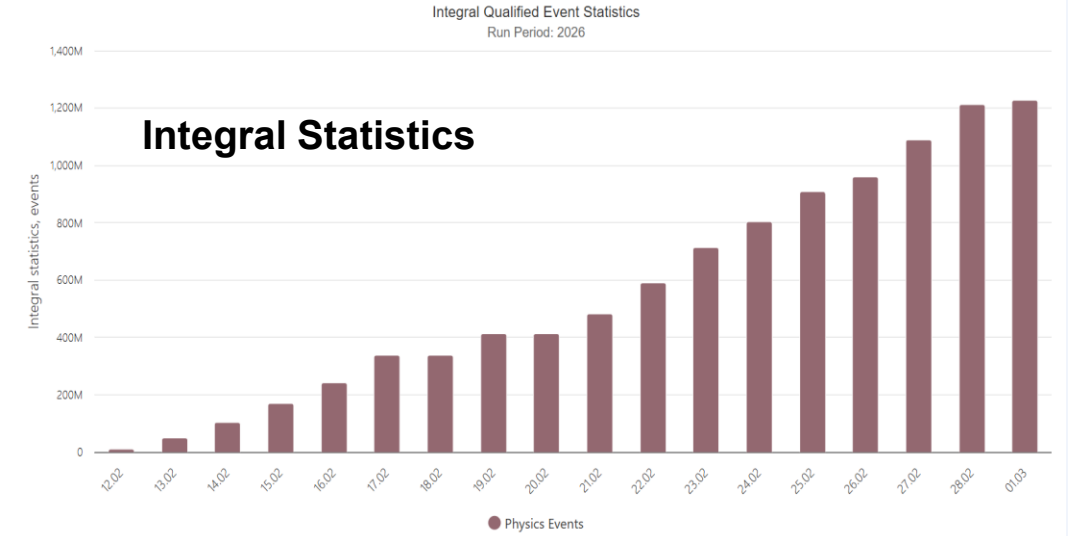
ROOT Format Digit Decoder

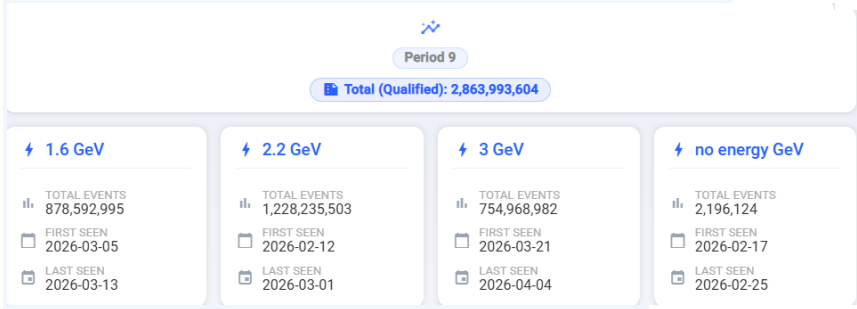
period, run
start & end time, start & end event, event count, file size. path, hash

online & offline data processing

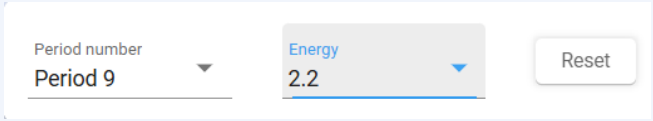
event & run statistics

Daily Event Statistics during BM@N Runs

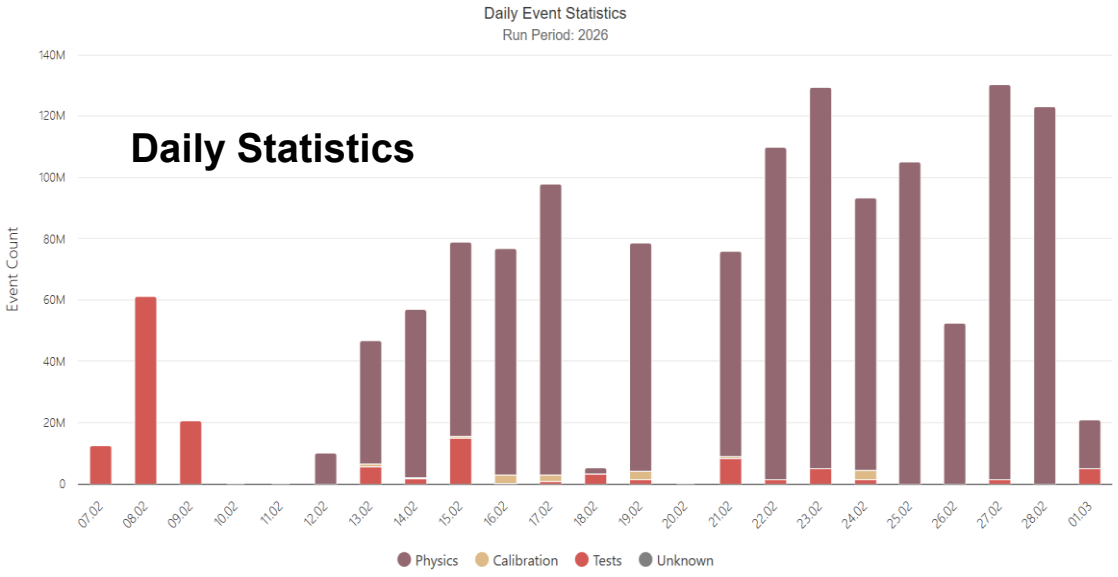




summary statistics on physics events by energy

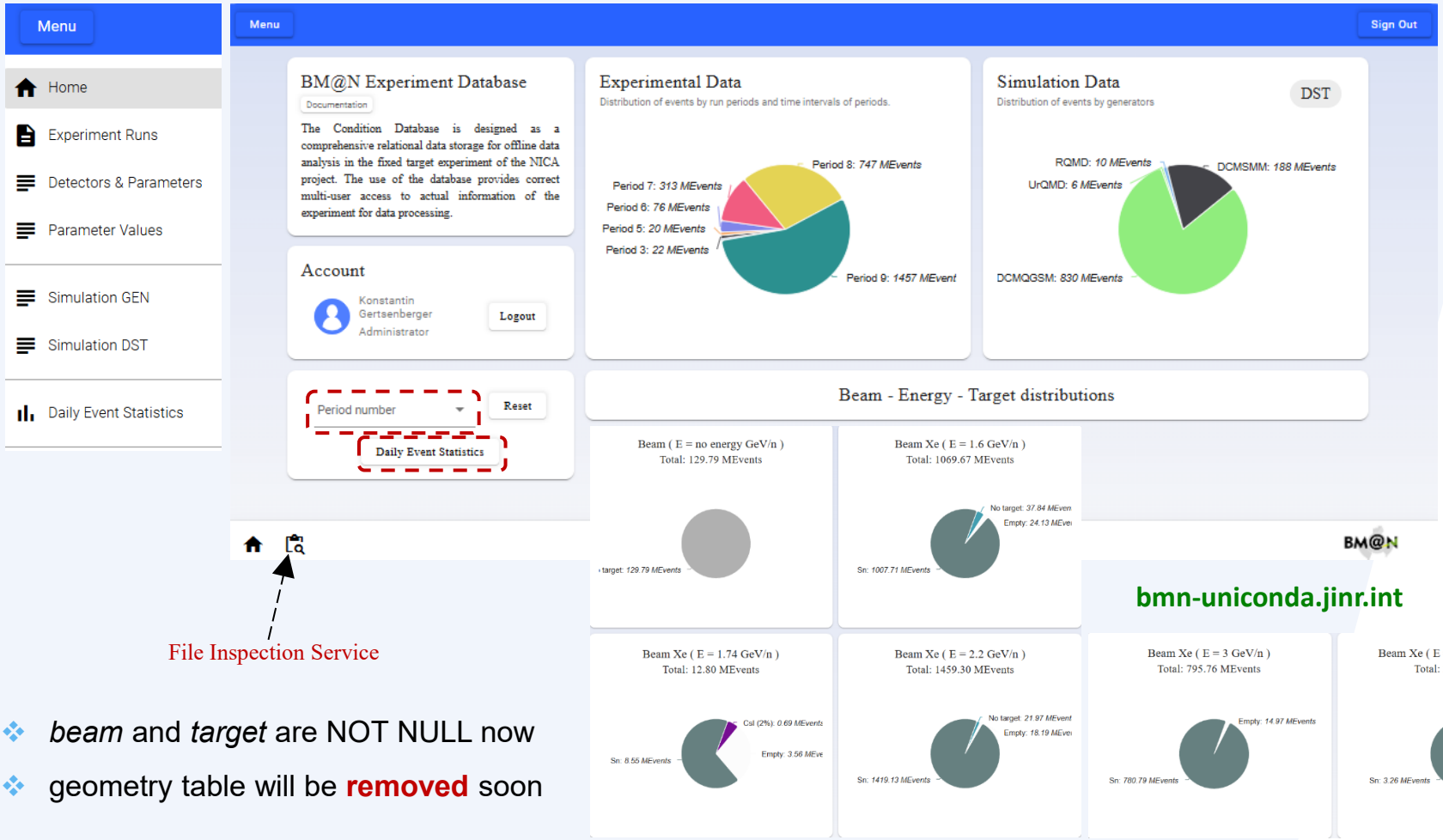


separate statistics for different beam energies in Daily Event Statistics



thanks to Alexander Chebotov for his support and development

BM@N Condition Database (UniConDa)



File Inspection Service

bmn-uniconda.jinr.int

- *beam* and *target* are NOT NULL now
- geometry table will be **removed** soon

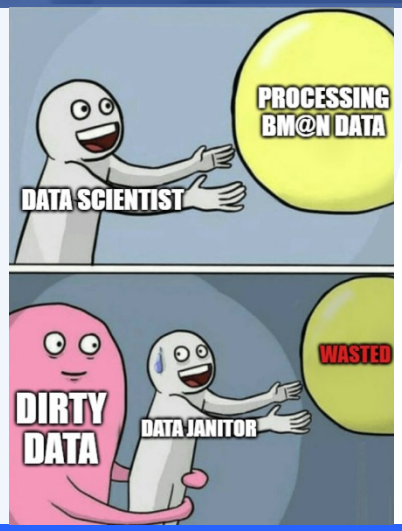
8978 per.9: 2026-01-17 16:48:27 – 10775 per.9: 2026-04-06 11:54:08 → 1517 runs

Incorrect Run Metadata from Decoder

Menu | Sign Out

9	9070	Test	2026-01-20 00:07:36	2026-01-20 00:07:36	Xe	1.74	Sn	52.455722	13233	Show	≡
9	9069	Test	2026-01-19 23:54:49	2026-01-19 23:54:49	Xe	1.74	Sn	52.455722	4969	Show	≡
9	9068	Test	2026-01-19 23:50:00	2026-01-19 23:50:00	Xe	1.74	Sn	52.455722	1409	Show	≡
9	9067	Test	2026-01-19 23:29:48	2026-01-19 23:29:48	Xe	1.74	Sn	52.455722	54057	Show	≡
9	9066	Test	2026-01-19 22:55:15	2026-01-19 22:55:15	Xe	1.74	Sn	52.455722	168649	Show	≡
9	9065	Test	2026-01-19 22:07:31	2026-01-19 22:07:31	Xe	1.74	Sn	52.455722	181073	Show	≡
9	9064	Test	2026-01-19 20:03:02	2026-01-19 20:03:02	Xe	1.74	Sn	52.455722	0	Show	≡
9	9063	Test	2026-01-19 18:59:51	2026-01-19 18:59:51	Xe	1.74	Sn	52.455722	0	Show	≡
9	9062	Test	2026-01-19 18:24:30	2026-01-19 18:24:30	Xe	1.74	Sn	52.455722	0	Show	≡
9	9061	Calibration	2026-01-19 17:42:01	2026-01-19 17:42:01	Xe	1.74					
9	9060	Unknown	2026-01-19 17:31:21	2026-01-19 17:31:21							
9	9059	Test	2026-01-19 16:52:01	2026-01-19 16:52:01	Xe	1.74					

metadata from decoder



Menu | Sign Out

9	9064	Test	2026-01-19 20:03:02	2026-01-19 20:03:02	Xe	1.74	Sn	52.455722	0	Show	≡
9	9063	Test	2026-01-19 18:59:51	2026-01-19 18:59:51	Xe	1.74	Sn	52.455722	0	Show	≡
9	9062	Test	2026-01-19 18:24:30	2026-01-19 18:24:30	Xe	1.74	Sn	52.455722	0	Show	≡
9	9061	Calibration	2026-01-19 17:42:01	2026-01-19 17:42:01	Xe	1.74	Sn	0	0	Show	≡
9	9060	Unknown	2026-01-19 17:31:21	2026-01-19 17:31:21					0	Show	≡
9	9059	Test	2026-01-19 16:52:01	2026-01-19 16:52:01	Xe	1.74	Sn	52.455722	0	Show	≡
9	9058	Calibration	2026-01-19 15:36:17	2026-01-19 15:36:17	Xe	1.74	Sn	0	0	Show	≡
9	9057	Calibration	2026-01-19 15:27:33	2026-01-19 15:27:33	Xe	1.74	Sn	0	0	Show	≡
9	9056	Calibration	2026-01-19 15:00:52	2026-01-19 15:00:52	Xe	1.74	Sn	0	0	Show	≡
9	9055	Calibration	2026-01-19 14:46:29	2026-01-19 14:46:29	Xe	1.74	Sn	0	0	Show	≡
9	9054	Test	2026-01-19 14:39:50	2026-01-19 14:39:50	Xe	1.74	Sn	0	0	Show	≡
9	9053	Test	2026-01-19 14:34:37	2026-01-19 14:34:37	Xe	1.74	Sn	0	0	Show	≡

metadata from decoder

equal timestamps → no possibility to calculate magfield → no reconstruction

zero event count from decoder → no possibility to show statistics

time (32 records): 1995-10-11, 1999-12-07, 2026-07-27, 2038-12-24…

run (3 record): 0, -15432432…

Statistics Collection & Success Check Service

- Shows histograms and summary data for:
  - Run – file – event statistics
    & checks integrity of files: event number being equal to a value in the database
  - Processing time for runs and times per event by parsing job logs
    & defines failed jobs and forms a list of data files for reprocessing
- Implemented on Python (stats.py)
- https://git.jinr.ru/nica/bmnroot/-/tree/dev/services/statistics

```
# python stats.py --size --dir /ceph/bmn/run/run9/beam/ --config config-size-exp.json --recursive
```

