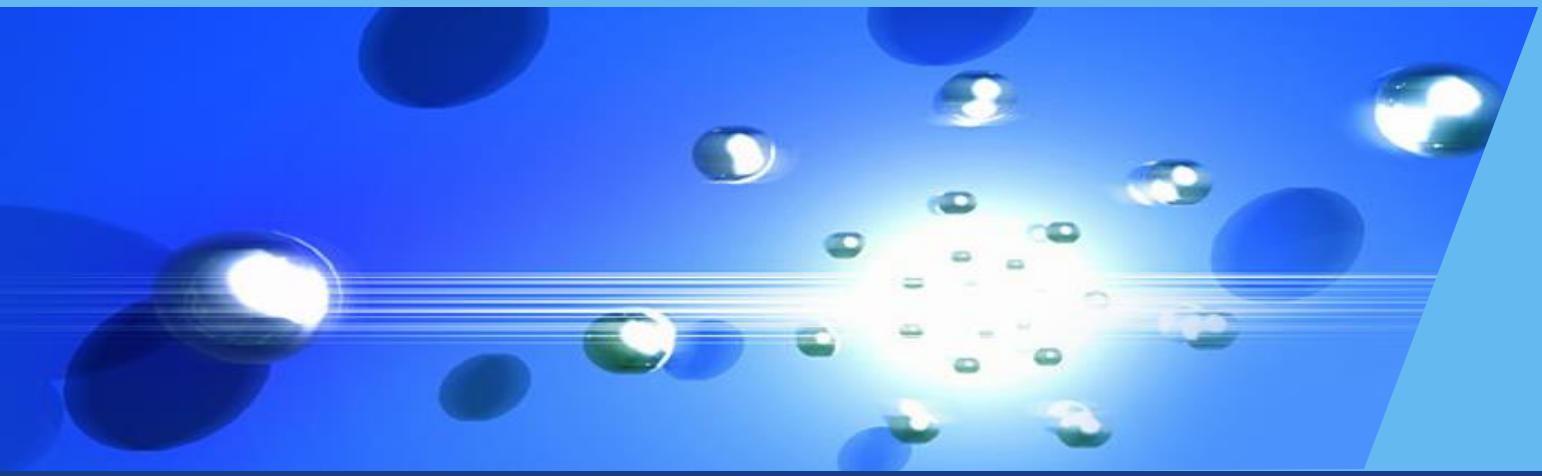


BM@N Software Development. Summary of the Software Section.

Konstantin Gertsenberger
Veksler and Baldin Laboratory of High Energy Physics, JINR, Dubna

BM@N Collaboration

11 *Countries,* ***21*** *Institutions,* ***234*** *participants*

spokesperson – ***M. Kapishin****,* ***JINR***

technical coordinator – ***A. Maksimchuk****,* ***JINR***

University of Plovdiv, ***Bulgaria;***
University of Chinese Academy of Sciences, UCAS, ***China;***
Shanghai Institute of Nuclear and Applied Physics, ***China;***
Tsinghua University, Beijing, ***China;***
Nuclear Physics Institute CAS, ***Czech Republic;***
CEA, Saclay, ***France;***
Tubingen University, ***Germany;***
TU Darmstadt & GSI (Consortium), ***Germany;***
*Tel Aviv University****,*** ***Israel;***
Almaty Institute of Physics & Technology, ***Kazakhstan;***
Institute of Applied Physics, ***Moldova;***
University of Wroclaw, Wroclaw, ***Poland****;*
Warsaw University of Technology, ***Poland;***
Institute of Nuclear Research RAS, ***Russia;***
Institute of Theoretical & Experimental Physics, NRC KI, ***Russia;***
Joint Institute for Nuclear Research;
*Joint Institute for Nuclear Research, Laboratory of Information Technologies****;***
NRC Kurchatov Institute, ***Russia;***
*Moscow Engineer and Physics Institute****,*** *MEPhI, Moscow,* ***Russia;***
Moscow Institute of Physics and Technology, Moscow, ***Russia;***
Skobeltsin Institute of Nuclear Physics, MSU, ***Russia;***
Massachusetts Institute of Technology, ***USA.***

MIPT contribution to BM@N software

Head of the MIPT group: Tagir AUSHEV



Current BM@N Software Activity:

- GUI for the NICA-Scheduler
- Slow Control Data Visualization
- Next Generation Event Display



Alexander NOZIK (14 October 9:00)
MIPT contribution in BM@N software systems: visualization and web-services

JINR LIT participation in BM@N software

Director, LIT JINR: Vladimir V. KORENKOV

Andrey DOLBILOV: Computing Infrastructure for the NICA experiments

Nikita BALASHOV: GitLab Services for BmnRoot

Irina FILOZOVA, Igor ALEXANDROV, Evgeniy ALEXANDROV: Geometry Database for the BM@N experiment

Dmitriy PODGAYNY (Head of the HybriLIT team), Oksana STRELTSOVA, Maksim ZUEV: HybriLIT and SC Govorun support

Danila OLEYNIK, Artem PETROSYAN: BM@N WorkFlow implementation

BM@N in Nuclotron Runs (2015 – 2018)

Nuclotron Run 51 (d,C)		*Feb. 22 – Mar. 15,* ***2015***
Nuclotron Run 52 (d)		*June 29 – June 30,* ***2016***
Nuclotron Run 53 (d, $d^{\uparrow}$)	***Technical*** ***interaction rate: 5 KHz***	*Dec. 9 – Dec. 23,* ***2016***
Nuclotron Run 54 (C)		*Mar. 7 – Mar. 18,* ***2017***
Nuclotron Run 55 (C,Ar,Kr)	***Technical + Physics*** ***interaction rate: 10 KHz***	*Mar. 3 – Apr. 05,* ***2018***

- Beams: deutron (4 AGeV), C^{12} (3.5–4.5 AGeV), Ar (3.2 AGeV), Kr (2.4, 3.0 AGeV)
  Targets: C, Cu, Pb, Al, Sn, C_2H_4, H_2 or empty
- Trace beams, measure beam profile and time structure
- Test integrated DAQ, T_0 and Trigger system
- Detectors: MWPC, Si, GEM, ToF-400, DCH-1, DCH-2, ToF-700, ZDC, ECAL, LAND
- Detect min bias beam-target interactions to reconstruct hyperons, identify charged particles and nucleus fragments

Data Collected in Run 7 (Nucl. Run 55)

Main BM@N program:

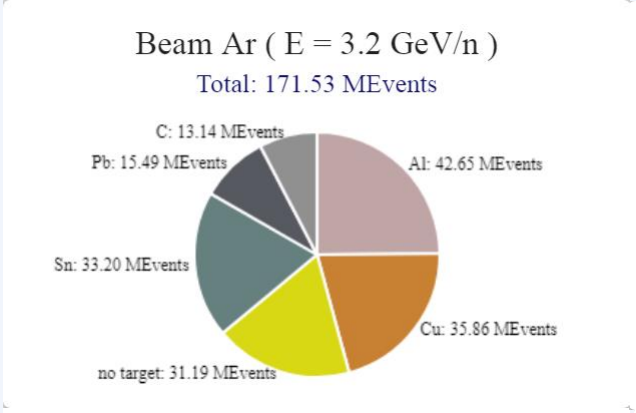
One beam energy available for Ar-beam and three for Kr-beam

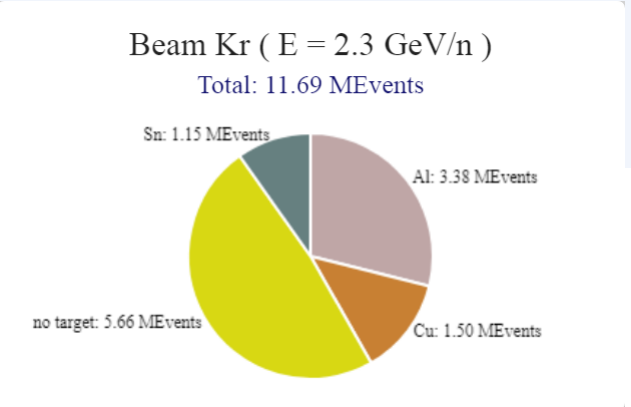
Wide set of targets used: (*C*; *Al*; *Cu*; *Sn*; *Pb*)

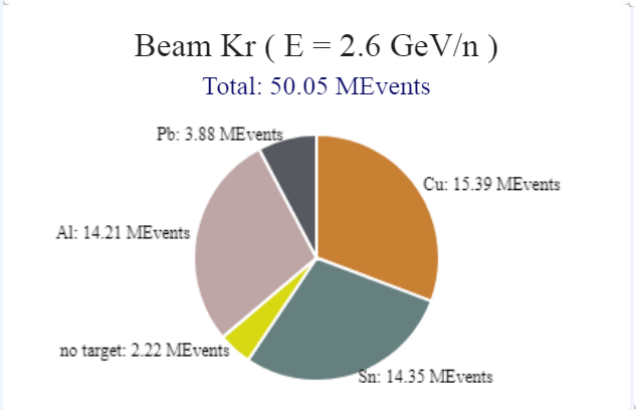
BM@N SRC program:

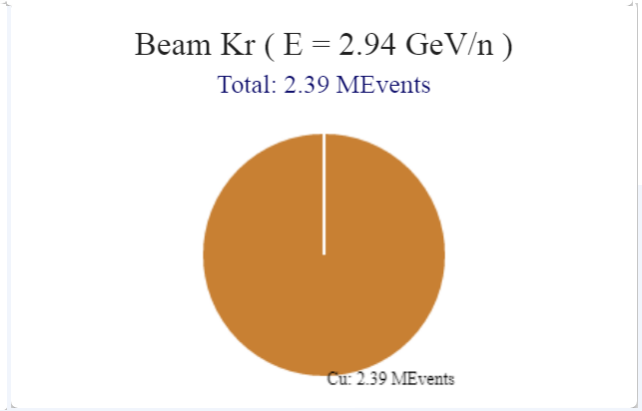
One beam energy available for C-beam

More than half of the collected statistics can be used for SRC analysis

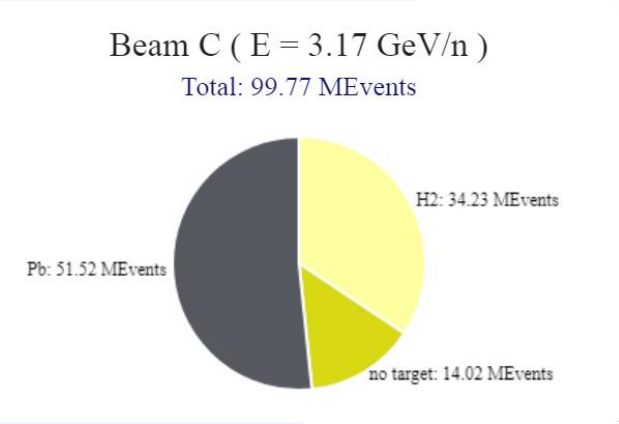








BM@N



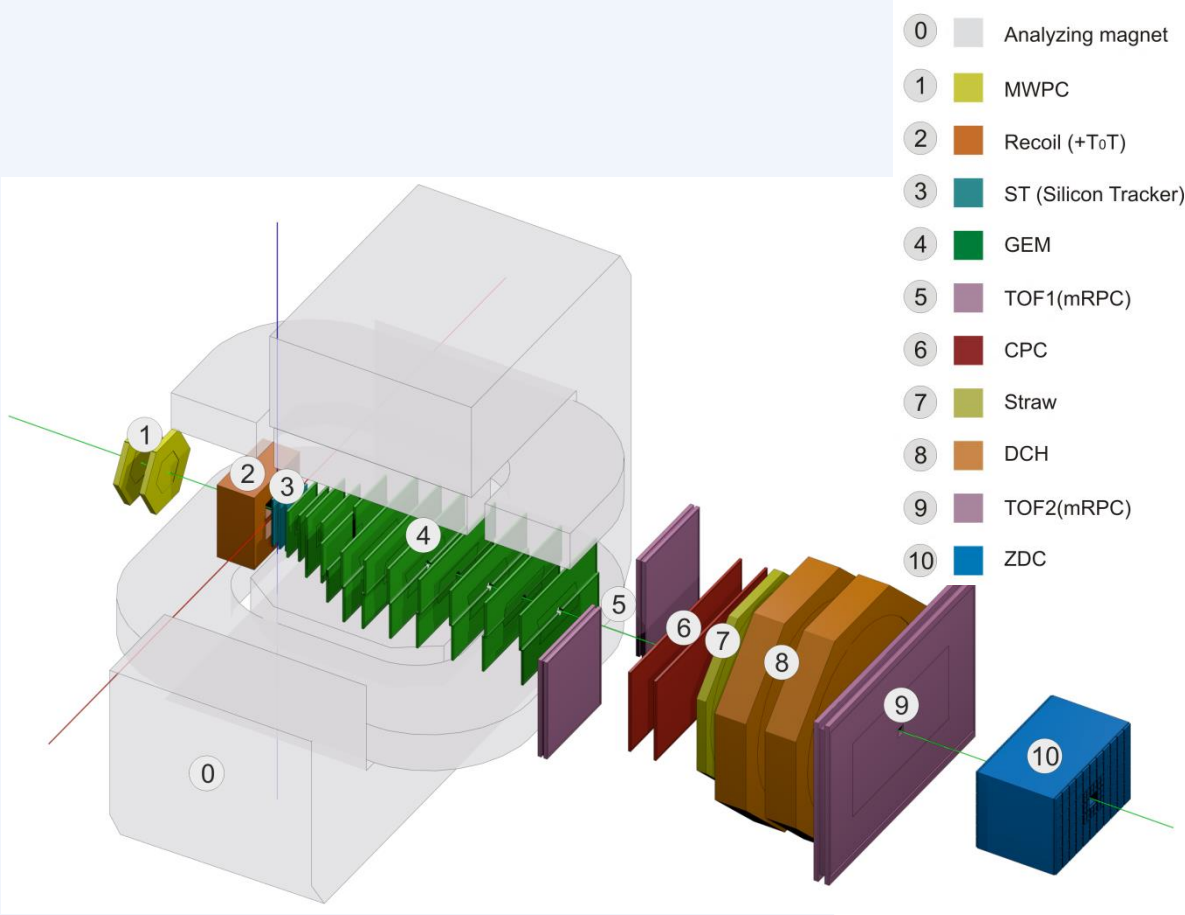
SRC

BmnRoot Environment

BmnRoot Framework

The software BmnRoot is developed for event simulation, reconstruction of experimental or simulated data and following physics analysis of collisions of elementary particles and ions with a fixed target at the BM@N facility.

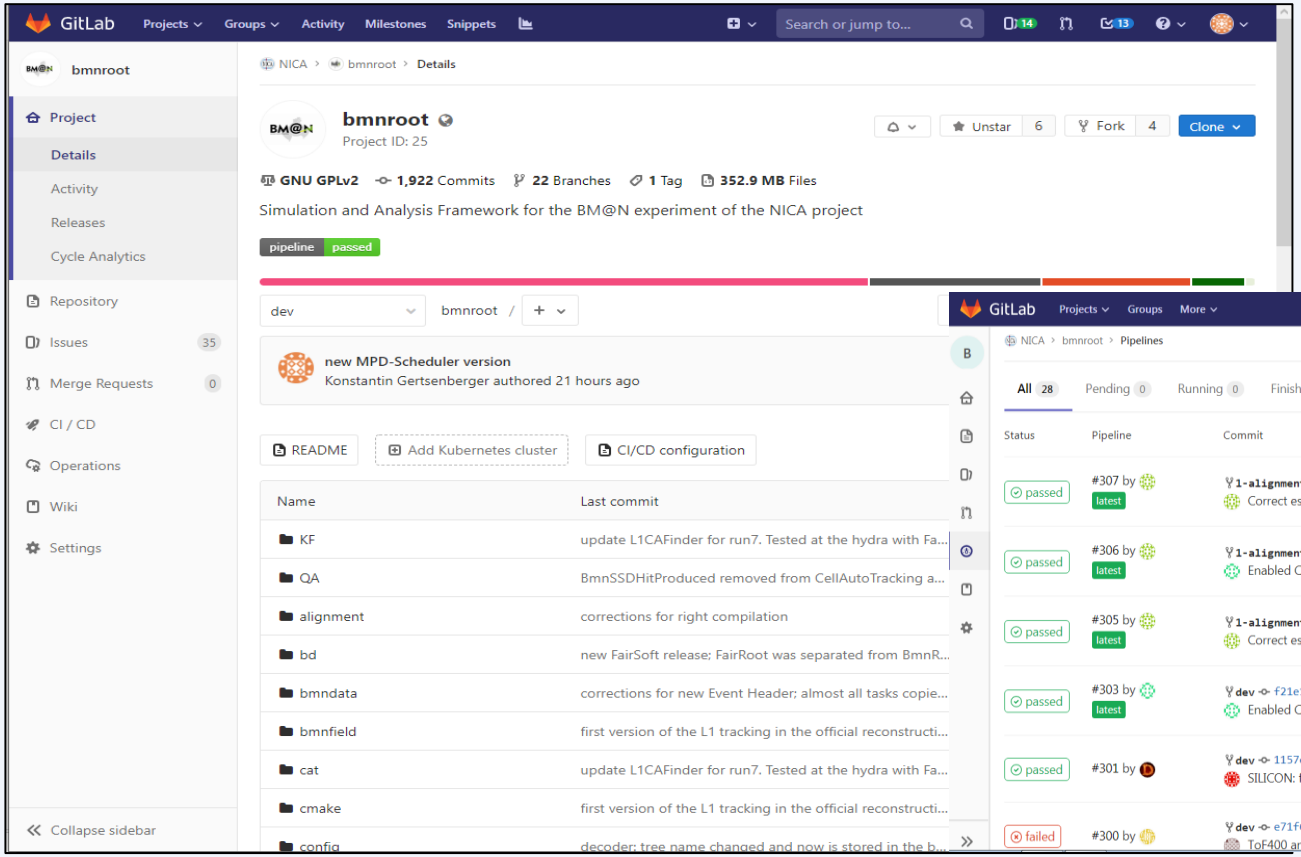
C++ classes, Linux OS support, based on ROOT and FairRoot

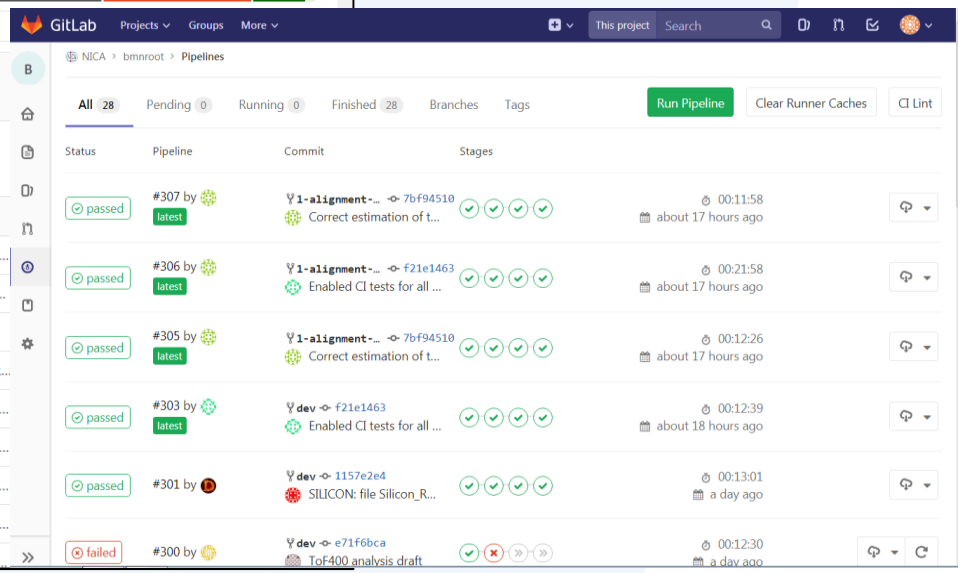


The Installation Procedure: http://bmn.jinr.ru/software-installation/

The BmnRoot software is available in GitLab@JINR: https://git.jinr.ru/nica/bmnroot

GitLab services for BM@N software





advanced opportunity for collective development

Version Control System – Git
Automated Tests / Automated Deployment – GitLab Runners
Issue tracker
Repository branch protection
Role-based access control to projects

Nikita BALASHOV (14 October 9:50)
Software development workflow in BM@N: tools and features