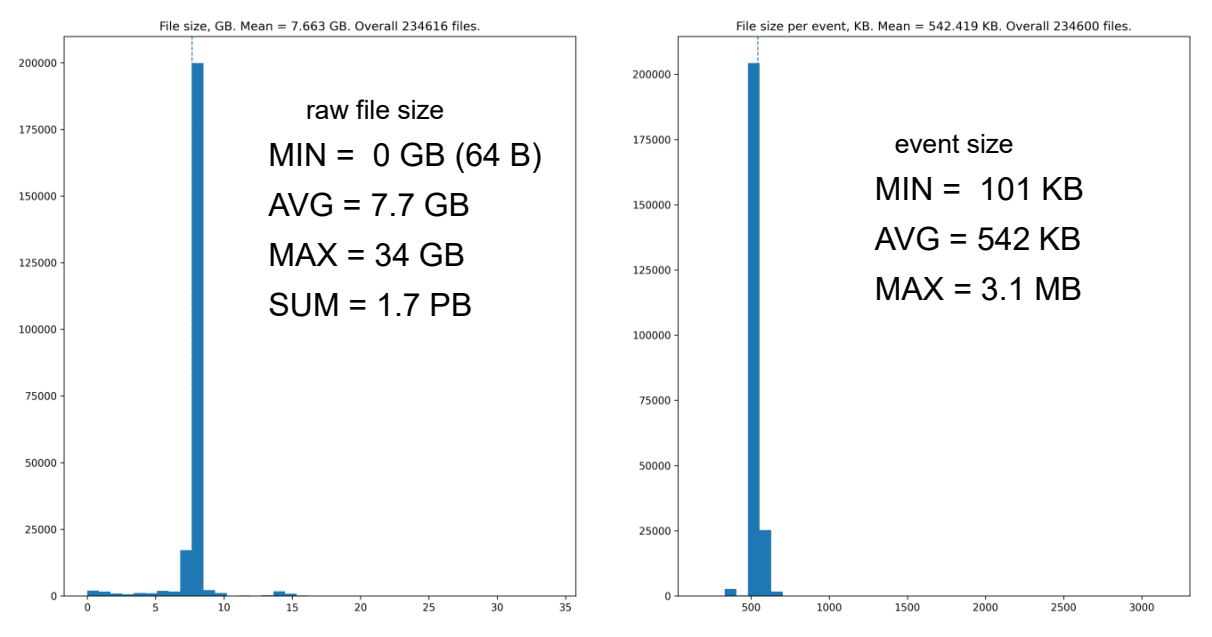
```
# python stats.py --time --dir /eos/nica/bmn/users/logs/ --config config-time.json
```

*python bmnroot/services/statistics/**stats .py***
*root bmnroot/database/examples/uni_db/**postrun_update.C***
*root bmnroot/database/examples/uni_db/**postrun_check.C***
*root bmnroot/database/tango/examples/**show_avg_field.C***
*root bmnroot/database/uni_db/examples/run/**show_run_stats.C***
*root bmnroot/database/uni_db/examples/raw/**show_raw_stats.C***
*root bmnroot/database/uni_db/examples/root/**show_root_stats.C***
*python bmnroot/services/inspection/raw_inspection **/...***



Run 9 Statistics on Raw Files

- “/ceph/bmn/run/run9/beam/”: **1517 runs** | UniConDa: **1517** | e-Log: **1332**



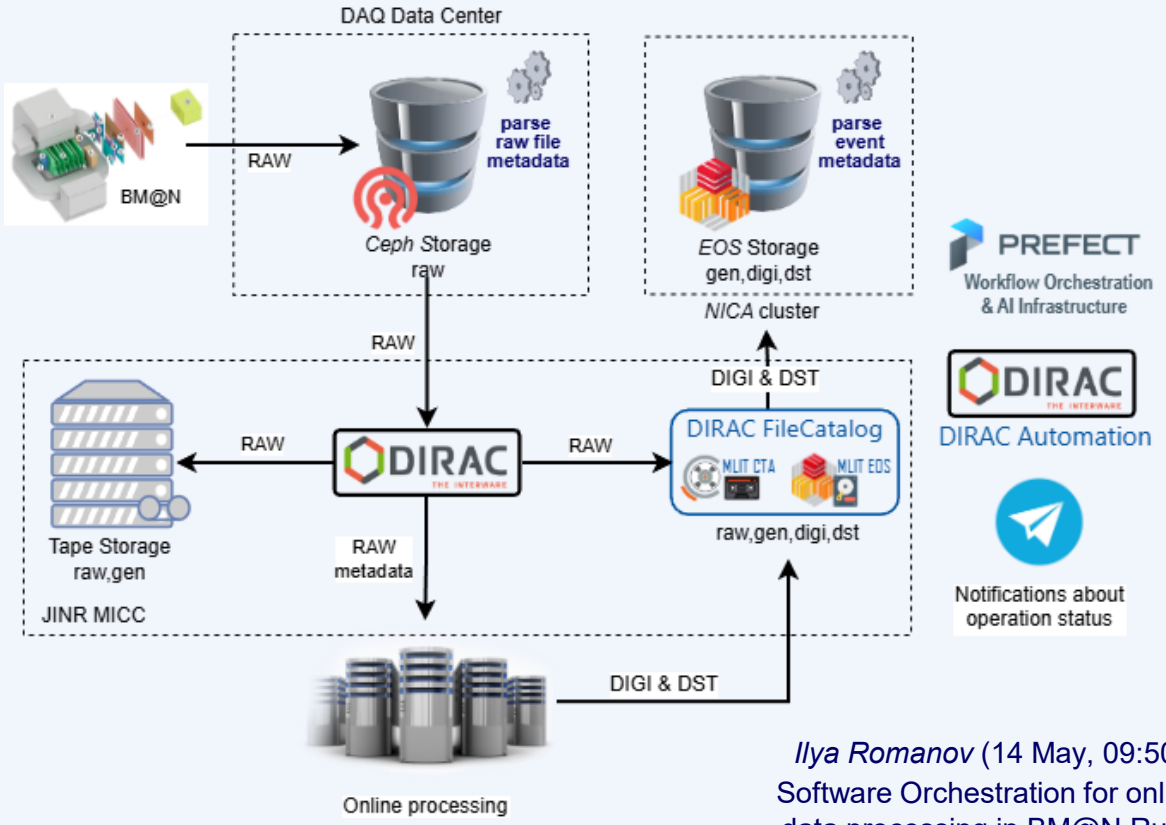
- “bad” (less than 5 GBs) runs are moved to “beam-bad” directory after Run

synchronize the replacement with the Condition Database & DIRAC File Catalog is required

- DDC SLURM parameters restricts raw file metadata collector

```
DEBUG nica-scheduler$ Batch command: sbatch -J raw9info  -a 1-5320%60 /ceph/bmn/work/gertsen/bmnroot/b
uild/bin/job_1689179895652662403.sh
sbatch: error: Slurm temporarily unable to accept job, sleeping and retrying
sbatch: error: Batch job submission failed: Resource temporarily unavailable
```

Run Orchestration with Workflow Manager



PREFECT
Workflow Orchestration & AI Infrastructure

DIRAC
DIRAC Automation

Notifications about operation status

copying of the raw data to the DIRAC File Catalog

backup to the NICA Tape Storage

collecting and storing raw file metadata (& run metadata)

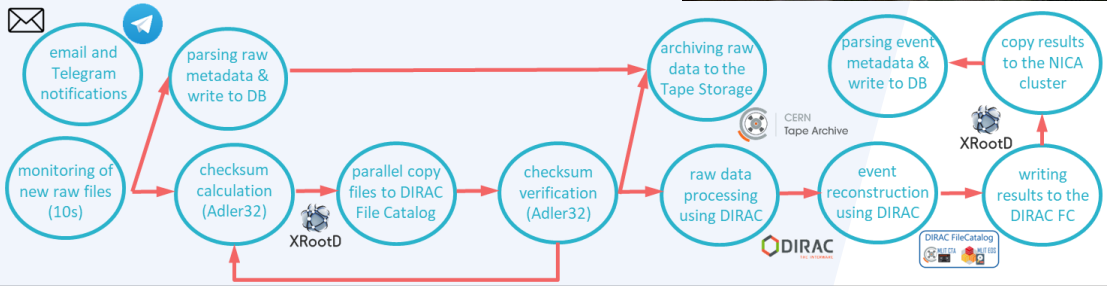
"online" processing of collected data on the provided distributed computing resources via DIRAC

copying result DIGI & DST files to the NICA cluster

Event Indexing of the DST files



Ilya Romanov (14 May, 09:50)
Software Orchestration for online data processing in BM@N Runs



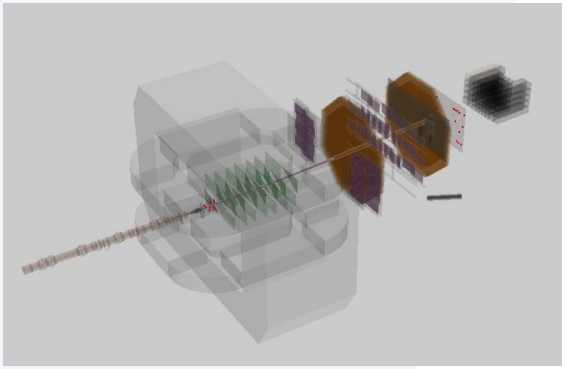
PREFECT
Workflow Orchestration & AI Infrastructure

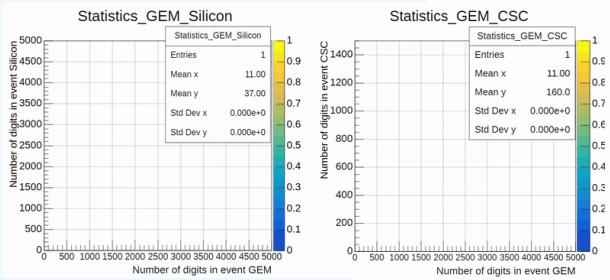
Online and Offline TaskFlows for mass data processing

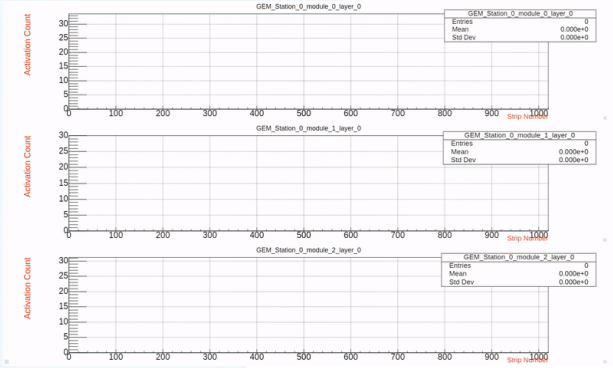
Online Processing System for BM@N

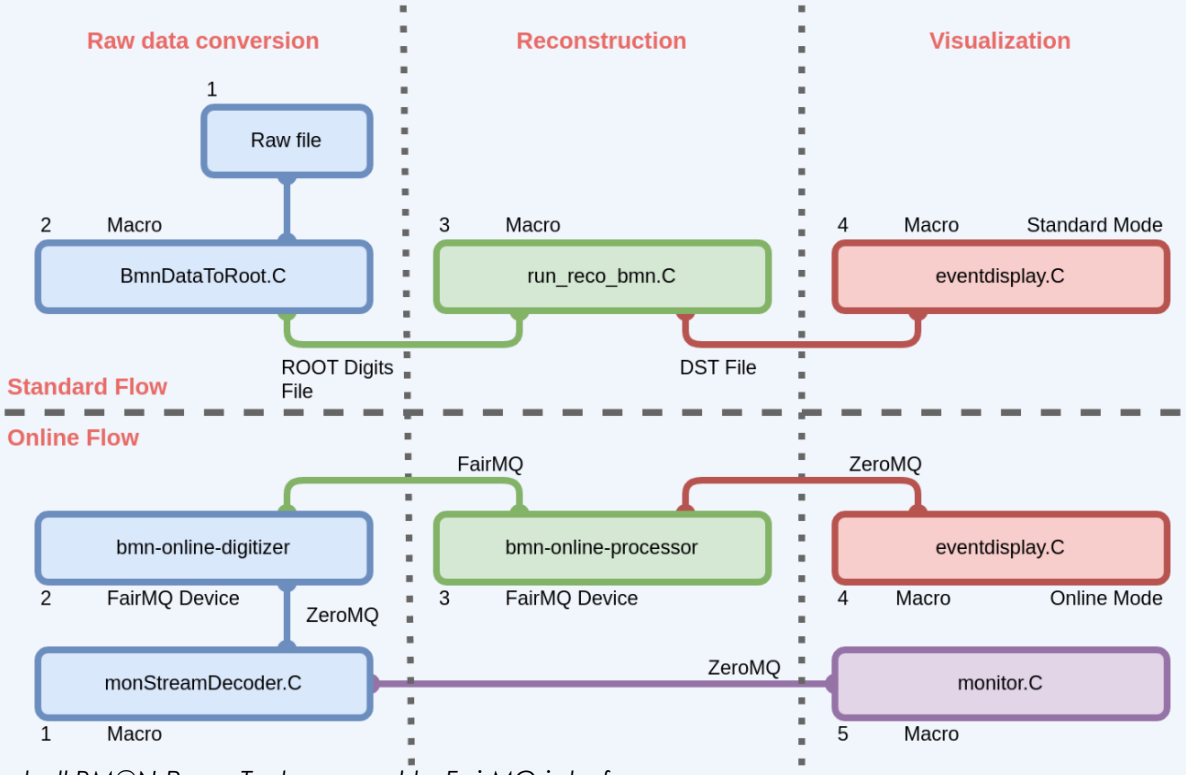
DDS (Dynamic Deployment System) is a set of tools that facilitates the process of system deployment. As a Remote Manipulator System (RMS), it initially provides SSH or SLURM, but also allows you to use other methods.