New Package Versions in BmnRoot Design

ROOT 6.16

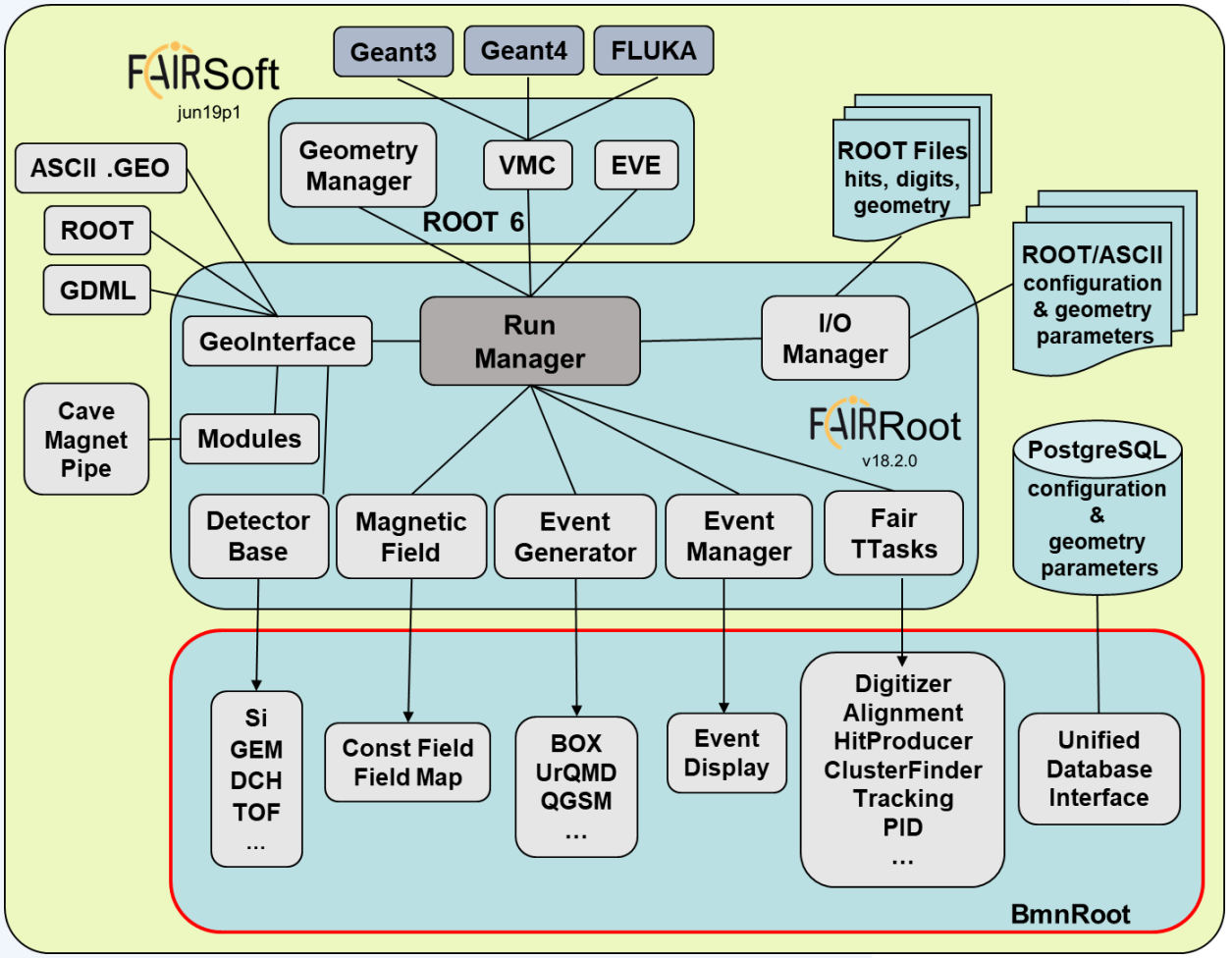
FAIRSoft

jun19p1

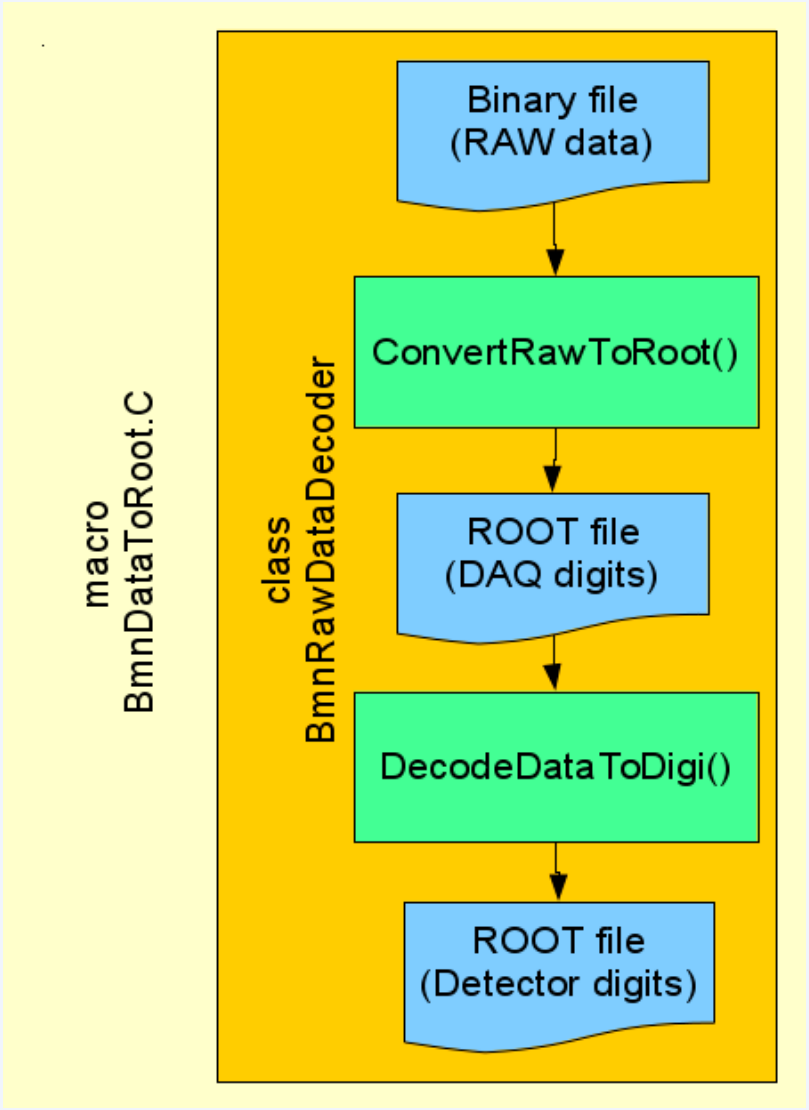
FAIRRoot

v18.2.0

BmnRoot



BmnRoot Release for Run 7 production: 19.10.0

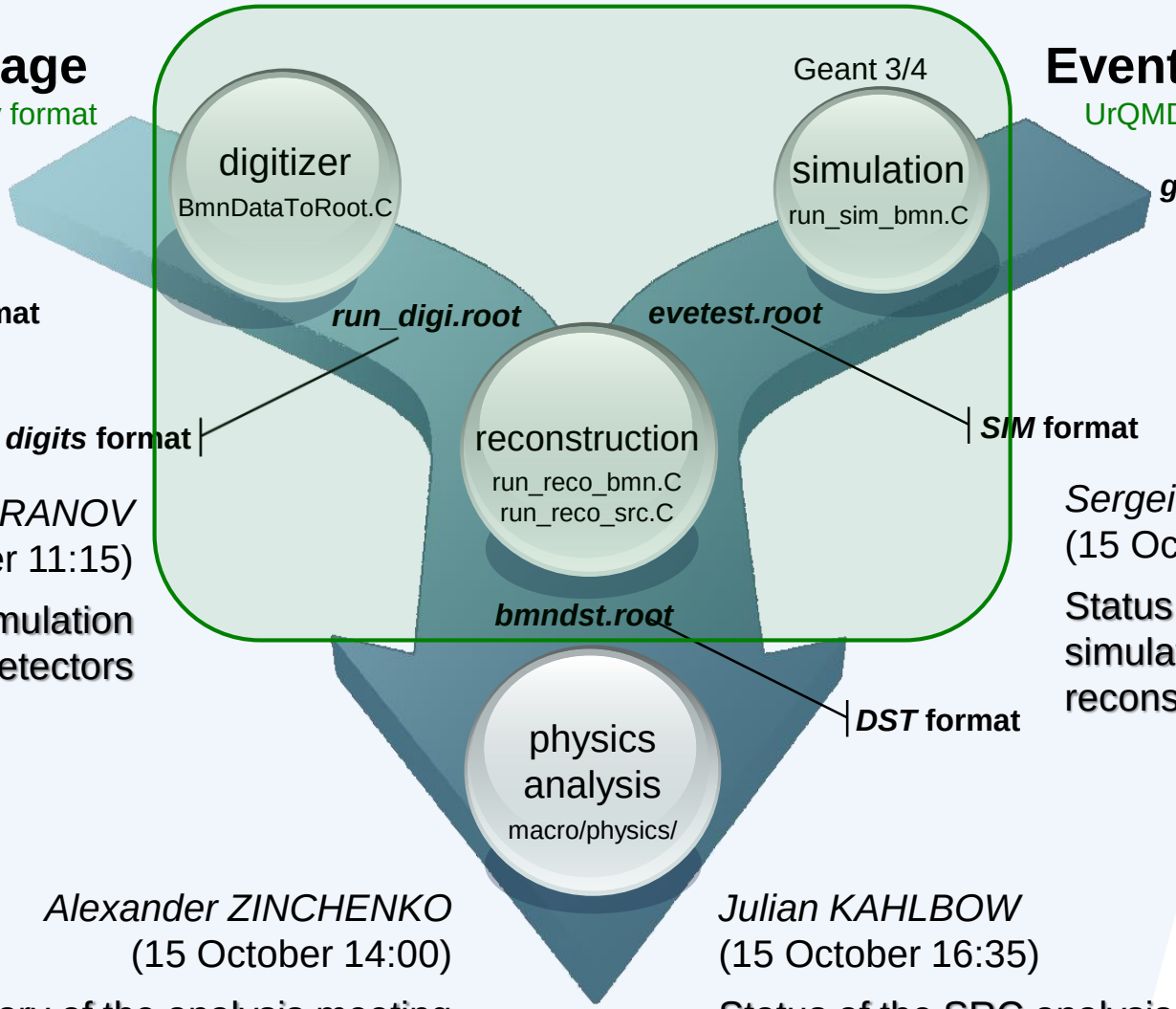


Raw Data Converter preparations

- separate pieces of raw conversion code for all BM@N detectors have been combined into single Raw Data Converter
- the result tree with detector digits has been renamed and cleaned
- TAI times has been translated to the UTC format
- bugs in raw data conversion, such as wrong mapping, have been corrected
- Run and Event Headers for ROOT files with BM@N digits have been implemented
- Default options do not save RAW-ROOT files
- unification of the silicon and GEMs digits obtaining in two groups was finished a few weeks ago

Mass production of BM@N detector digits and DST files for Run 7 (& Run 6) has been started at JINR distributed clusters

BM@N Event Processing in BmnRoot



Dmitry BARANOV
(14 October 11:15)

Progress in simulation of the BM@N detectors

Sergei MERTS
(15 October 14:55)

Status of the BM@N simulation and data reconstruction

Alexander ZINCHENKO
(15 October 14:00)

Summary of the analysis meeting

Julian KAHLBOW
(15 October 16:35)

Status of the SRC analysis

Data Quality Analysis (offline system)

Current Run: 3387
Energy: 3.17
Beam: C
Target: H2

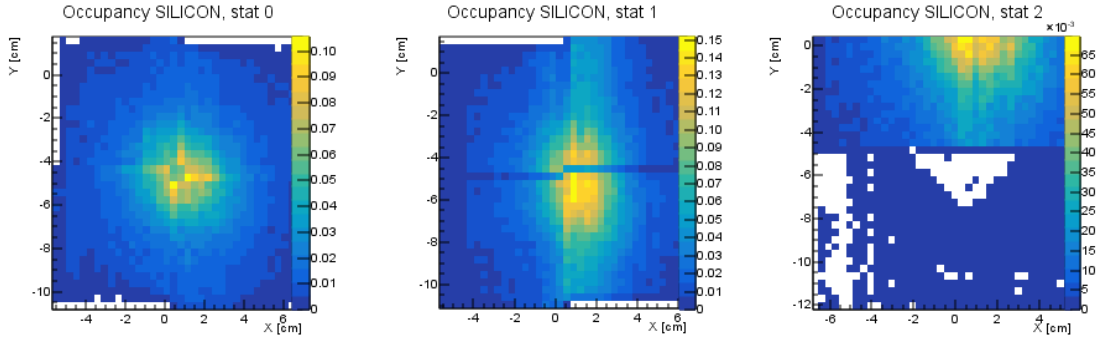
Ref. Run: 1801
Energy: 4.50
Beam: C
Target: Cu

Release: 0.0
Period: 7
Setup: SRC

Occupancy for SILICON in RUN7 SRC

bmn-qa.jinr.ru

Select Release:	Select Period:	Select Setup:	Select Current Run:	Select Reference Run:
0.0	7	SRC	Run 3387, beam C, energy 3.17, target H2, Voltage 108	-



Pavel BATYUK
(14 October 11:55)

Data Quality Analysis

1. To represent basic distributions for obtained experimental data for all detectors (trigger counters, GEMs, SILICONs, DCH ...), and define whether one relies on a run is being analyzed or not
2. To check hit finders and tracking by basic hit and track distributions (occupancy, reconstructed track parameters, results on matching and PID...)
3. To monitor data that would require a precise monitoring

Distributed Computing

Current Computing Clusters for NICA

NICA Cluster
ncx[101-106].jinr.ru
(LHEP, b.215, b.216)

OS: Scientific Linux 7
Exp. software: Local

EOS: 3.3 PB (replicated)
GlusterFS: 320 TB (*replicated*)

Sun Grid Engine: 3 060
(Intel Xeon cores)

MICC Tier1/2 Center
lx[pub,mpd-ui].jinr.ru
(LIT, b.134)

OS: Scientific Linux 6
Exp. software: CVMFS

EOS: 4 PB

Torque/Maui:
Tier2: **~300 IX cores**
Tier1: ~**600 IX cores**

HybriLIT platform
hydra.jinr.ru
(LIT, b.134)

OS: CERN CentOS 7
Exp. software: CVMFS, **Modules**

ZFS 200 TB**,**
UltraFast Storage on Lustre 70 TB_{ssd}

SLURM: 2880 (Xeon cores) + **6048** (Xeon Phi cores) + **40 GPU** NVidia Tesla V

All external packages for BmnRoot were installed & configured.

Automatic BmnRoot deployment on CVMFS with GIT CI was implemented.

NICA Cluster: from a prototype to the future

OS: Scientific Linux 7

(LHEP, b.215, b.216)

Cluster Administrator:
Schinov B. G.

Storage

EOS: 0.5 PB distributed FS (*replicated*)

sim. data: /eos/nica/bmn/sim/[gen,dst]

exp. data: /eos/nica/bmn/exp/[raw,digi,dst]

for users: /eos/nica/bmn/users/$USER

GlusterFS volumes are obsolete

Software

FairSoft:

/opt/fairsoft/bmn/pro → jun19p1

FairRoot:

/opt/fairroot/bmn/pro → v18.2.0

SetEnv.sh:
need correction!

Computing

Batch System: **Sun Grid Engine**

Intel Xeon: **3096 log. cores**

Registration & User Space Quotes

Email to the software coordinator with a detailed user info.

Currently, about 80 users have been registered

MICC Tier1/2 Center: a piece for NICA

OS: Scientific Linux 6

(LIT, b.134)

Cluster Administrator:
Mitsyn V. V.

Storage

EOS: **1 PB** distributed FS

sim. data: /eos/nica/bmn/sim/[gen,dst]
exp. data: /eos/nica/bmn/exp/[raw,digi,dst]
for users: /eos/nica/bmn/users/$USER
scratch: /scr/u/$USER

Software

CVMFS: distributed software FS

scl enable devtoolset-4 python27 bash

SetEnv.sh: need correction!

FairSoft: **/cvmfs/nica.jinr.ru/sl6/fairsoft/bmn** (jun19p1)
FairRoot: **/cvmfs/nica.jinr.ru/sl6/fairroot/bmn** (v18.2.0)

Computing

Batch System: **Torque/Maui**
Tier2 queue ‘mpd’: **~300 log. cores** (Intel Xeon)
Tier1 queue ‘mpd@bfsrv’: **~600 log. cores** (Intel Xeon)

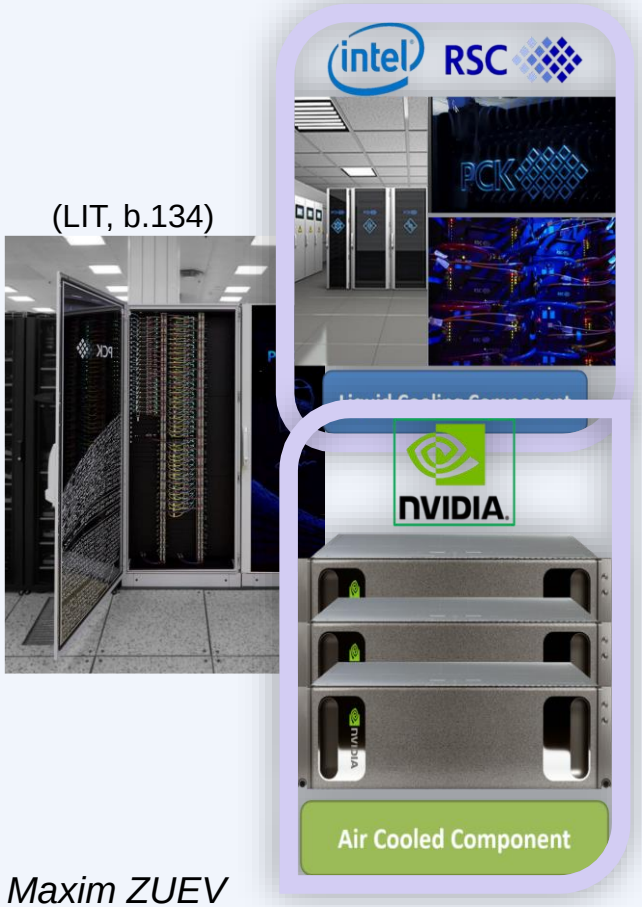
Registration

http://lxs-s03.jinr.ru/cicc/index.php/en/registration-at-cicc/

HybriLIT Platform: from education to SC Govorun

OS: CERN CentOS 7

(LIT, b.134)



Storage

EOS:

for users: /eos/hybrilit.jinr.ru/user/

scratch: /eos/hybrilit.jinr.ru/scratch, /run/user/$UID

/eos/eos.jinr.ru → MICC EOS

Software

CVMFS: distributed software FS

export MODULEPATH="/cvmfs/hybrilit.jinr.ru/sw/slc7_x86-64/modulefiles:/cvmfs/hybrilit.jinr.ru/sw/slc7_x86-64/NICA/modulefiles"

module avail – print all modules

FairSoft & FairRoot: **module add FairRoot/v18.2.0**

Computing

Batch System: **SLURM**

module add GVR/v1.0-1 → SuperComputer Govorun

Intel Xeon Gold (queue 'skylake'): **IN PROGRESS**

Intel Xeon Cascadelake (queue 'cascadelake'): **I / P**

Intel Xeon Phi (queue 'knl'): **6048 log. cores**

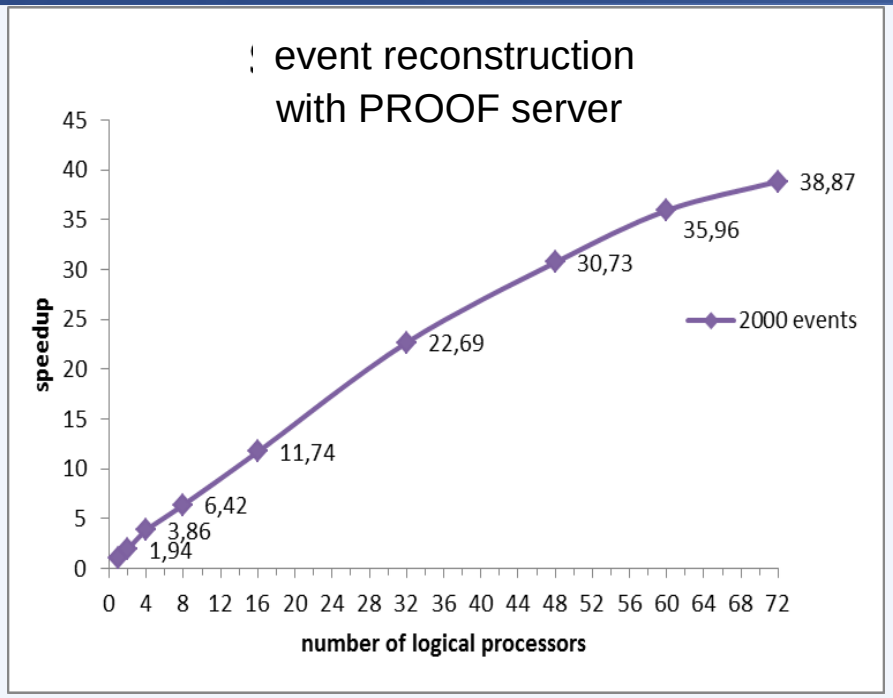
NVidia Tesla V (queue 'dgx'): **40 GPU cards**

Registration

http://hlit.jinr.ru/for_users/registration/

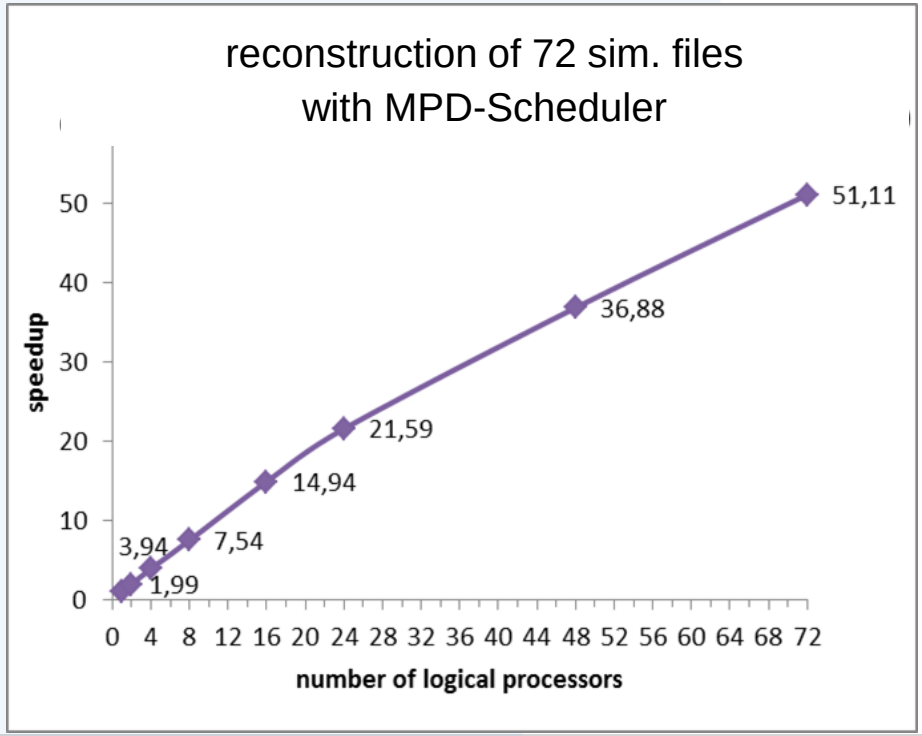
Maxim ZUEV
(14 October 10:05)
HybriLIT platform and Supercomputer Govorun as computing platform for BM@N

Tools for parallel data processing



PROOF (**P**arallel **ROO**T **F**acility) is a part of the ROOT software

Parallel NICA event data processing in ROOT macros on the parallel architectures: user multicore machines, heterogeneous distributed clusters and GRID system



NICA-Scheduler for task distribution to parallelize NICA data processing on multicore machines and cluster nodes

Supports SLURM, SGE and Torque system

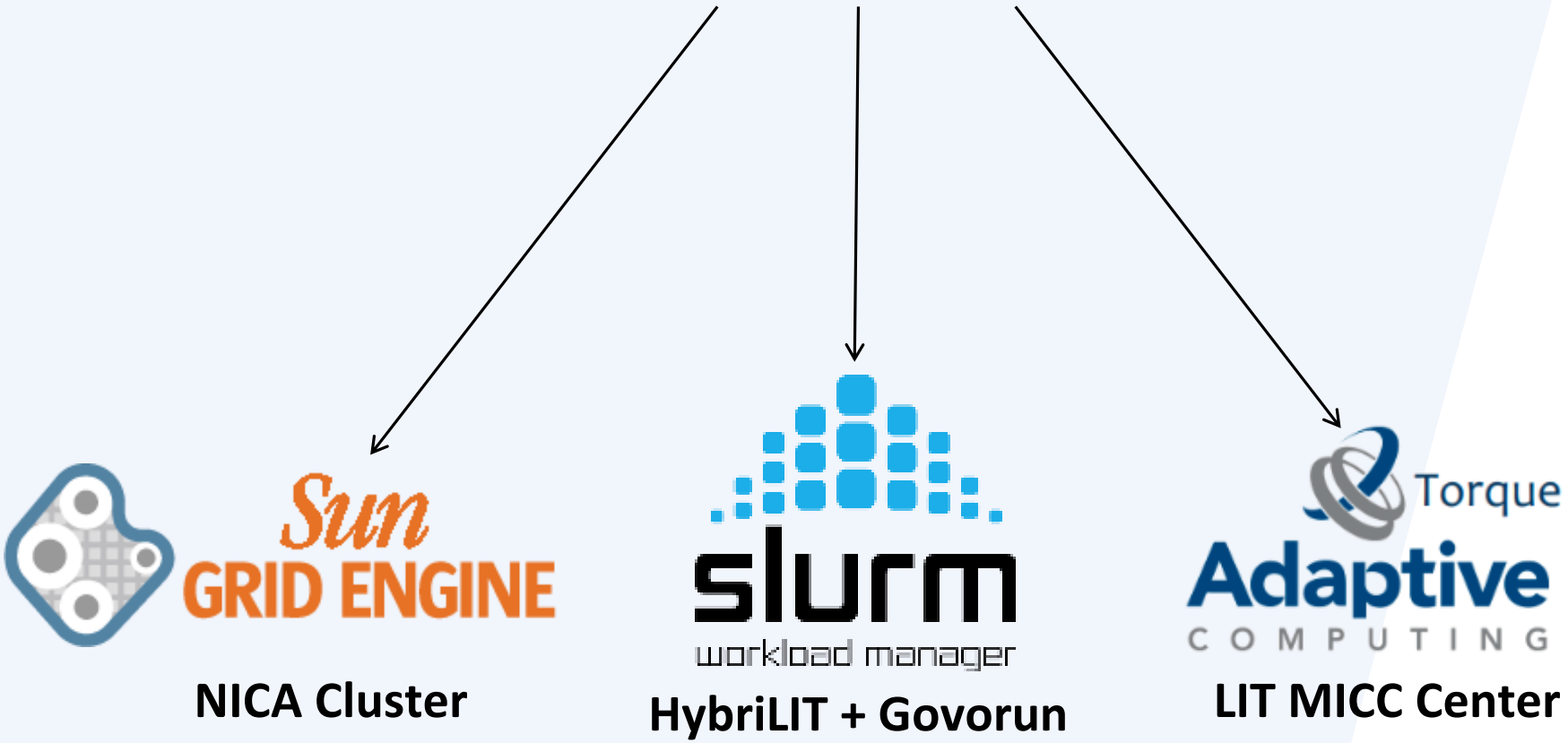
Can use data of the Unified Database

Jobs are described and passed as XML file

NICA-Scheduler: from SGE to SLURM

NICA-Scheduler

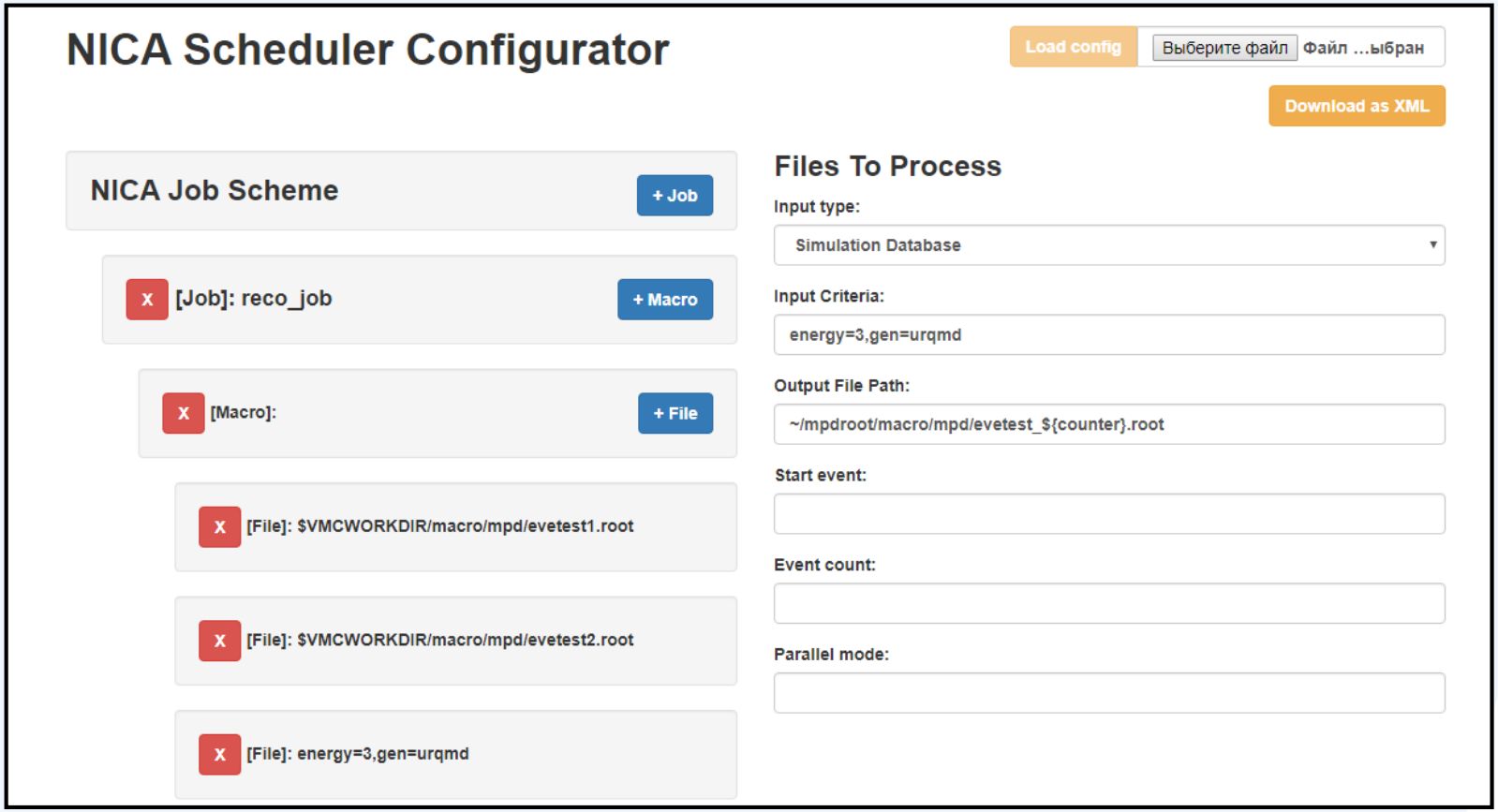
$ mpd-scheduler my_job.xml



NICA Cluster | **HybriLIT + Govorun** | **LIT MICC Center**

The NICA-Scheduler Guide: http://bmn.jinr.ru/nica-scheduler/

NICA-Scheduler GUI



- Written as a Kotlin Multiplatform application
  - Runs as JavaScript in browser, or in JVM
- Available at https://git.jinr.ru/nica_modules/mpd-scheduler-gui

BM@N Workflow

Mass production for BM@N Run 7 (&6)

MICC Complex
1 PB available
BM@N experimental data

raw_run7.data / run_digi.root
xrdcp
run_digi.root / bmndst.root

UltraFast Storage
70 TBssd available

Supercomputer GOVORUN

NICA-Scheduler

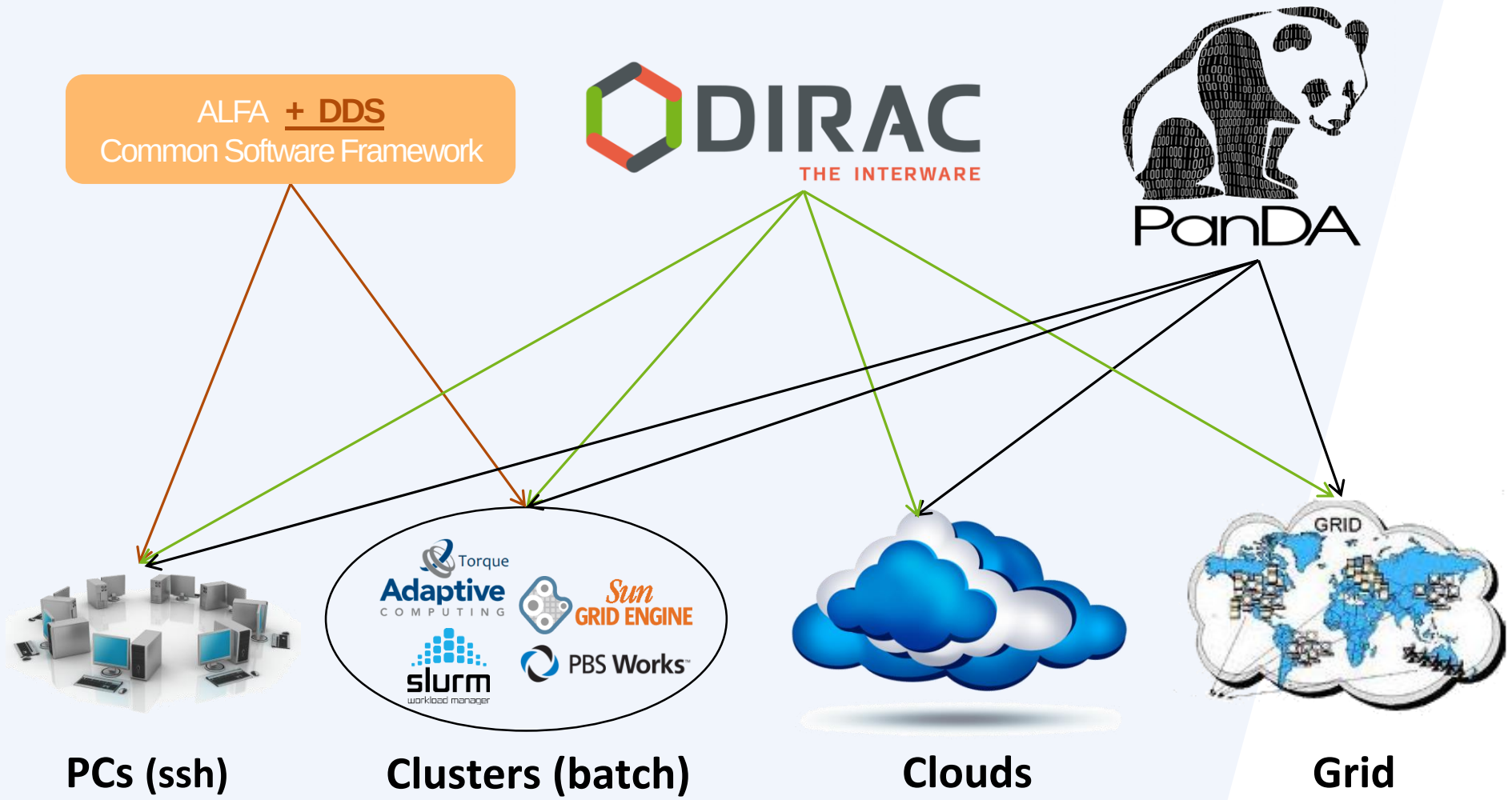
$ mpd-scheduler *raw_run7.xml*


```
<job name="convert_bmn_raw">
 <macro path="~/bmnroot/macro/raw/BmnDataToRoot.C">
  <file input="/eos/nica/bmn/exp/raw/run7/*">
   <put command="xrdcp" path="/lustre/stor/${file_name_with_ext}"/>
   <get command="xrdcp" path="/lustre/stor/bmn_run${last_number}_digi.root"
output="/eos/nica/bmn/exp/digi/run7/bmn_run${last_number}_digi.root"/>
  </file>
 </macro>
 <run mode="global" count="100" config="~/bmnroot/build/config.sh"
work_dir="/lustre/stor"/>
</job>
```