FairMQ is a messaging library focused on building modular systems for data processing in high energy physics experiments. It represents an abstraction over various messaging technologies such as ZeroMQ, Nanomsg, etc.





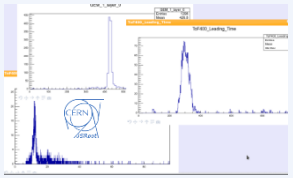


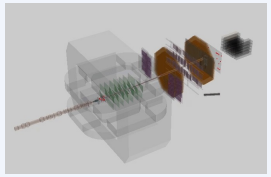


**not all BM@N Reco Tasks moved to FairMQ interface*

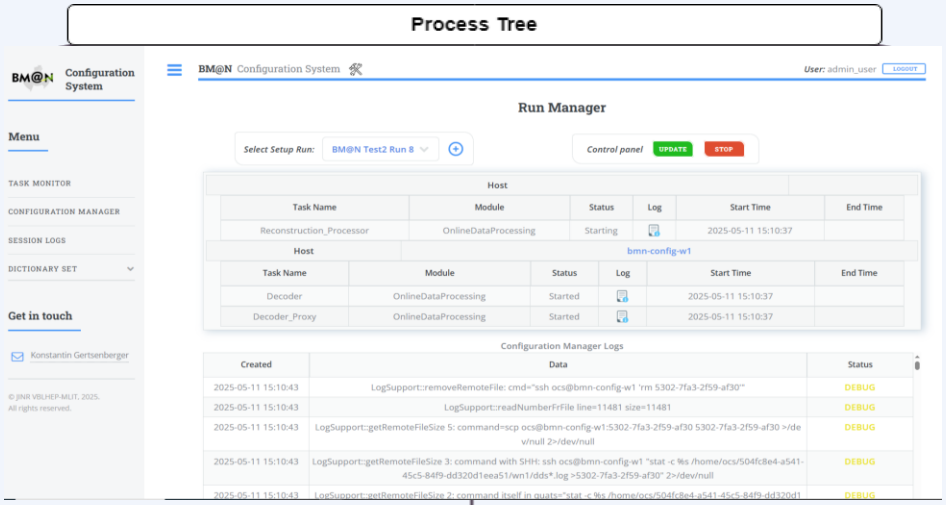
BM@N COnfiguration Online Platform (COOP)

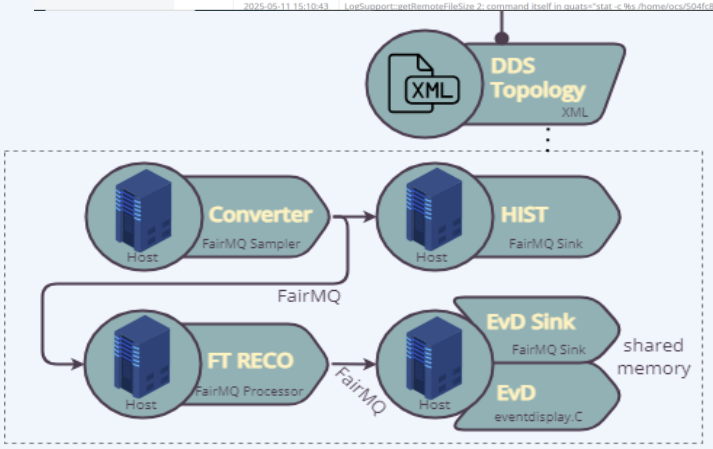
Online Histogramming System

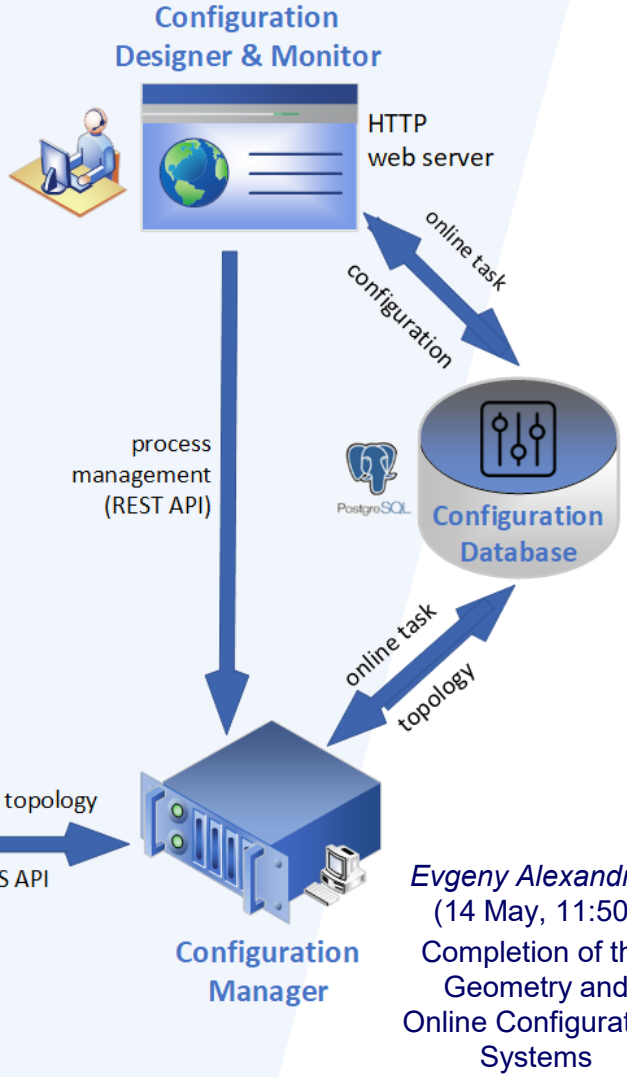




Event Monitor







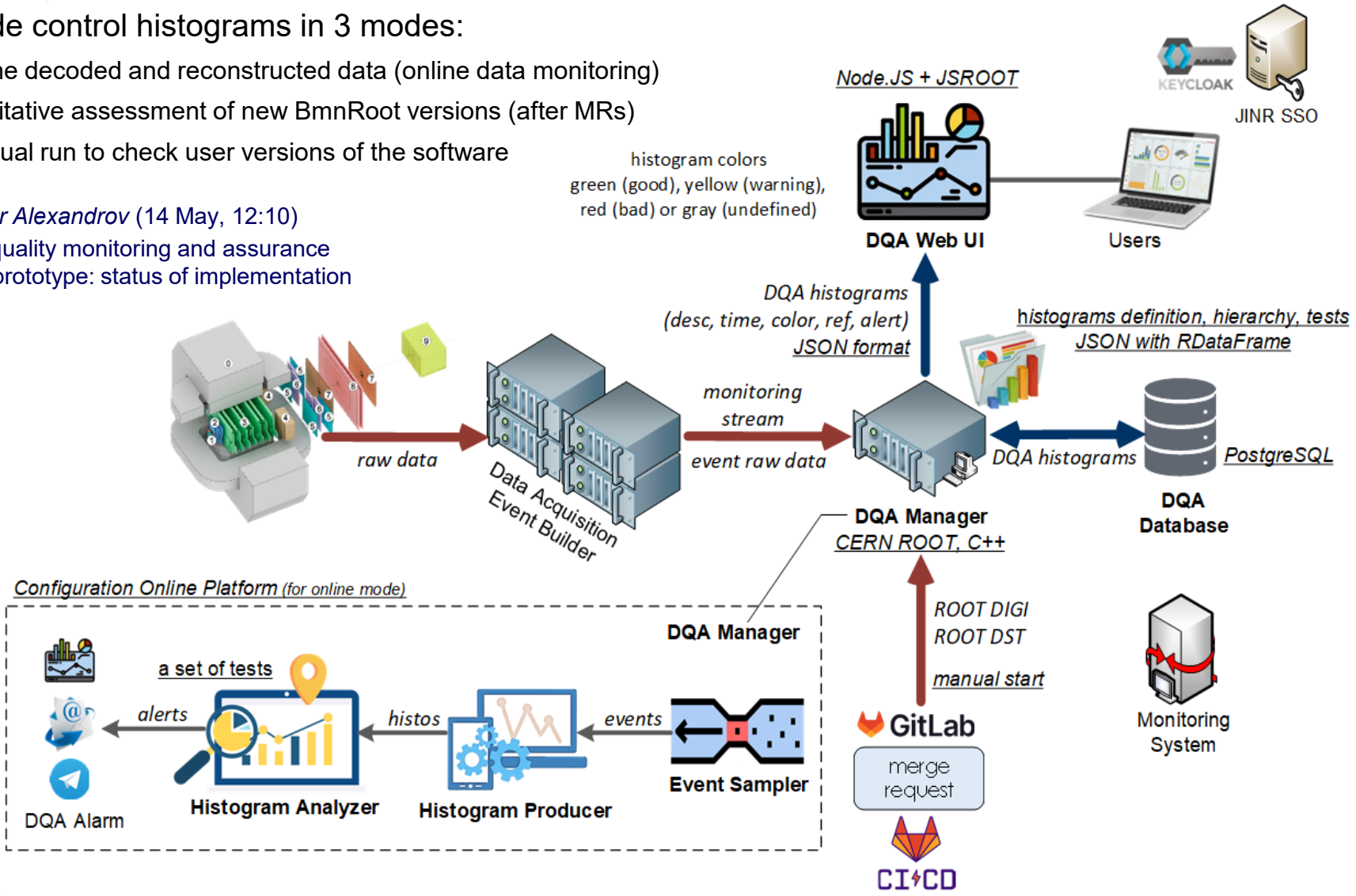
Evgeny Alexandrov
(14 May, 11:50)
Completion of the Geometry and Online Configuration Systems