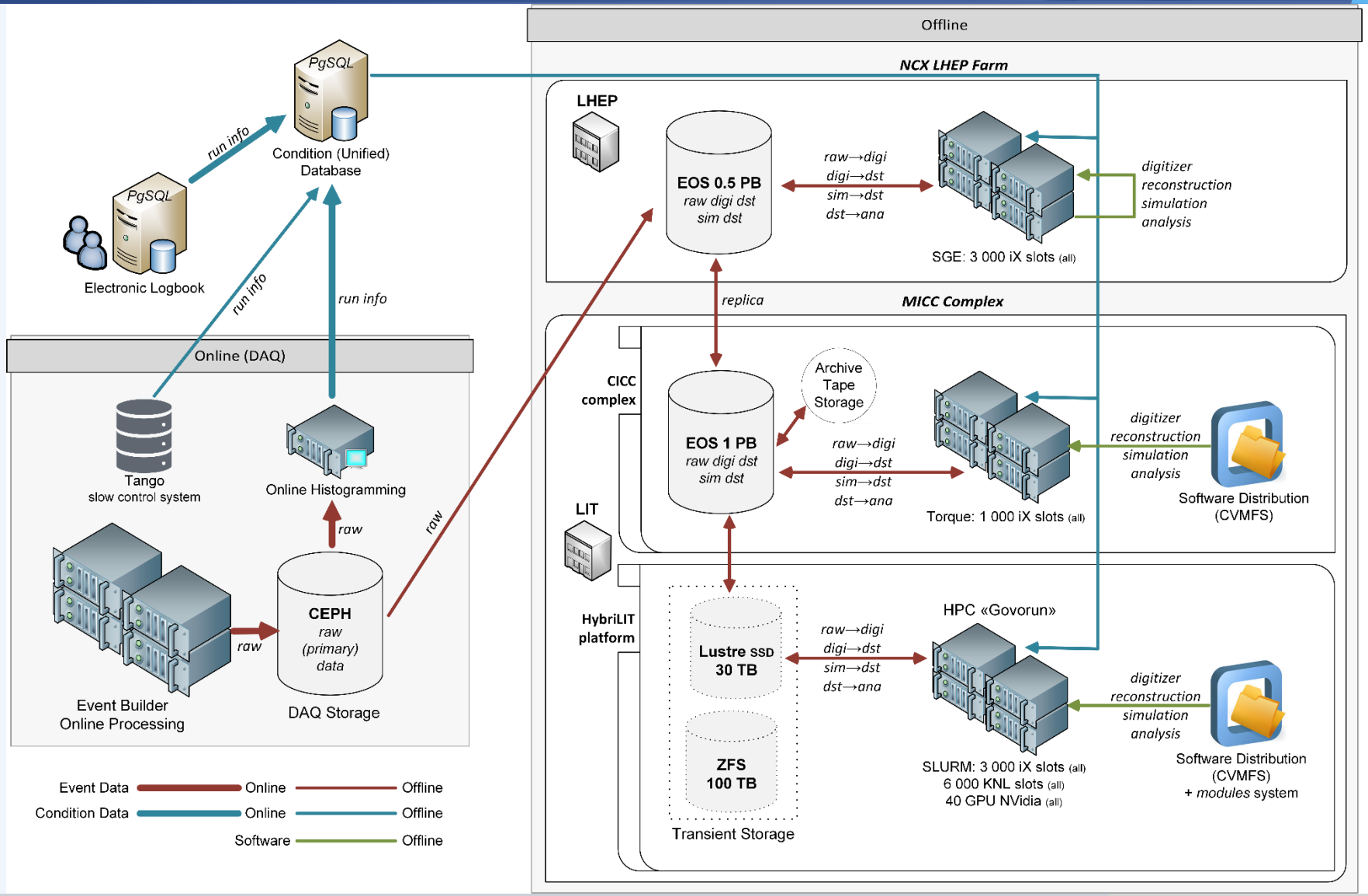
BmnDataToRoot.C

Xeon Gold (queue ‘skylake’): 2880 cores
Xeon Cascadelake (queue ‘bmn’): 384 cores
Xeon Phi (queue ‘knl’): 6048 cores

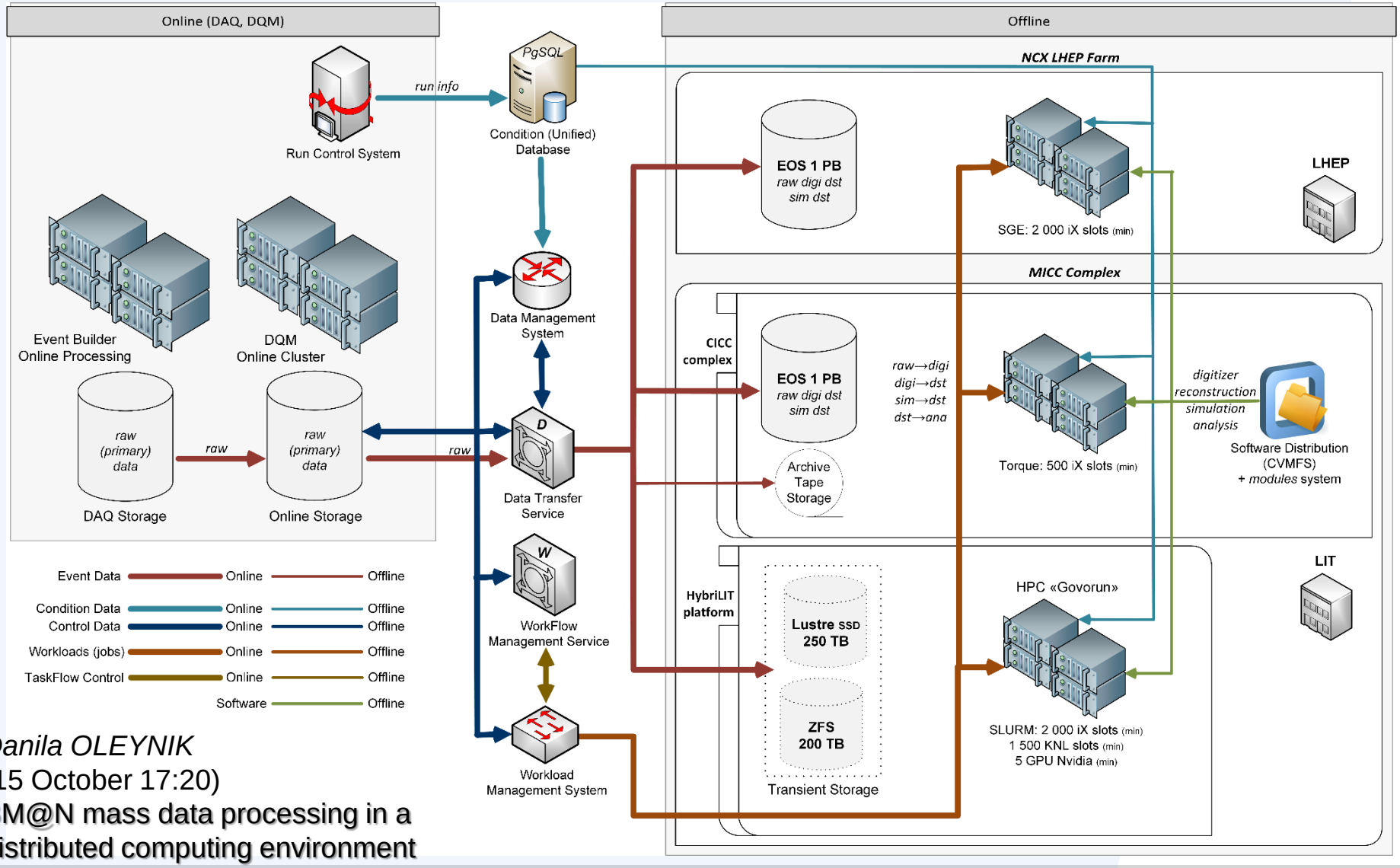
Workload Manager Selection



BM@N WorkFlow Status (Run 7)



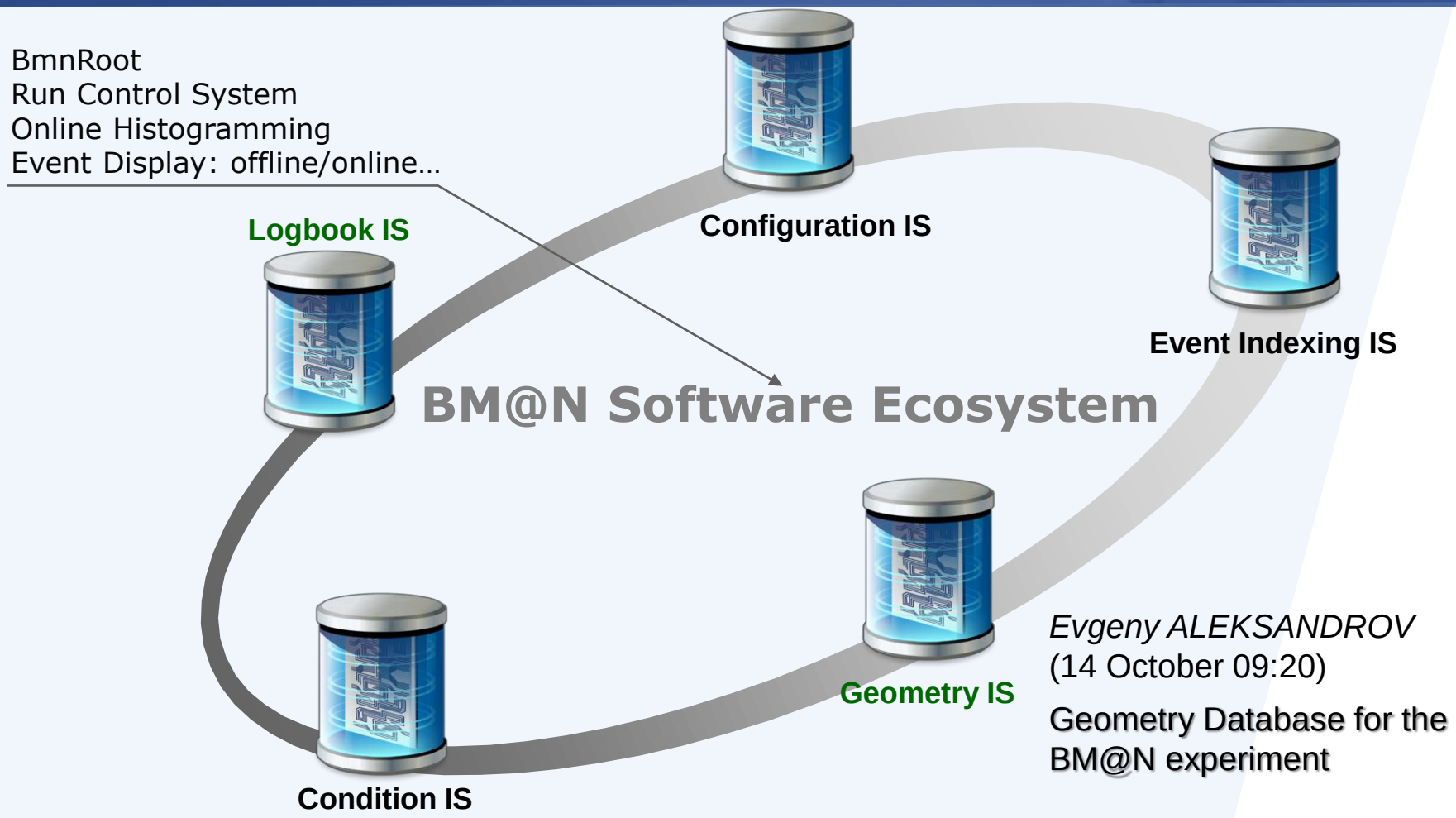
BM@N WorkFlow Proposal (Run 8)



Danila OLEYNIK
(15 October 17:20)
BM@N mass data processing in a distributed computing environment

Information Systems

Information Systems for online & offline processing



Evgeny ALEKSANDROV
(14 October 09:20)

Geometry Database for the BM@N experiment

RFBR Grant 2019 – 2021: Development of Information Systems for Online and Offline Data Processing for the Experimental Setups of the NICA Complex

Electronic Logbook (e-Log)

- e-Log platform is a collaborative tool which provides shift crews with an interface to store and share information with offline users on various events or problems occurred in the experiment during its operation.
- The e-Log system uses a developed Logbook Database based on PostgreSQL which ensures correct multi-user access, data consistency, integrity and automatic backup of the stored data.
- A part of e-Log data is automatically transferred to the Unified Database of the experiment to use in offline analysis.
- Developed interfaces provide a unified access to required logbook data for various online and offline systems, and convenient viewing, transparent managing and searching for required information by users.

Web-interface of the Electronic Logbook

BM@N Electronic Logbook — **Logged in as admin**

Home | New | Find | Last day | Reference Book

Page: 1 of 141 | Number of items per page: 20 | Logout

Date	Shift Leader	Type	№ Run	Trigger	DAQ Status	SP-41, A	SP-57, A	VKM2, A	Beam	Energy, GeV	Target	Comment	Attachment	
2018-04-05 11:47:06	Rumyantsev	Inform All	5185 per.7	Special Trigger	All	0	0	0	Kr	2.94	Cu (2 mm)	End of the RUN7		Edit
2018-04-05 11:09:20	Rumyantsev	New Run	5184 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3 VKM2: I=125A, SP-57=50A, SP41=1250A; 100 k		Edit
2018-04-05 08:12:35	Rumyantsev	New Run	5183 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>2 VKM2: I=125A, SP-57=50A, SP41=1250A; 120 k		Edit
2018-04-05 07:46:35	Babkin	New Run	5182 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3 VKM2: I=125A, SP-57=50A, SP41=1250A; 208 kev		Edit
2018-04-05 07:41:29	Babkin	New Run	5180 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 201 kev		Edit
2018-04-05 07:25:08	Babkin	New Run	5179 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 201 kev		Edit
2018-04-05 06:01:07	Babkin	New Run	5178 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 201 kev		Edit
2018-04-05 05:27:39	Babkin	New Run	5177 per.7	Beam Trigger + Si >3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & Si>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 204 kev		Edit
2018-04-05 05:27:06	Babkin	New Run	5176 per.7	Beam Trigger + BD>3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & BD>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 150 kev		Edit
2018-04-05 04:47:27	Babkin	New Run	5174 per.7	Beam Trigger + BD>3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & BD>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 213 kev		Edit
2018-04-05 04:37:43	Babkin	New Run	5173 per.7	Beam Trigger + BD>3	All	1250	50	125	Kr	2.94	Cu (2 mm)	Cu target; Tr.= BC1 & BC2 & VC & BD>3; VKM2: I=125A, SP-57=50A, SP41=1250A; 211 kev		Edit
												Cu target; Tr.= BC1 & BC2 & VC &		