Design of the BM@N DQA system

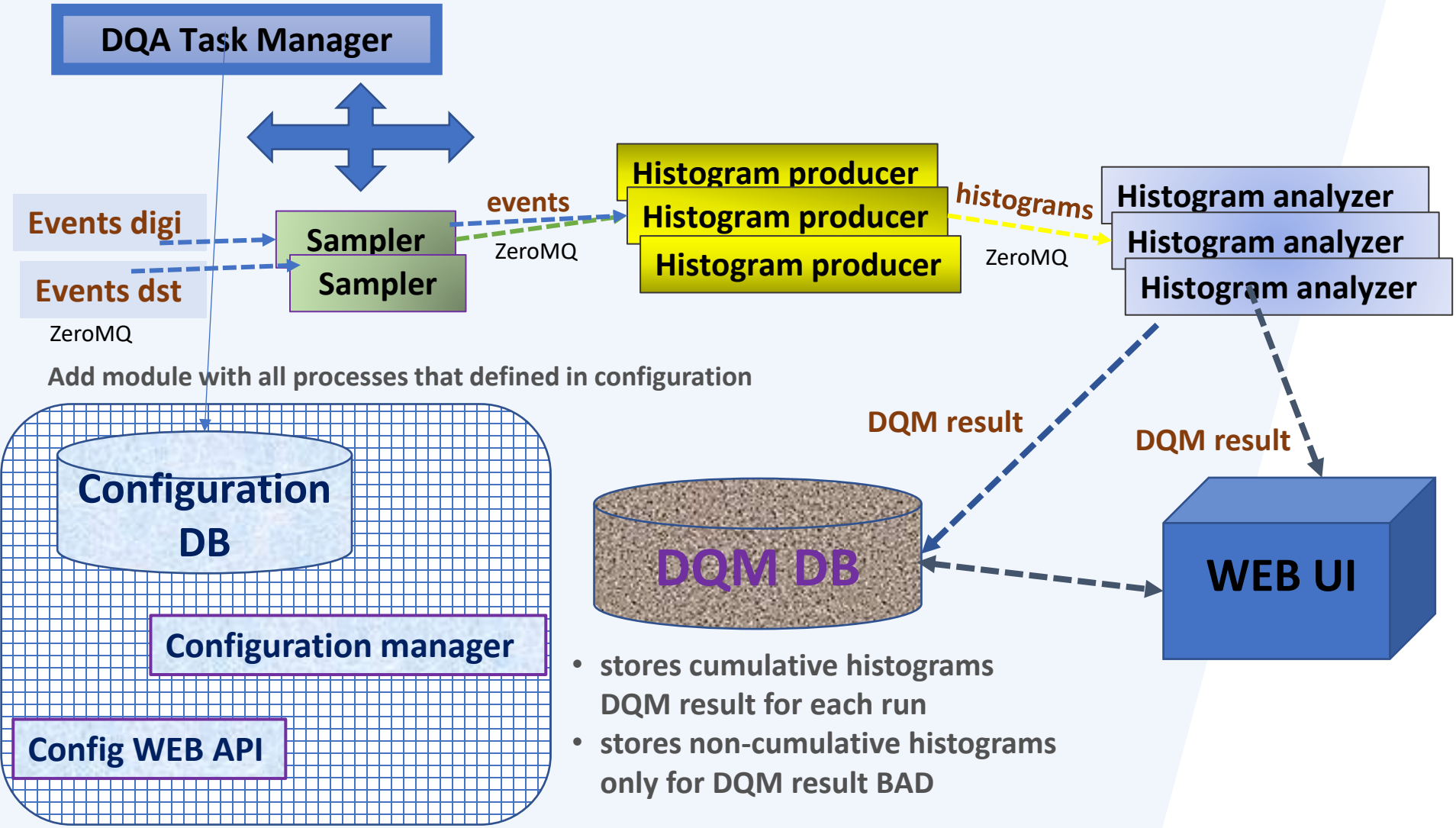
to provide control histograms in 3 modes:

- for online decoded and reconstructed data (online data monitoring)
- for qualitative assessment of new BmnRoot versions (after MRs)
- for manual run to check user versions of the software

Igor Alexandrov (14 May, 12:10)
Data quality monitoring and assurance system prototype: status of implementation

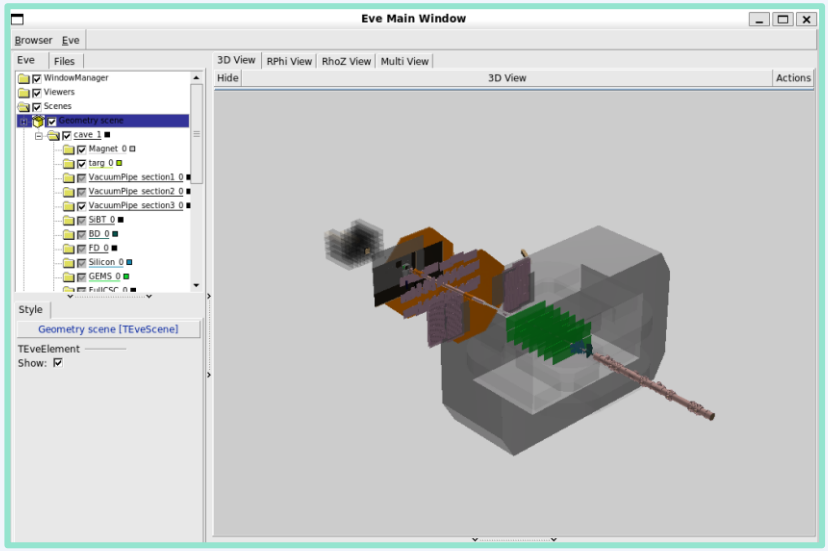


DQA Flow Diagram



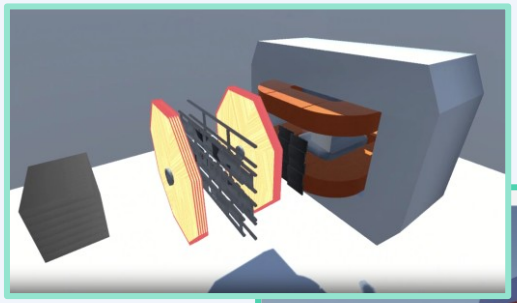
Event Display for the BM@N experiment

The Current Solution

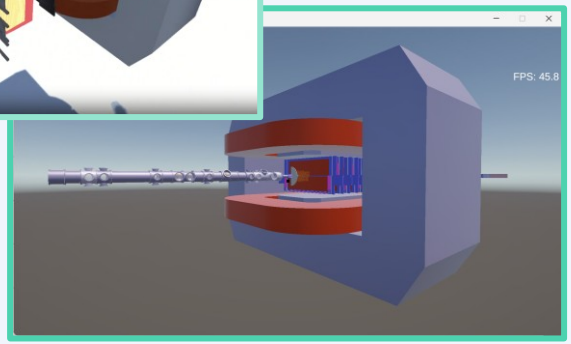


Event Display on Unity supporting VR & AR (SPbSU)

New Solutions from external teams



Anastasiia Iusupova



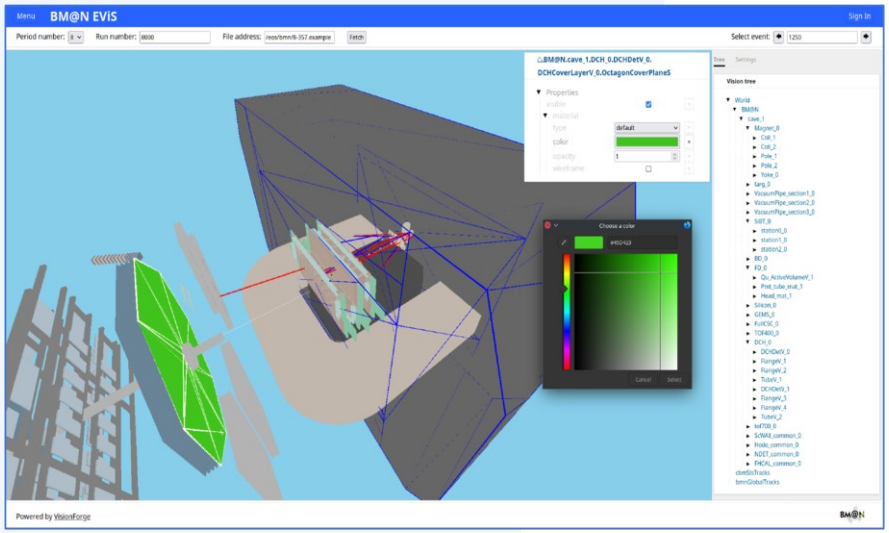
Konstantin Tukhvatulin (14 May, 10:45)
Visualization of BM@N experiment in Unity

The aim: to develop a new instrument for immersive visualization and analysis the BM@N detector and particle tracks.

Objectives:

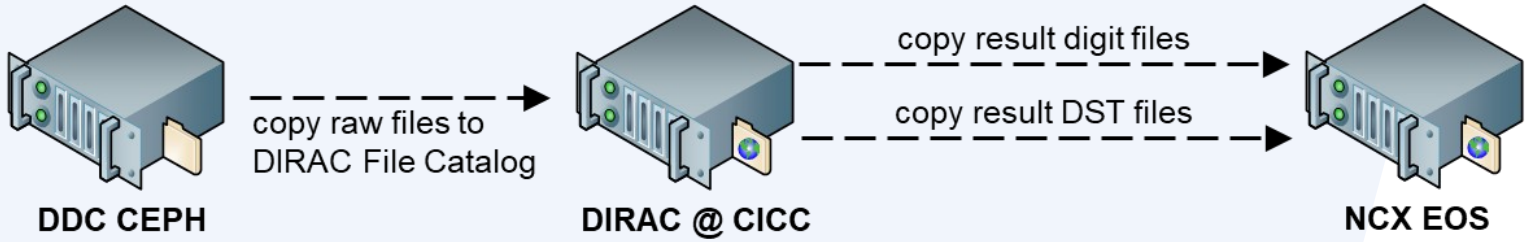
- Build an application for visualizing the BM@N detector geometry
- Import the ROOT geometry file of BM@N
- Implement basic functions for viewing and interaction with the detector
- Add particle track visualization
- Integrate VR support for immersive visualization

Next-Gen Event Display (MIPT) *Igor Dunaev* (14 May, 11:30)



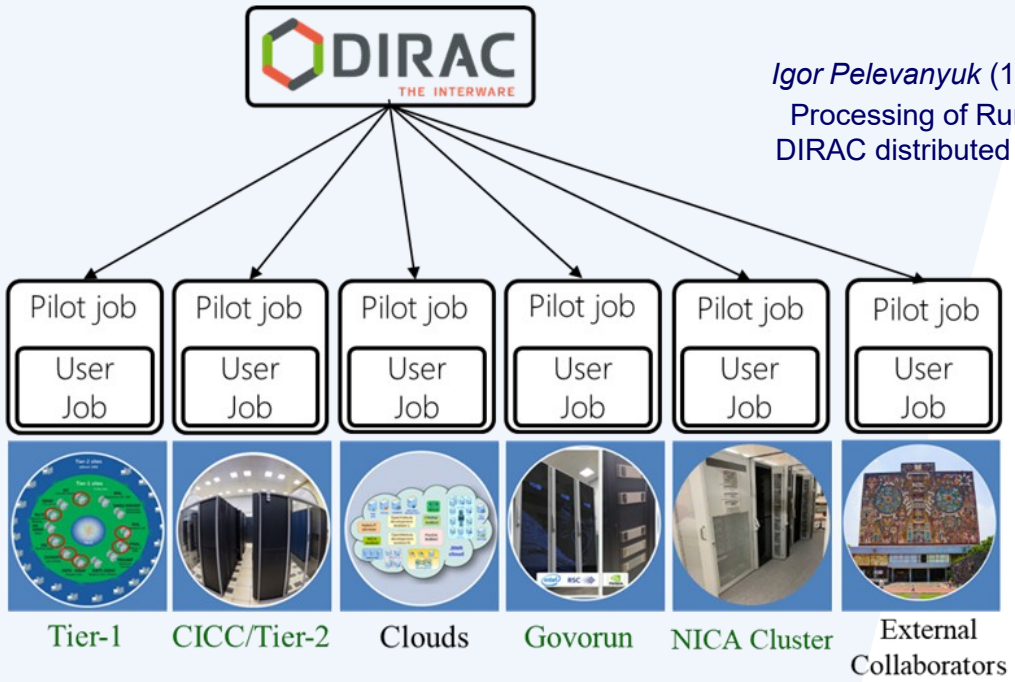
BM@N Data Processing with DIRAC

Run mass production of DIGIT and DST files for obtained raw files via DIRAC without writing run and raw file metadata to UniConDa: **BmnRoot tag 26.02.0**



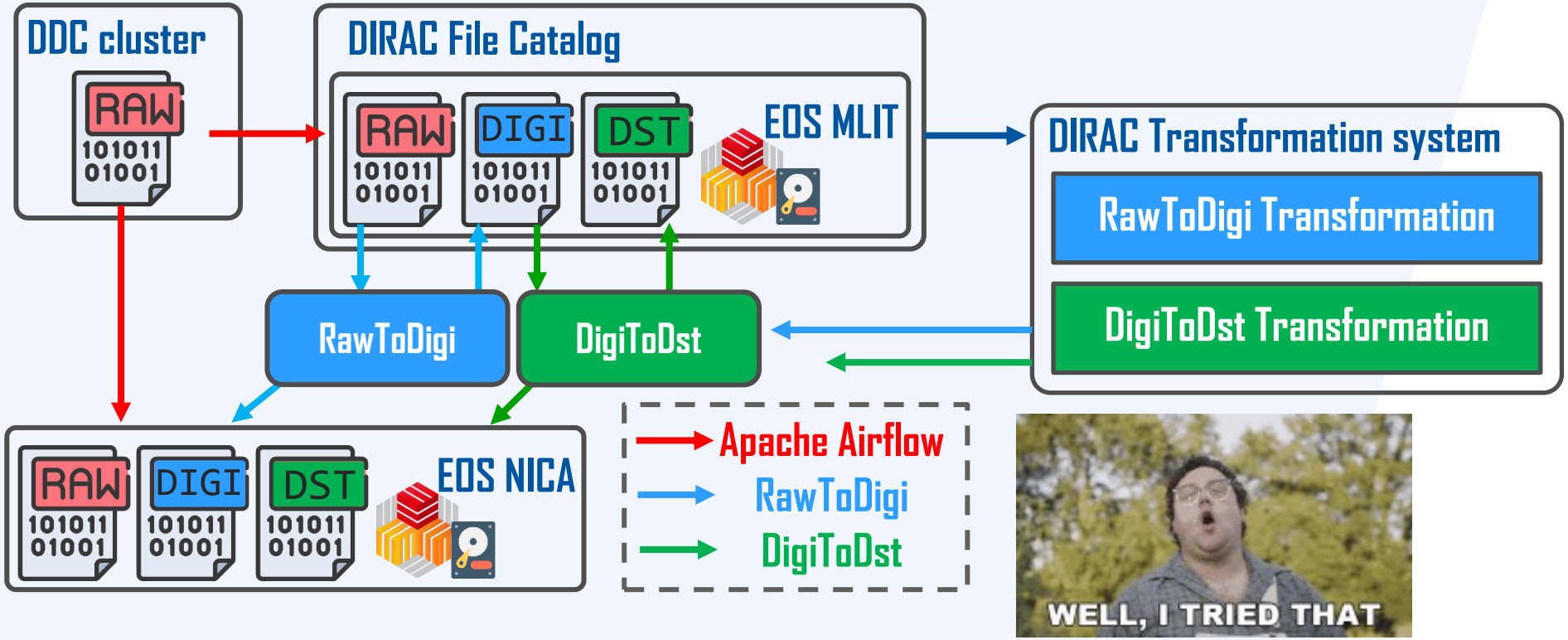
new directory structure
in *run9/beam* directory



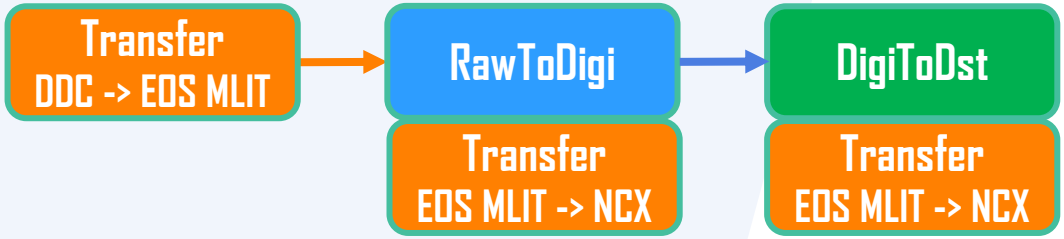


Igor Pelevanyuk (14 May, 09:30)
Processing of Run9 data on a DIRAC distributed infrastructure

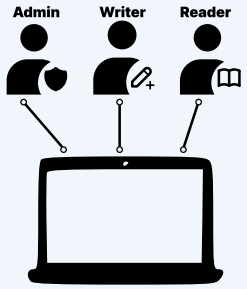
Automation with DIRAC during BM@N Runs

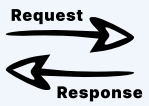


Simple cascade job initialization was used for the price of adding a delay between appearance of RAW files and initiation of processing

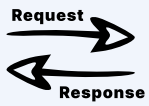


BM@N Production Request System







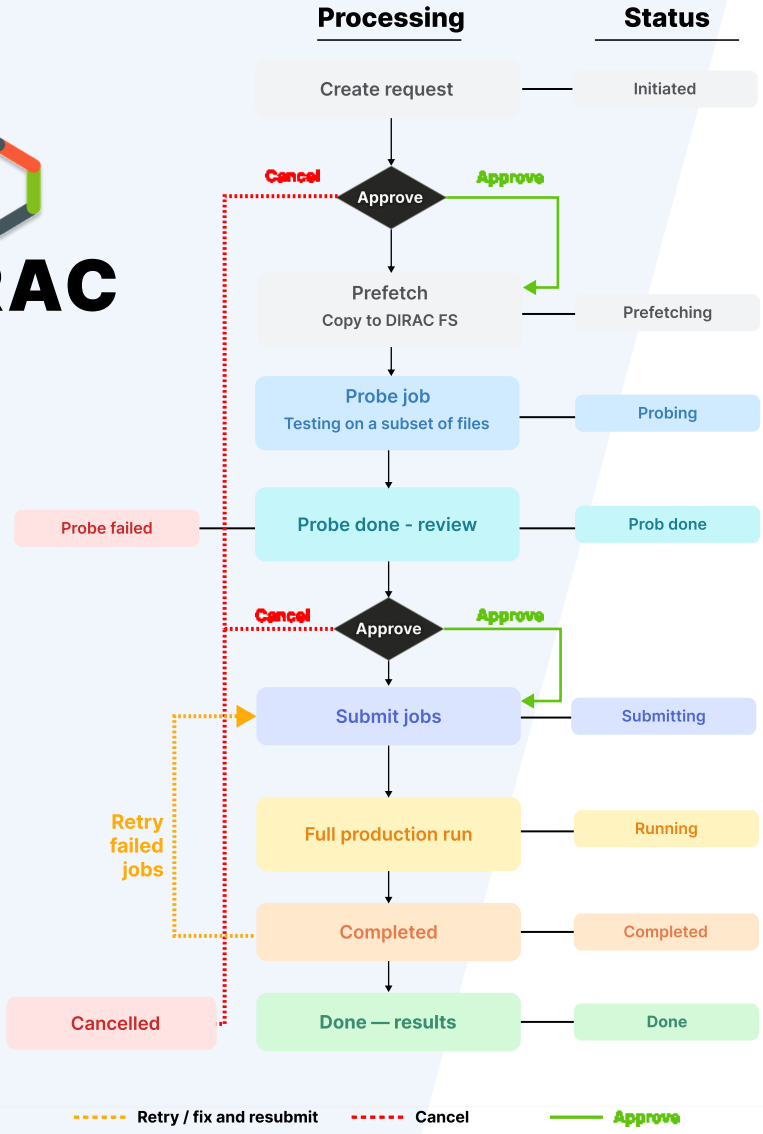


DIRAC



Alexander Chebotov (14 May, 14:00)
Development of the BM@N Production Request System for Mass Productions of Reconstructed Data

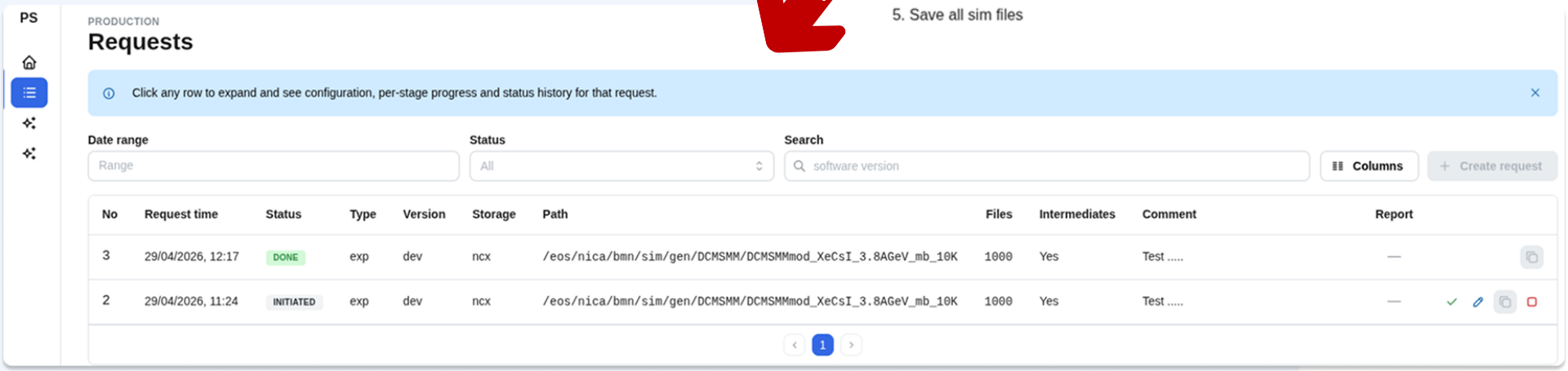
- Single entry point for official mass processing of BM@N experimental and simulated data
- Probe phase on a subset of files first
- Operator approves probes and productions
- Failed jobs of a production are restarted
- The request can be cancelled at any point



BM@N Production Request System

- Request: software version · dataset type · data location · file limit · additional info
- The system polls DIRAC and updates information on status, the current stage and numbers of processed & failed files





- Probe with a preliminary test before the main DST production
- Monitor in real time: status, current stage, number of processed/failed files
- Manage lifecycle: approve, cancel at any stage, restart failed jobs
- Browse full history: all requests and its parameters, status and final report

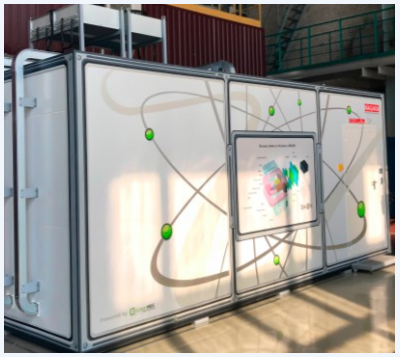
BM@N Computing Platforms

/bmn-daq-computing-center/

BM@N Online Cluster

ddc.jinr.ru

(LHEP, b.205)



bmn.jinr.int/nica-cluster/

NICA Cluster

ncx[101-106].jinr.ru

(LHEP, b.216)



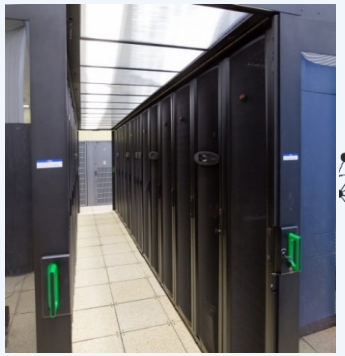
OS: AlmaLinux 9

bmn.jinr.int/micc-complex/

GRID Tier1&2 Centres

lxui.jinr.ru (CICC)

(MLIT, b.134)



OS: CentOS / Scientific Linux 7.9 (EOL in 2024)

bmn.jinr.int/hybrilit-govorun/

HybriLIT platform («Govorun» SC)

hydra.jinr.ru

(MLIT, b.134)



OS: AlmaLinux 9

Central Software Repository based on ***CVMFS*** for the experiment

CEPH: 8 PB (*BM@N+MPD*)
(*1.4x replica*)
CEPH (hot): 100 TB$_{ssd}$
SLURM: ≈**0** cores

EOS: 2.2 PB (*2x replica*)
NFS: **300 TB** (*for NICA*)
SLURM: ≈**1800** cores
(*for all NICA users*)

EOS: 4.5 PB (*2x replica*)
EOS CTA: **5 PB$_{tapes}$**
SLURM: 2500 cores
(*for all NICA users*)

ZFS: 200 TB
Lustre: **1.5 PB$_{ssd}$** (*for NICA*)
SLURM: *bmn* – **192** cores

BM@N software is deployed on *JINR CVMFS* for Centos 7 and AlmaLinux 9

Automatic software deployment of the BmnRoot package on CVMFS with *GitLab CI*

Data Storages for BM@N

Cold Data Storages

DAQ Data Center

ceph

*for BM@N **online** (4 PB)*

*build on HDD with SSD buffer, **0 TB free***

NICA cluster

EOS

*for BM@N **offline** (2.2 PB)*

*build on HDD, **1.6 PB free***

MLIT MICC

EOS

*for BM@N **offline** (4.5 PB)*

*build on HDD , **1.2 PB free***

BM@N Storage Strategy

- DDC Ceph storage: **total *raw*** data
- NCX EOS storage: total *gen*, *digit* & *DST*
- MLIT EOS storage: **operative *raw*** data (3 runs) & total *gen*, *digit* and *DST*
- MLIT Tape storage: **total *raw*** data & *gen*



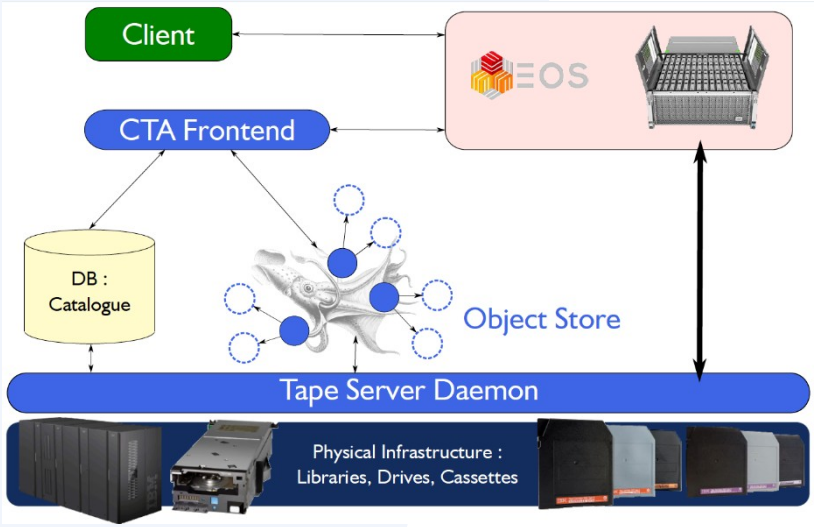
Archival Tape Storage for BM@N

MLIT Tape Storage for NICA using EOS CTA

- Advantages: long lifespan, cost of use, energy efficiency, security, but slow access times and additional actions are needed to get the stored data
- A long-term storage for BM@N to store *raw* and *gen* data. An important element of the BM@N *raw* data storage strategy:

  2 locations (CEPH@online + MLIT CTA) ↔
  2 types of storage (HDD + Tapes)
- *Online raw data backup* to tapes via Workflow Management System on Apache Airflow
- **5 PB**$_{\text{tapes}}$ are allocated for BM@N