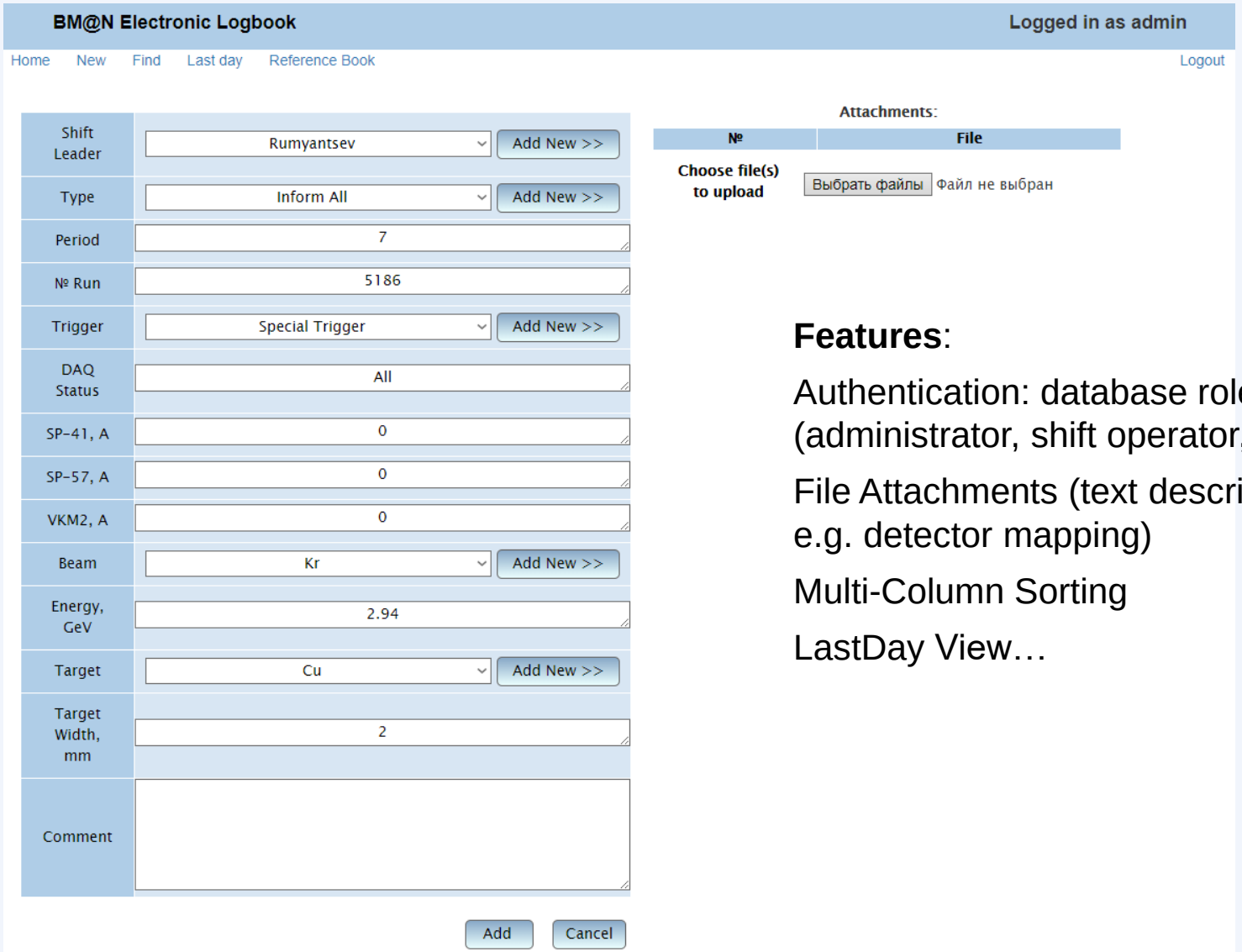
2019 - software team (contact e-mail: gertsen@jinr.ru)

BM@N Runs 1 - 7

 # records ~ 3 000

It contains records of different types for all BM@N conducted Runs
Easy search by all parameters

e-Log interface: modification by shift crew



Features:

Authentication: database roles (administrator, shift operator, user)

File Attachments (text description, photo, e.g. detector mapping)

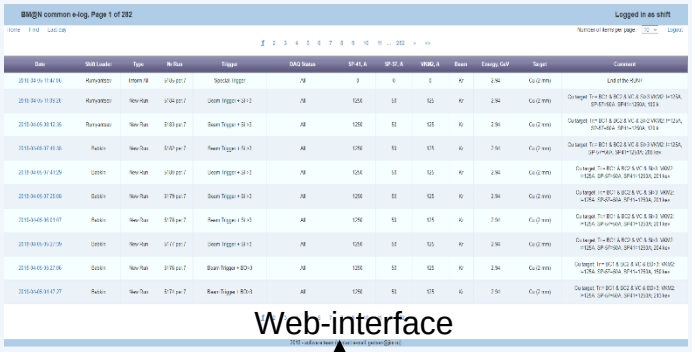
Multi-Column Sorting

LastDay View…

e-Log: Communication Scheme

shift operators

users



Web-interface

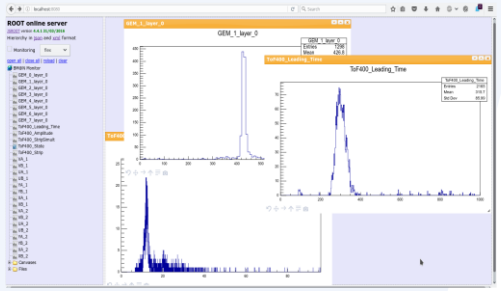
C++ Interface

C++ Interface

Online

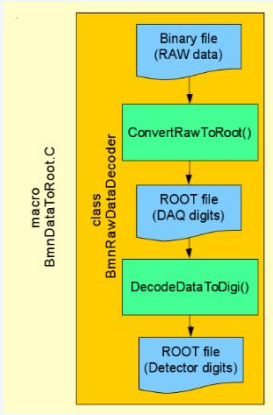
Offline

Online Histogramming



…

Raw Data Converter



BM@N Offline Database

Event Analysis in BmnRoot

…

e-Log: Notification Service

under testing now

e-mail notifications

different types of events:

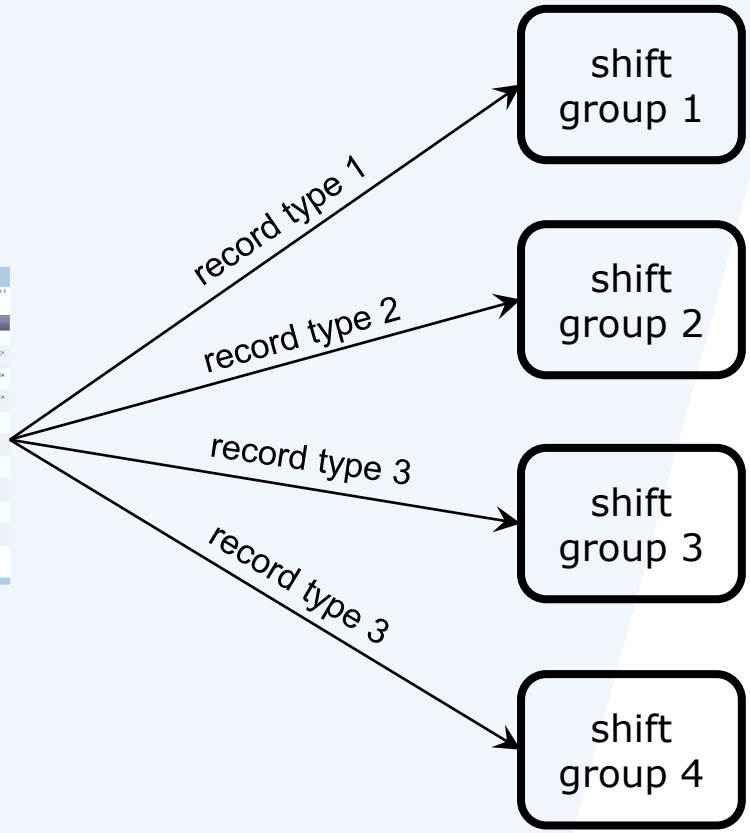
“shift started”

“problem report”

“configuration”

“inform all”

…



e-Log FreeIPA Authorization and Auto Recovery Services are under development

Geometry Database for the BM@N experiment

Guidlines

- **manage module geometries as ROOT binary objects**
- **for each module keep: tag, version, transformation matrix, mother module**
- **manage the pre-defined setups as combinations of module geometries**
- **manage module version**

Tasks

- **Store the modules of BM@N**
- **Load the geometry modules for setup construction**
- **Construct setup from the stored modules**
- **Present the BM@N setup**
- **Support different versions of module**

Web-interface of the Geometry Database

	Tag	Date	Status	Author	Description
Setup	run6	2018-07-26	Approved	aleksand@jinr.ru	run6 without field

View Setups
View Setup Modules
View Files
View Materials
View Fields
Download GeometryDB

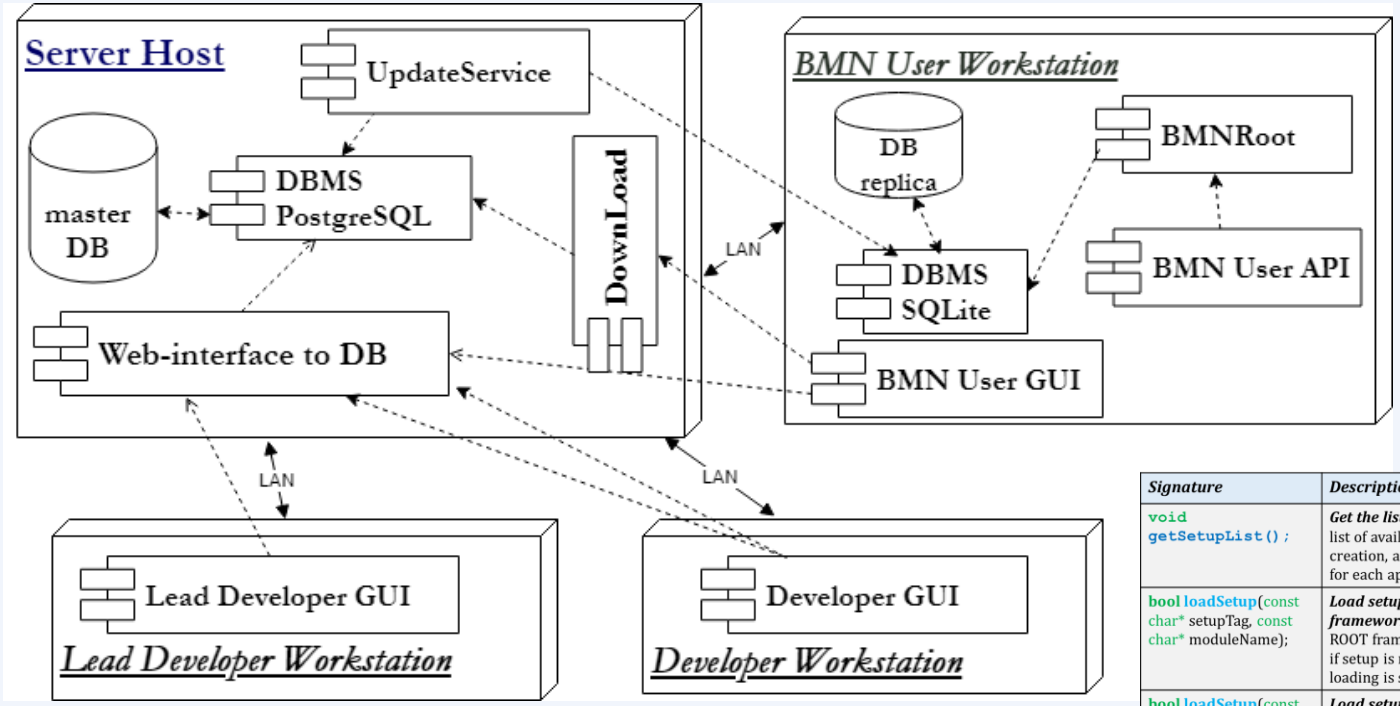
	Tag	Date	Author	Description
PIPE	magnet_modified	2018-07-11		magnet modified
PSD	TOF400_RUN6	2018-07-26		TOF400 RUN6
Material	1	2018-07-03	aleksand@jinr.ru	

PSD / TOF400_RUN6

Transformation	Scale	Translation	File Tag
1.000 0.000 0.000 0.000 1.000 0.000 0.000 0.000 1.000	1.000; 1.000; 1.000	0.000; 0.000; 0.000	TOF400_RUN6

GUI Functions
- View
- Edit
- Download

API Interface of the Geometry Database

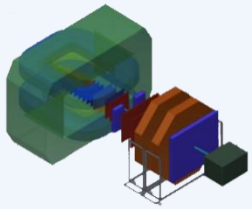


Signature	*Description*	*Call Example*	*Comment*
`void getSetupList();`	***Get the list of available setups.*** Print the list of available setups including tag, date of creation, author and description parameters for each approved setup.	getSetupList.c();	Return the available setups' list
`bool loadSetup(const char* setupTag, const char* moduleName);`	***Load setup into the BM@N ROOT framework.*** The Geometry can be used in ROOT framework afterwards. Return FALSE if setup is not loaded, and TRUE if the loading is successful.	bool res = loadSetup("run6", "*");	"*" – all setup modules to be loaded
`bool loadSetup(const char* setupTag, int moduleId);`	***Load setup into BM@N ROOT environment by module Id*** to load setup into the CBM ROOT framework. The Geometry can be used in ROOT framework afterwards. Return FALSE if setup is not loaded, and TRUE if loading is successful.	bool res = loadSetup("run6",-1);	
`bool loadSetup(const char* setupTag, const char* moduleName, const char* xml);`	***Load setup into the ROOT environment.*** Geometry can be used in the ROOT environment after this operation. User can use xml file in order to move any setup module during loading. Return false if setup was not loaded because of errors and true if load is successful.	loadSetup("run6", "*", "local.xml")	xml file contains information on the setup modules and their shifts.

API (Application Programming Interface)

implemented as macros of the ROOT environment

BM@N Data Processing Pipeline



DRE

LDC

FLP

First Level Processor

Data Check
Flow Control
Formatting

EvB

Event Builder

Buffering
Sorting
Distribution

HLT

High Level L3 Trigger

RQ

Raw Data Quality Check

Rootifier

ROOT Format Mapping Alignment

REC

Event Reconstruction

PA

Physics Analysis

BmnRoot @ distributed clusters

TDS

Transient Data Storage

PDS

Permanent Data Storage

FT REC

Fast Event Reconstruction

HIST

Online Histograms

EvM

Event Monitor

Database

DAQ

On-line Processing

Off-line Processing

matched from “Data Acquisition System TDR”, DAQ Collaboration

Online Histogramming: Web-interface

jsROOT server provides processed data via the Web

Welcome to the BM@N Experiment | Triggers | GEM | Silicon | ToF400 | ToF700 | DCH | MWPC | ZDC | ECAL | SRC Triggers | LAND | MSC

BM@N Silicons

Run: 4147

Event: 20000

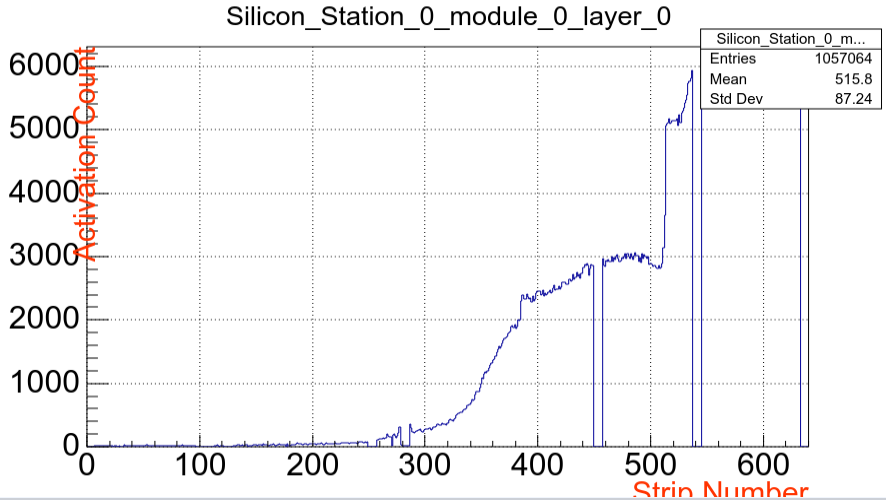
Run Type: beam

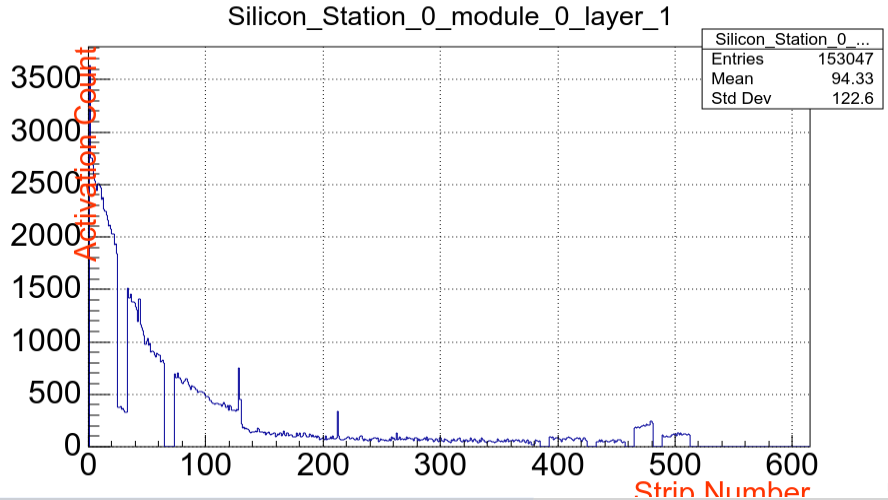
Energy: 3.20
Beam: Ar
Target: C
Field Voltage: 77.60

Reset | Select Reference Run | Run 3946, beam Ar, energy 3.2, target C, Voltage 77.597222

Ilnur GABDRAKHMANOV
(14 October 12:15)

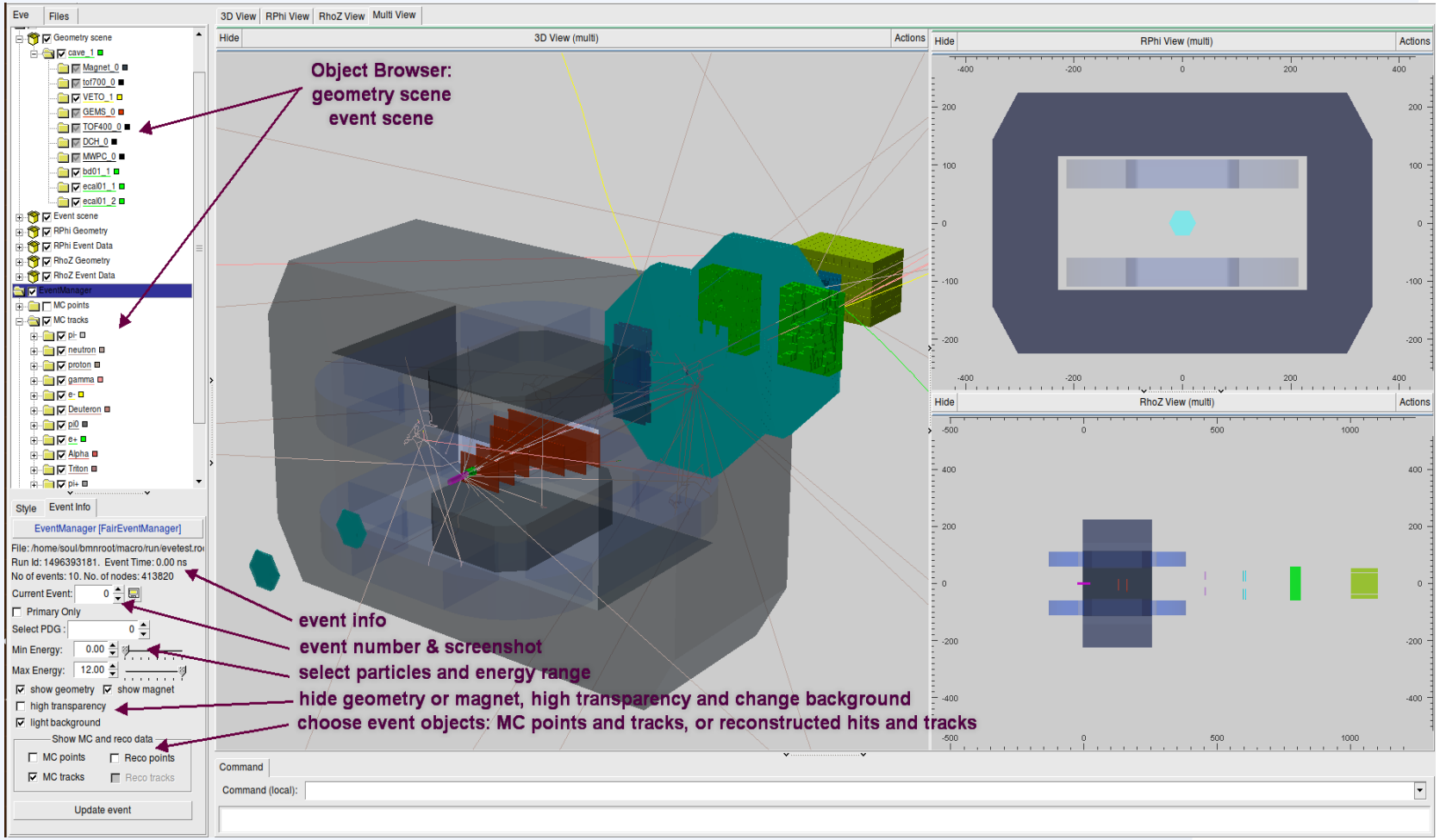
Online Monitoring System for BM@N and Raw Data Converter



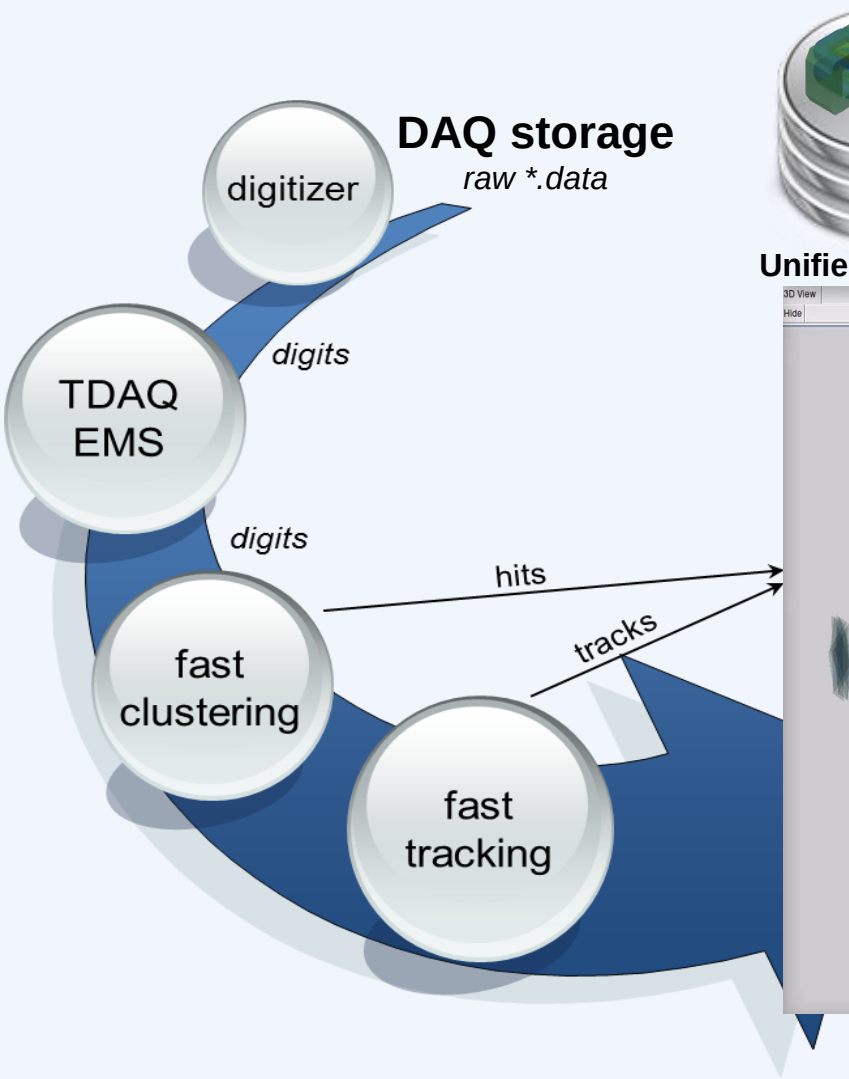


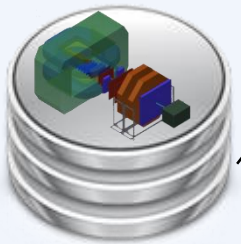
Event Display for the BM@N experiment

The Event Display can show/hide setup geometry, simulated and reconstructed data: points, hits, tracks, calorimeter towers, select event to display, select particles with definite PDG codes, set energy range and many other visualization options.



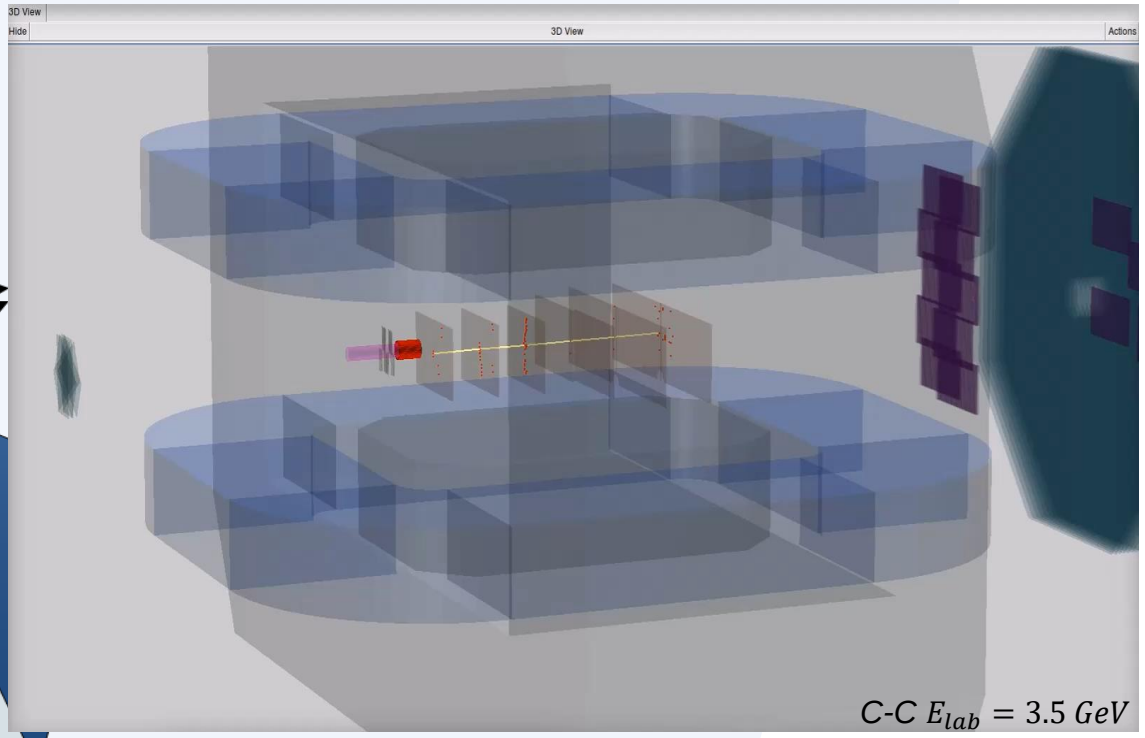
Online Event Display





Unified Database

BM@N geometry for a given run



Online Event Display
(GEM hits and tracks in run #1220)

BM@N Central Database for offline processing

detector simulation
raw data processing
event reconstruction
physics analysis

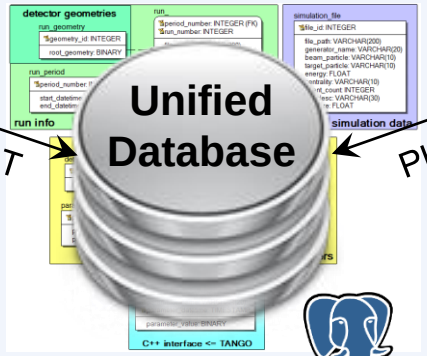
BmnRoot

reading and changing data

users

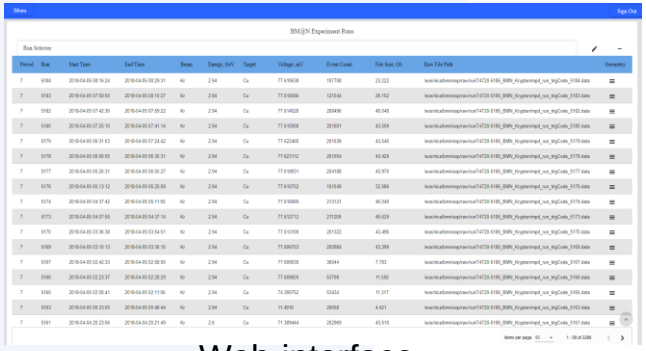
C++ database interface w/o SQL
(connect, SQL I/O)