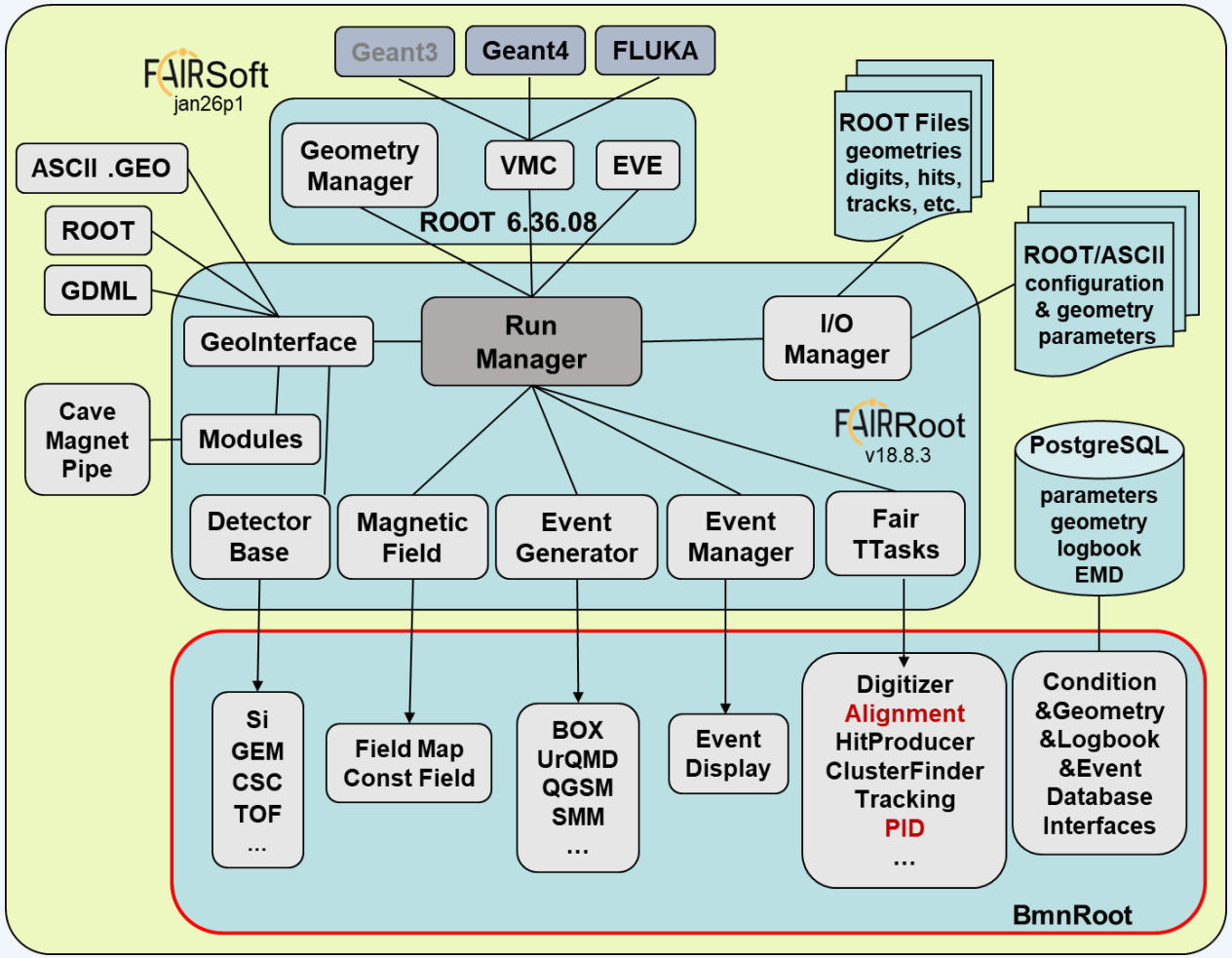




BmnRoot. *Production Tag 25.09.0*

FairSoft jan26p1 FairRoot v18.8.3

- FairSoft jan26p1 (with ROOT 6.36.08) and FairRoot v18.8.3 are used now
- FairRoot v19.0.1 is available but requires new compilation approach in BmnRoot



- BmnRoot tag 26.02.0 has been used and DST production has been finished using DIRAC
- macro/raw/BmnDataToRoot.C was moved to macro/run/**run_raw_bmn.C**
- *SplitDcmsmm.C* macro was added to split DCM-SMM files
- bash vars *UNICONDA_USERNAME* & UNICONDA_PASSWORD (as well as ELOG_USERNAME, ELOG_PASSWORD) is first used for the connection
- Period number is extracted from geometry, used by digitizers and written to MC digit- and dst-files
- Geometry Database is fully integrated into sim and reco
- Geometry tag is recorded to FairGeoParSet::description field
- Clang-format will be applied before the next BmnRoot tag for the whole project

Current BmnRoot Issues

- ✓ Obsolete PROOF has been removed from BmnRoot
- ✓ ROOT 6.32+ does not support Pythia6 anymore
- ✓ Raw Data Decoder should be checked because of incorrect run and raw file metadata
- ✓ The current BM@N geometry is not passing standard ROOT tests because of several overlaps
- ✓ Pure BmnRoot (from GitLab) takes up 1050 MB of disk space, where “bmnroot/input/” ≈ 700 MB (mostly, magnetic field files) and “bmnroot/parameter/” ≈ 100 MB
- ✓ BmnRoot manual should be updated, documentation on data file structure is necessary
- ✓ The task of generating Doxygen documentation for BmnRoot classes is still open
- ✓ SRC information will be removed from the BM@N databases → not done yet
- ✓ No separation of short summary output (by default) from debug output for individuals
- ✓ BmnRoot macros must contain common logic and parameters → all macros check failed
- ✓ Implement cleaning duplicates in $PATH, $LD_LIBRARY_PATH... lines in *config.sh* because of multiple rebuilding BmnRoot (adding the same variables to old ones in *config.sh*)
- ✓ It is needed to correct memory leaks, error and warning messages, temporary files, core.xxx dumps, all_XXX.par files, LOG(info) messages from FairRoot …

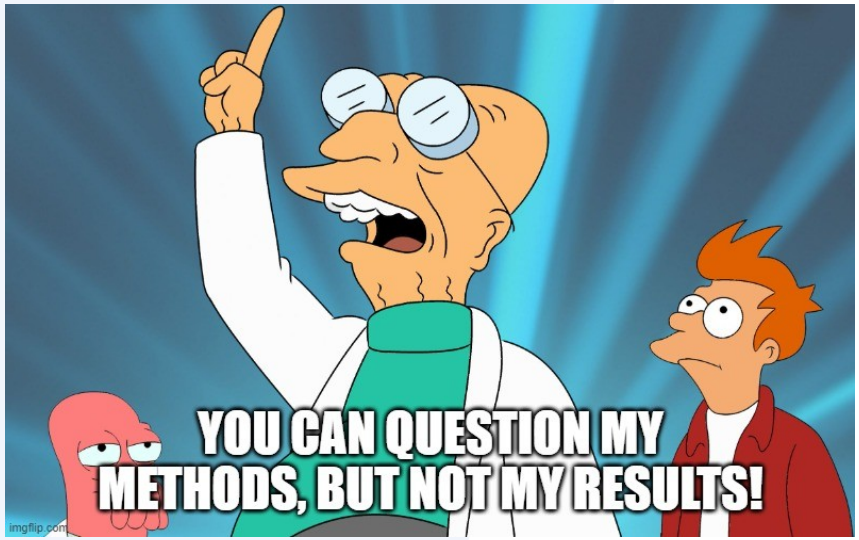
New methods for BM@N Detector Alignment

- Alignment algorithm utilizing the ROOT framework:
  - Millepede-like dimension-reduction scheme
  - iterative procedure for the non-linear measurement model with Levenberg–Marquardt regularization
  - arbitrary linear equality constraints using Lagrange
- Alignment quality evaluation criteria based on further physical analyses requirements
- Preliminary computational results of the Run-8 alignment
- Preliminary investigation of PyTorch as an alternative framework for the alignment algorithm implementation

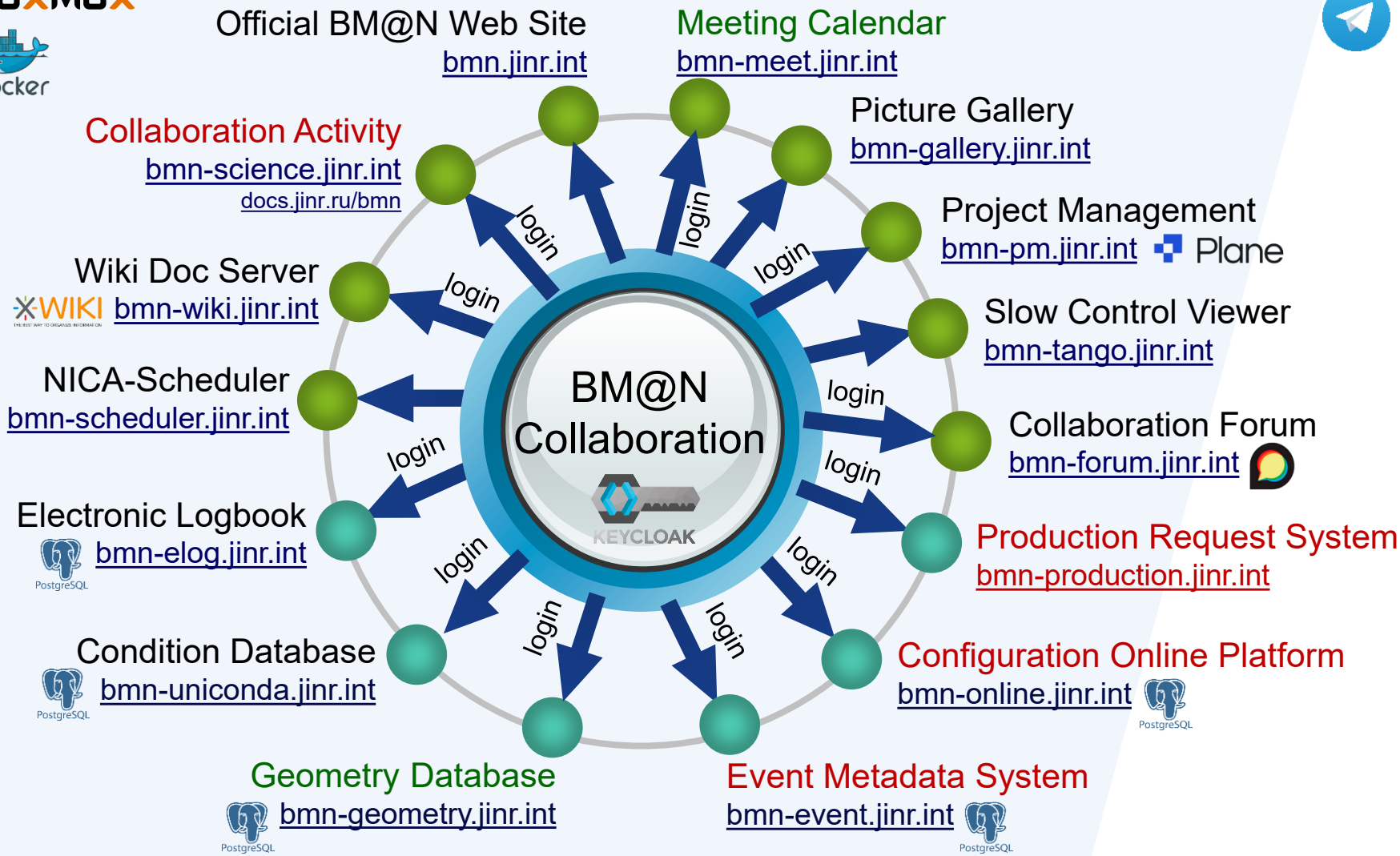
Igor Polev (14 May, 10:25)
Geometry alignment of the BM@N detectors: new approach

$$\begin{bmatrix} x_m \\ y_m \\ \tilde{z}_i \end{bmatrix} = R_{zyx}(i) \begin{bmatrix} x \\ y \\ z - \tilde{z}_i \end{bmatrix} + \begin{bmatrix} \delta x_i \\ \delta y_i \\ \delta z_i + \tilde{z}_i \end{bmatrix}, \quad R_{zyx}(i) = \begin{bmatrix} 1 & -\psi_i & \theta_i \\ \psi_i & 1 & -\phi_i \\ -\theta_i & \phi_i & 1 \end{bmatrix}$$

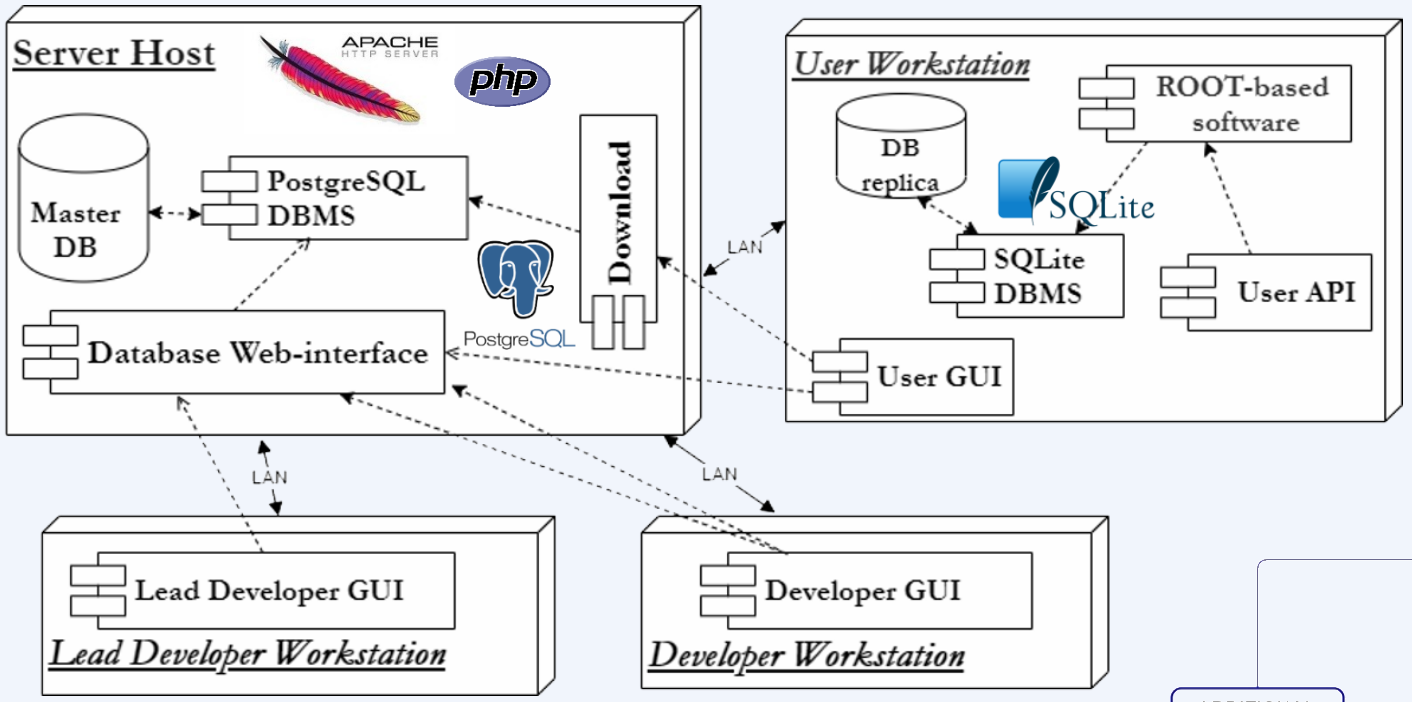
$(x_m,\ y_m)^T$: measured coordinates of the hit;
$\tilde{z}_i$: nominal z position of the i-th detector element;
$x,\ y,\ z$: true coordinates of the hit in the laboratory coordinate system;
$R_{zyx}(i)$: linearized combined rotation matrix for the i-th detector element;
$\delta x_i,\ \delta y_i,\ \delta z_i$: shifts of the i-th detector element along the X, Y, Z axes;
$\phi_i,\ \theta_i,\ \psi_i$: sines of the i-th detector element rotation angles around X, Y, Z;
a_i : alignment parameters of the i-th detector element;
$a_i = (\delta x_i,\ \delta y_i,\ \delta z_i,\ \phi_i,\ \theta_i,\ \psi_i)^T$.



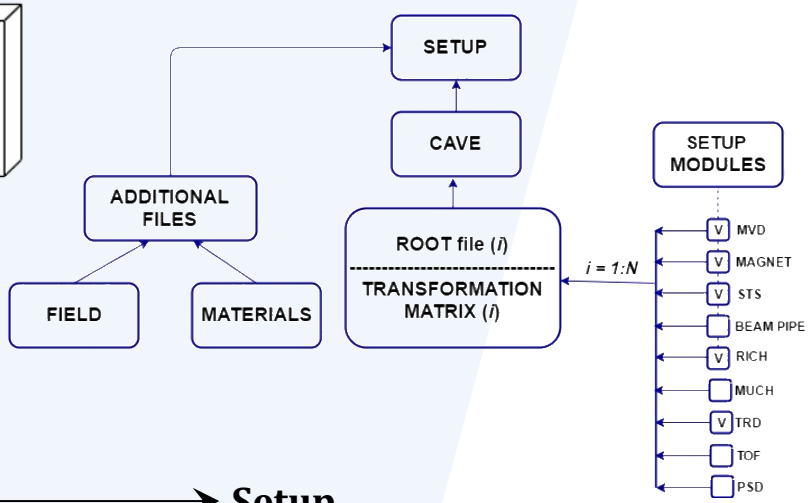
BM@N Software Ecosystem



Geometry Information System. *Architecture*



3 Roles
Lead Developer
Developer
User (Reader)



Evgeny Alexandrov (14 May, 11:50)
Completion of the Geometry and Online Configuration Systems

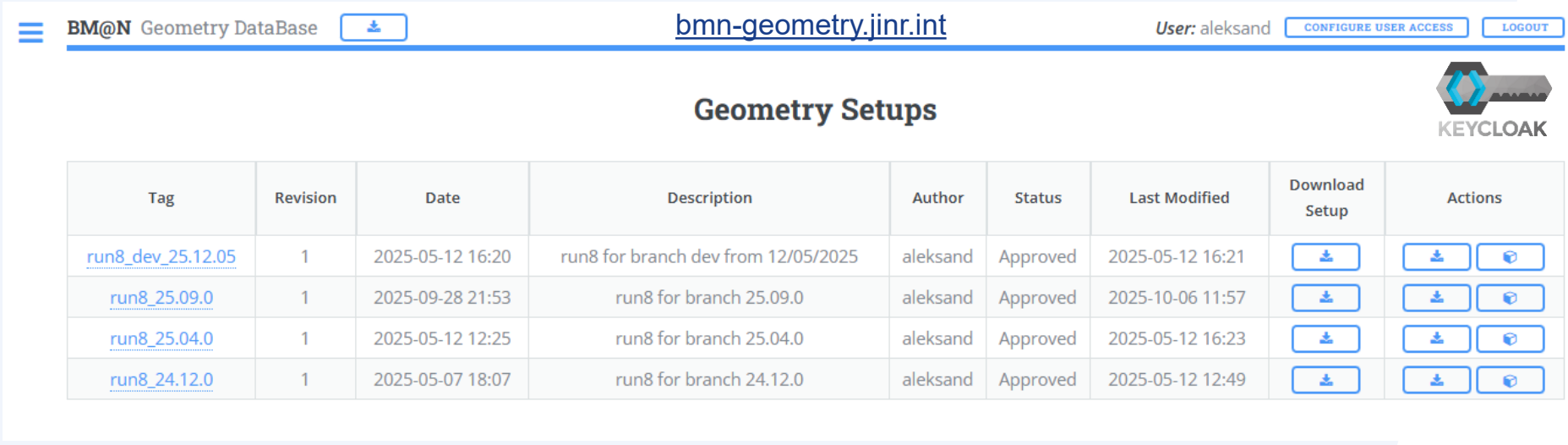
Geometry Module → **Setup Module** → **Setup**

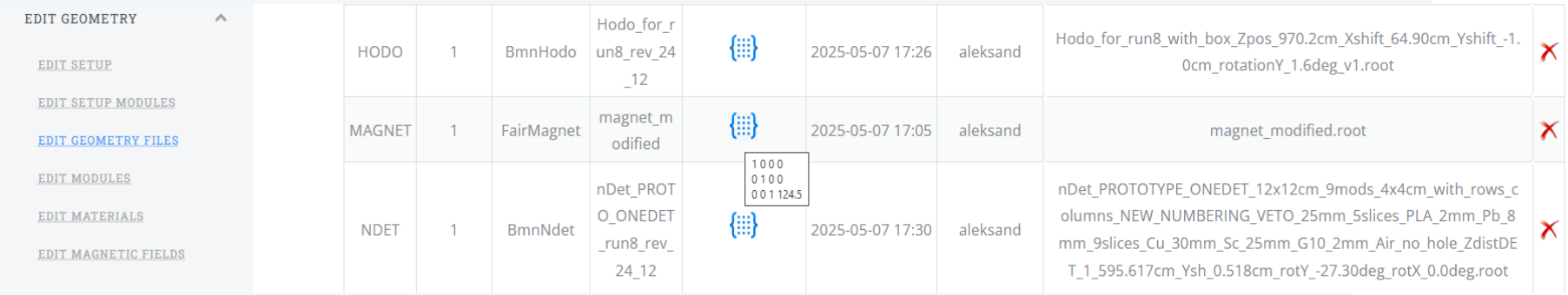
File in the ROOT format containing a detector geometry

Geometry module + link to the parent geometry module + its placement in the parent module

Combination of setup modules, which represents the full setup geometry

Geometry Information System. *Web Platform*





BM@N Geometry Database has filled with the setup geometries for Run 8 (production and dev geometries) and Run 9 (prod+dev)

User Interface Functions:

View Add Edit Approve Download

Geometry Information System. *BmnRoot*

Geometry API provides a set of public functions of the *GeoSetup* class intended for selecting and loading a required setup geometry and its components into the ROOT-based software of the experiment to perform simulation, reconstruction and physics analysis tasks

run_sim_bmn.C

```
// Set the BM@N geometry from the Geometry Database
GeoSetup gSetup;
int errStatus = gSetup.LoadSetupToFairRunSim("run8_dev_25.11.01");
```

run_reco_bmn.C

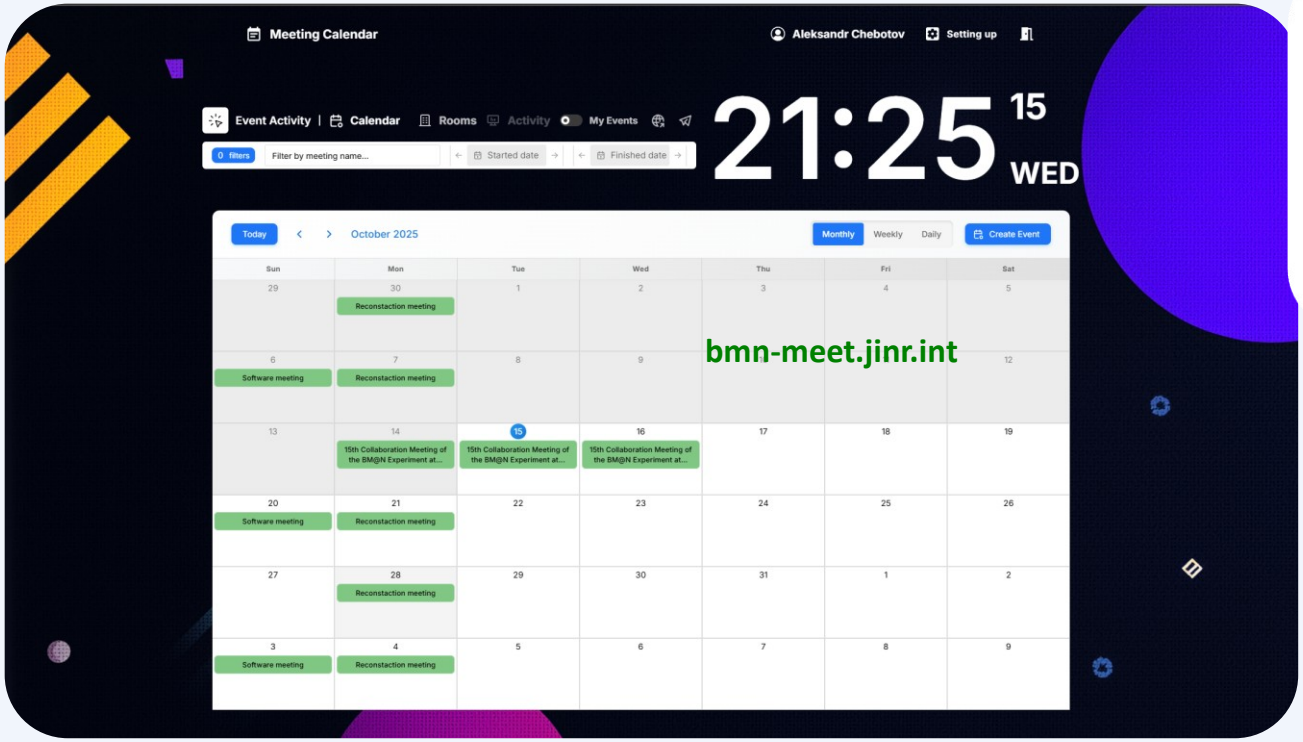
```
// get geometry for run
GeoSetup gSetup;
int errStatus = gSetup.LoadSetupToGeoManager("run9_dev_26.04.07");
if (errStatus != 0)
    LOG(fatal) << "Geometry not loaded. Error status " << errStatus << endl;
// TString run_tag(gSetup.GetLastApprovedSetupTag(TString::Format("run%d", run_period)));
```

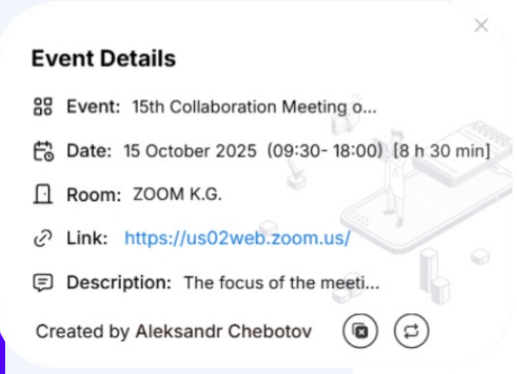
```
int LoadSetupToGeoManager(string_view setup_tag);  // 0 - loaded, !=0 – error code
int LoadSetupToFairRunSim(string_view setup_tag);     // 0 - loaded, !=0 – error code

FairField* GetMagneticField(double scale = 0);   // nullptr – no field
string_view GetParameterFile(string_view detector_name);  // "" – no parameter file

string_view GetLastApprovedSetupTag (string_view tag_prefix);  // "" – no setup found
```

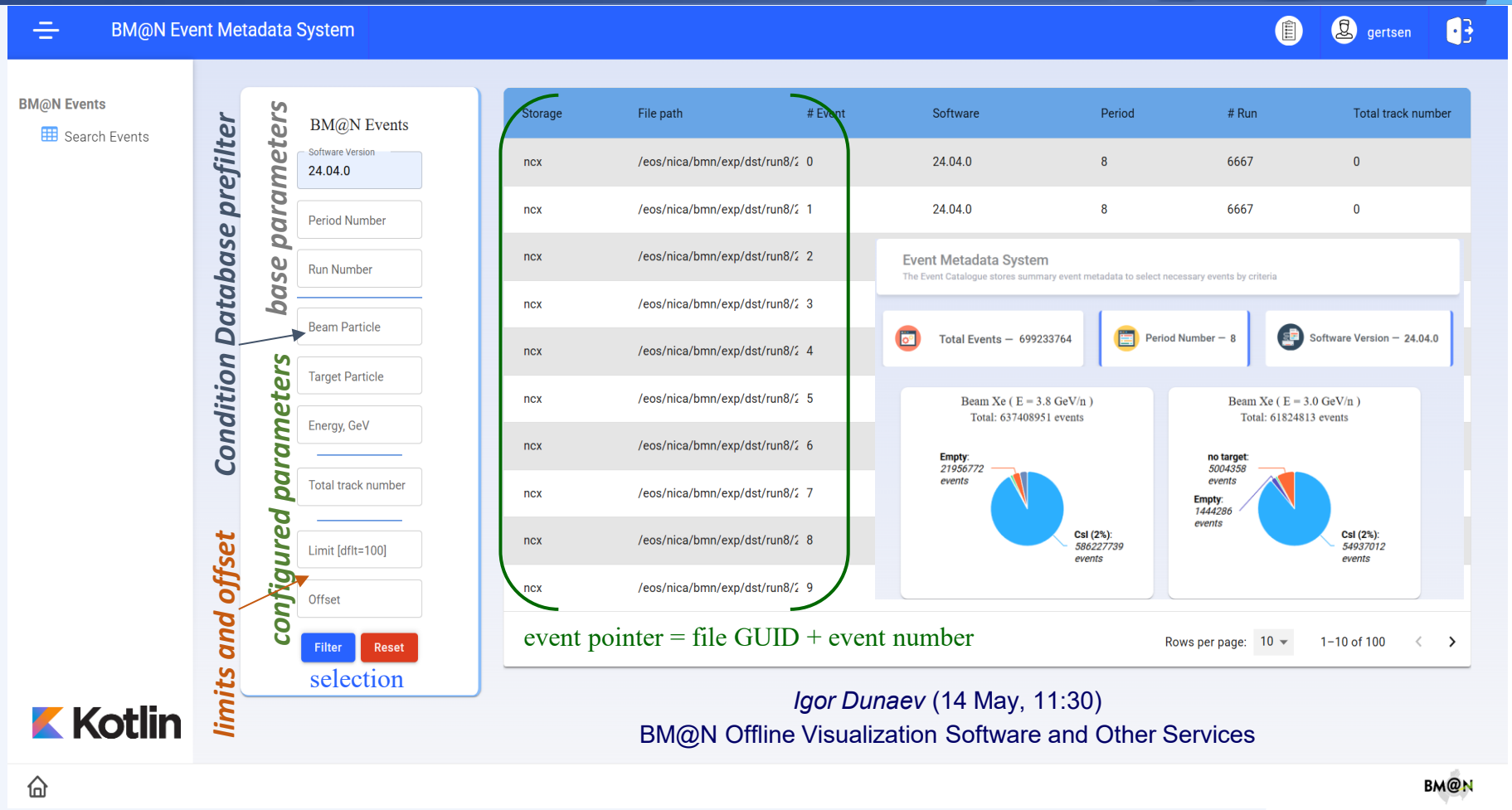
BM@N Official Meeting Calendar







BM@N Event Catalogue

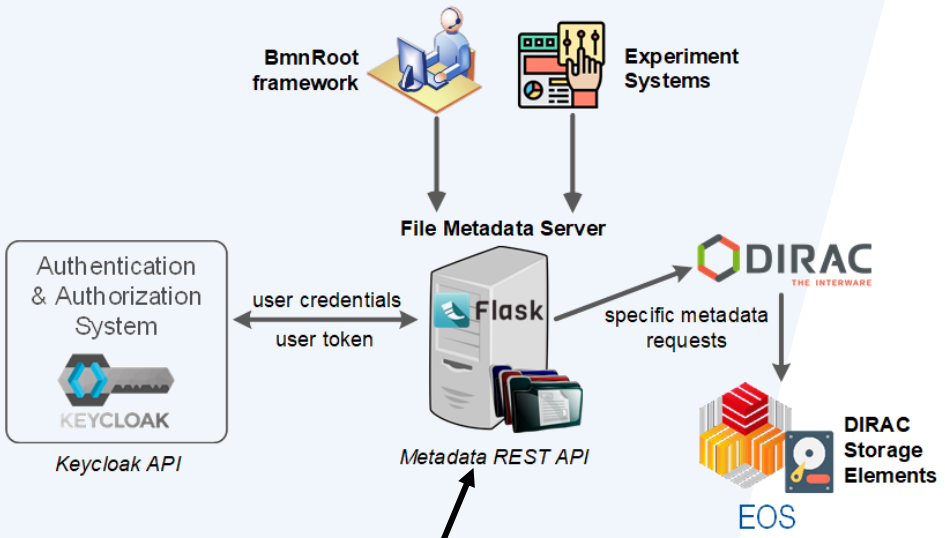


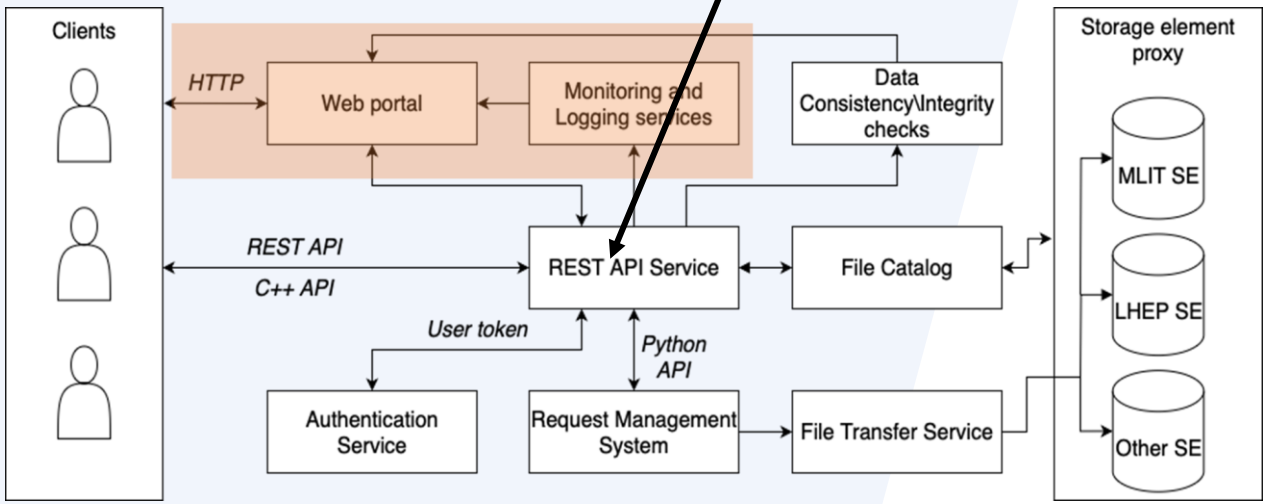
Igor Dunaev (14 May, 11:30)
BM@N Offline Visualization Software and Other Services

- enables users to browse and quickly search for event metadata stored in the Event Catalogue and retrieve events, which satisfy given parameters
- provides events according to the selected event metadata and run metadata of the Condition Database

Data Management System for BM@N

- DIRAC File Catalog (DFC) is maintaining a single global logical name space
- A user sees it as a single catalogue with additional features
- DataManager is a single client interface for logical data operations
- DIRAC File Catalog hosts file metadata

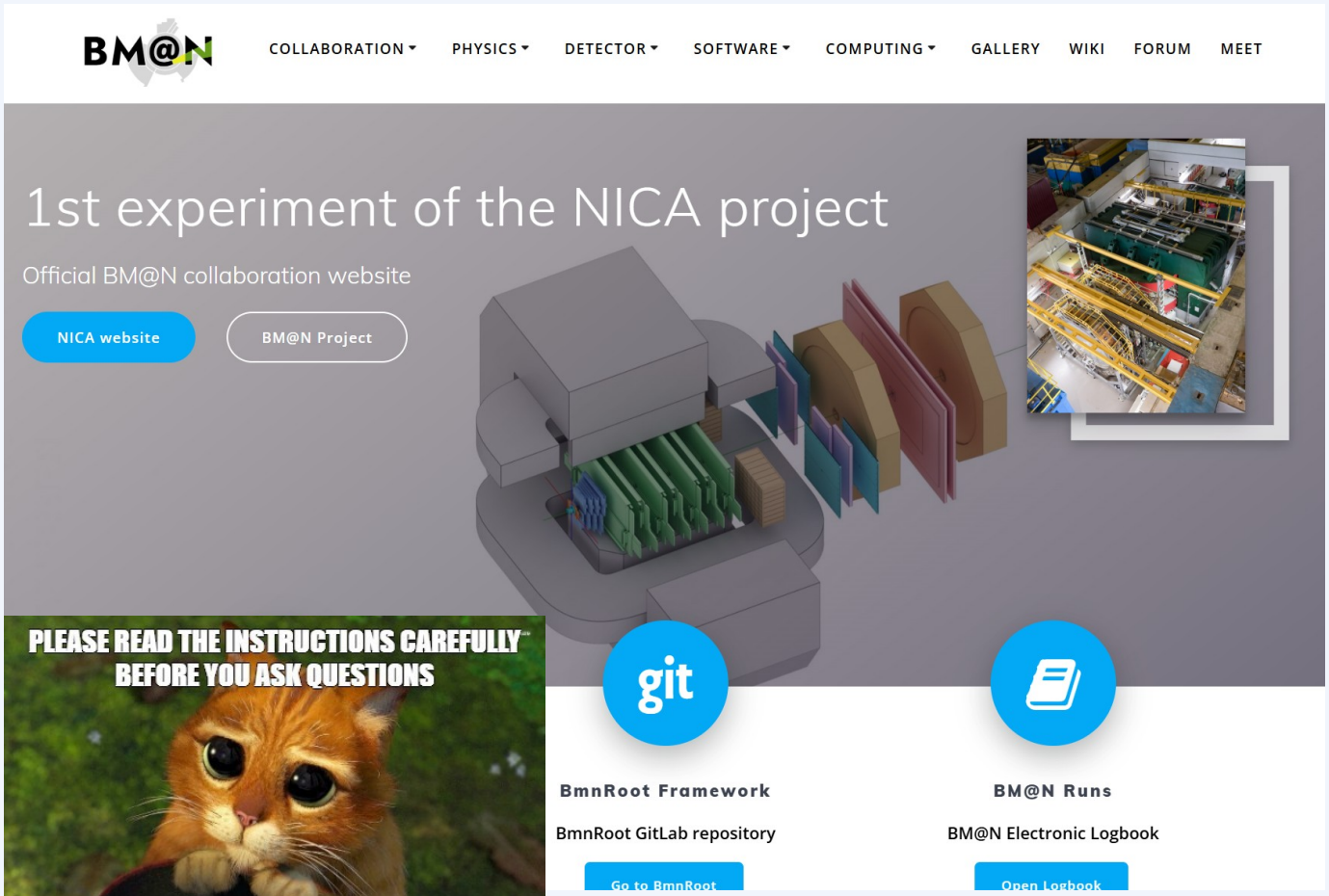




BM@N DFC Metadata:

- **period and run number**
- **start and end datetime**
- **beam and target particles**
- **run type**
- **energy**
- **magnetic field**
- **start and end event number**
- **event count**
- **file size**

Official BM@N Web-site at *bmn.jinr.int*



- ✓ ***Collaboration***
- ✓ ***Information***
- ✓ ***Documents***
- ✓ ***Software***
- ✓ ***Databases***
- ✓ ***Computing (NICA Cluster, MICC Complex, HybriLIT & Govorun)***
- ✓ ***Guides, Manuals***
- ✓ ***Wiki-docs***
- ✓ ***Forum***
- ✓ ***Gallery***
- ✓ ***News***
- ✓ ***Mail-lists***
- ✓ ***etc.***

Thank you for your attention!



Happy International
Chihuahua Appreciation Day