Simulation File List and Run Info have been updated



ROOT

PHP



Web-interface

Tango Interface

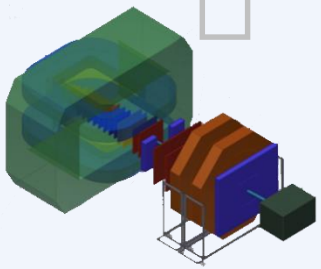
PostgreSQL

Tango

Slow Control System

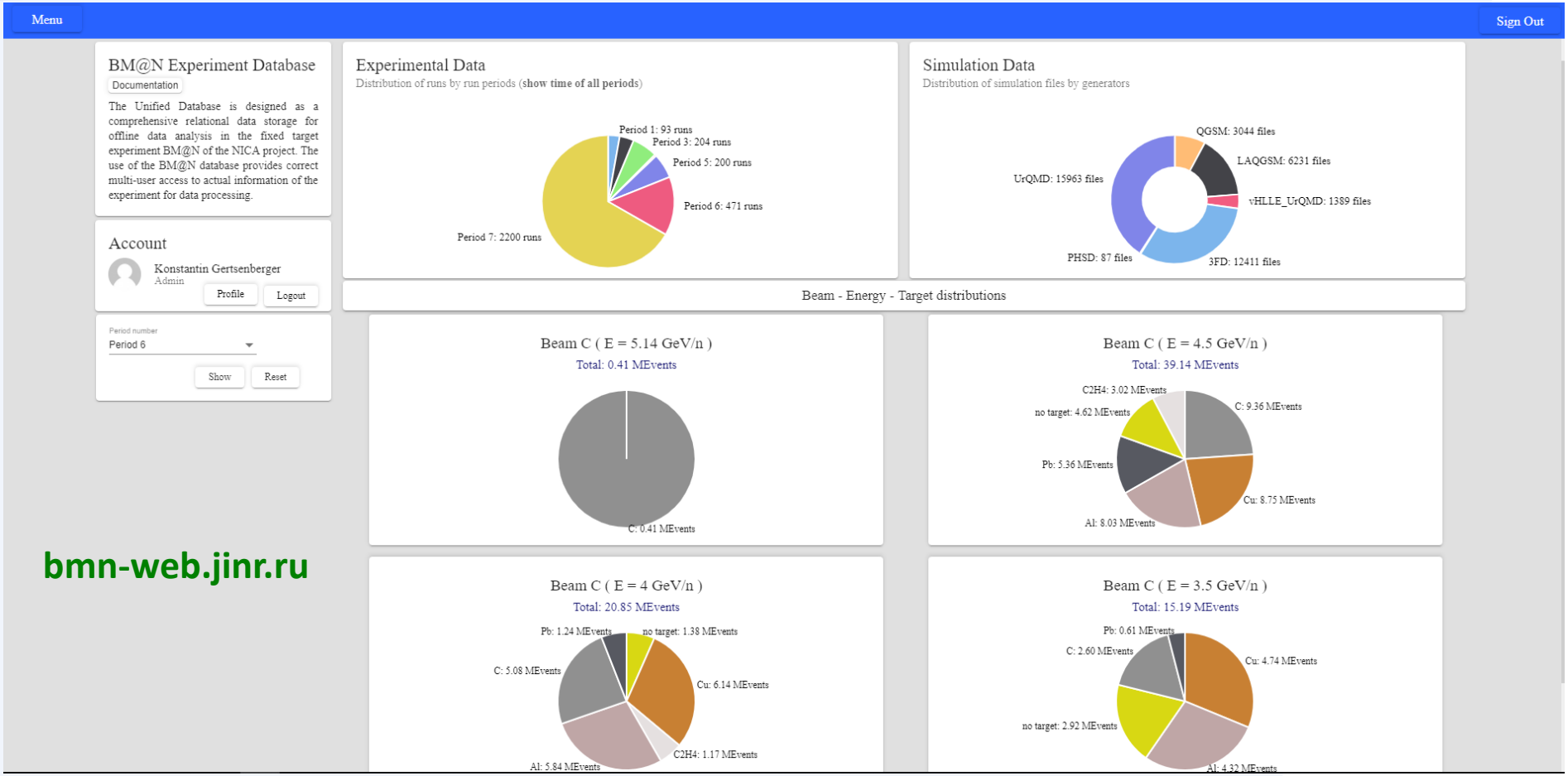
configuration calibration

parameter and algorithm data



- central data storage for offline data analysis
- unified access and data management
- correct multi-user data processing
- ensuring the actuality, data consistency and integrity
- excluding the multiple duplication and use of outdated data
- automatic backup

Web-interface of the BM@N database

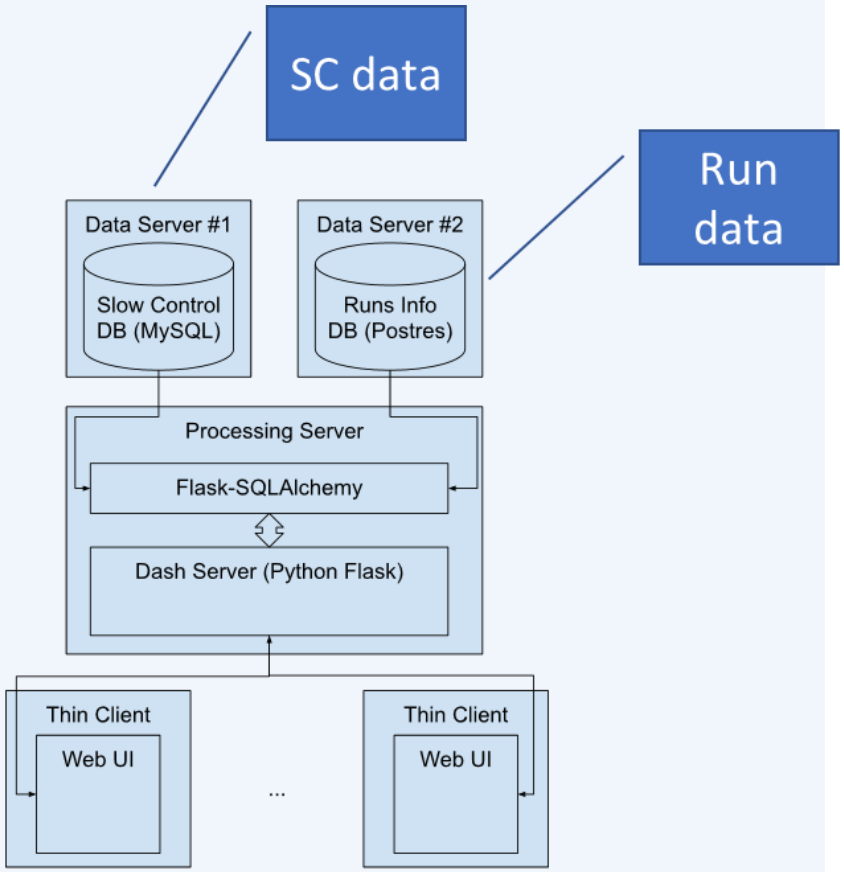


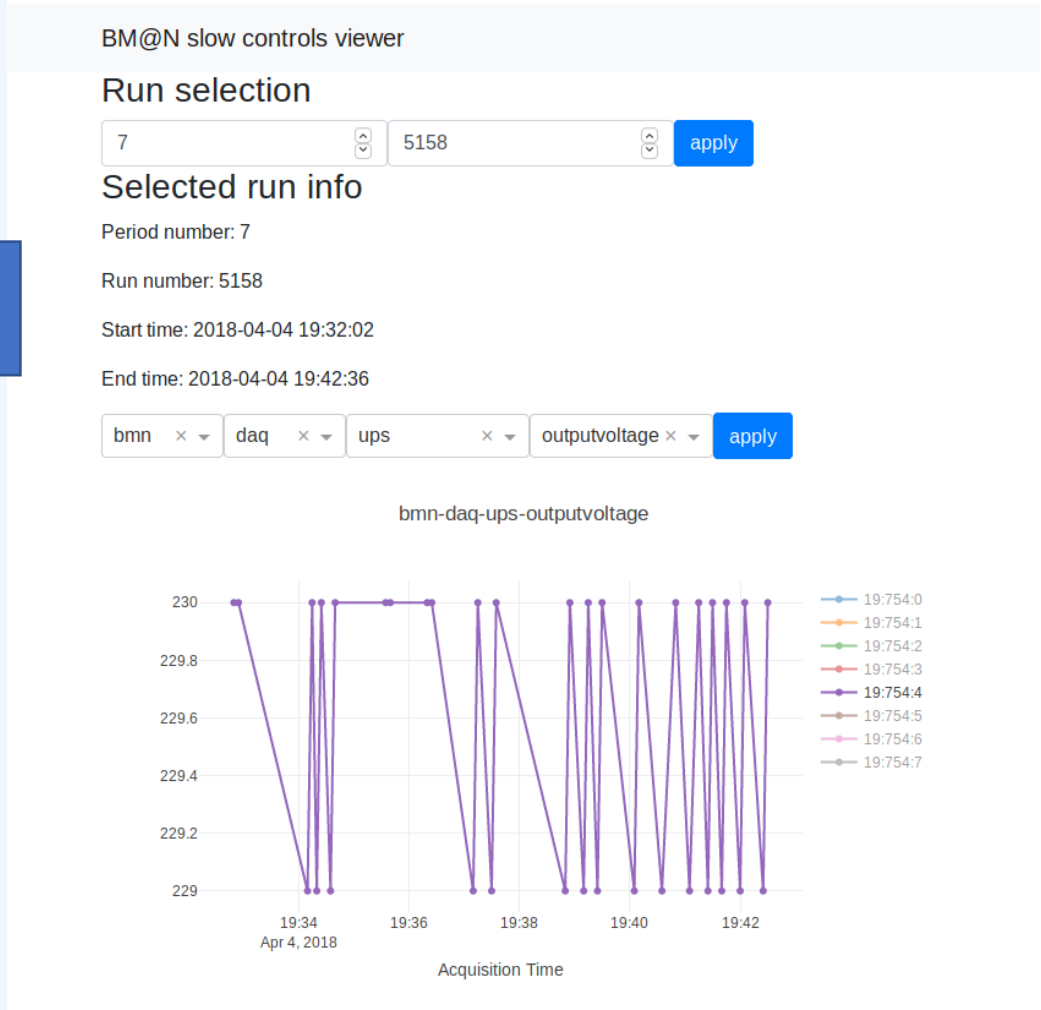
bmn-web.jinr.ru

storing information on BM@N experiment sessions and runs, setup geometries, detectors, parameters and parameter values, and generated simulation files

Alexander CHEBOTOV
(14 October 10:35)
User web-interface for the BM@N offline database

Tango Slow Control Visualization





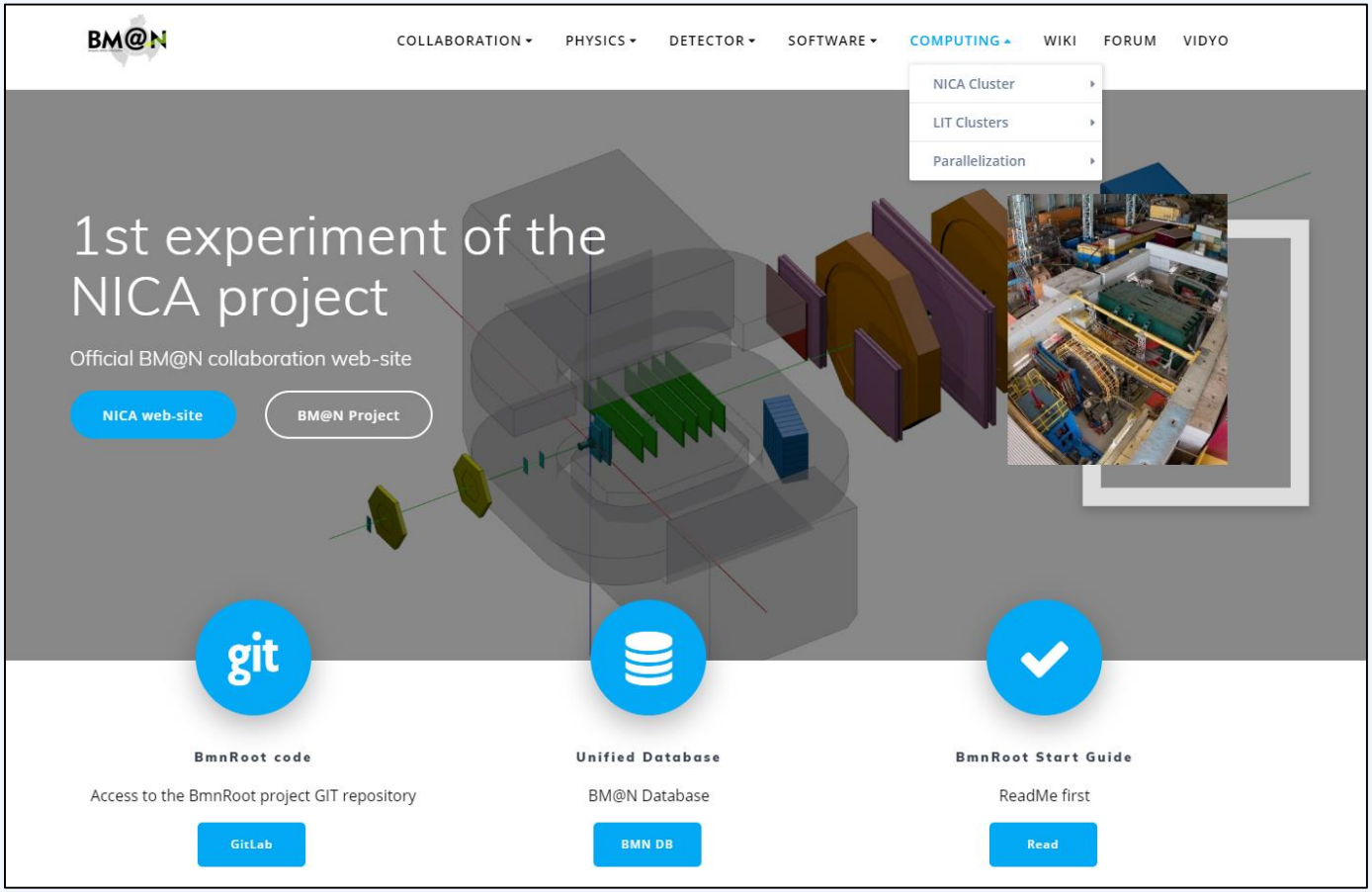
Collaboration Services

Ivan SLEPOV

(14 October 09:35)

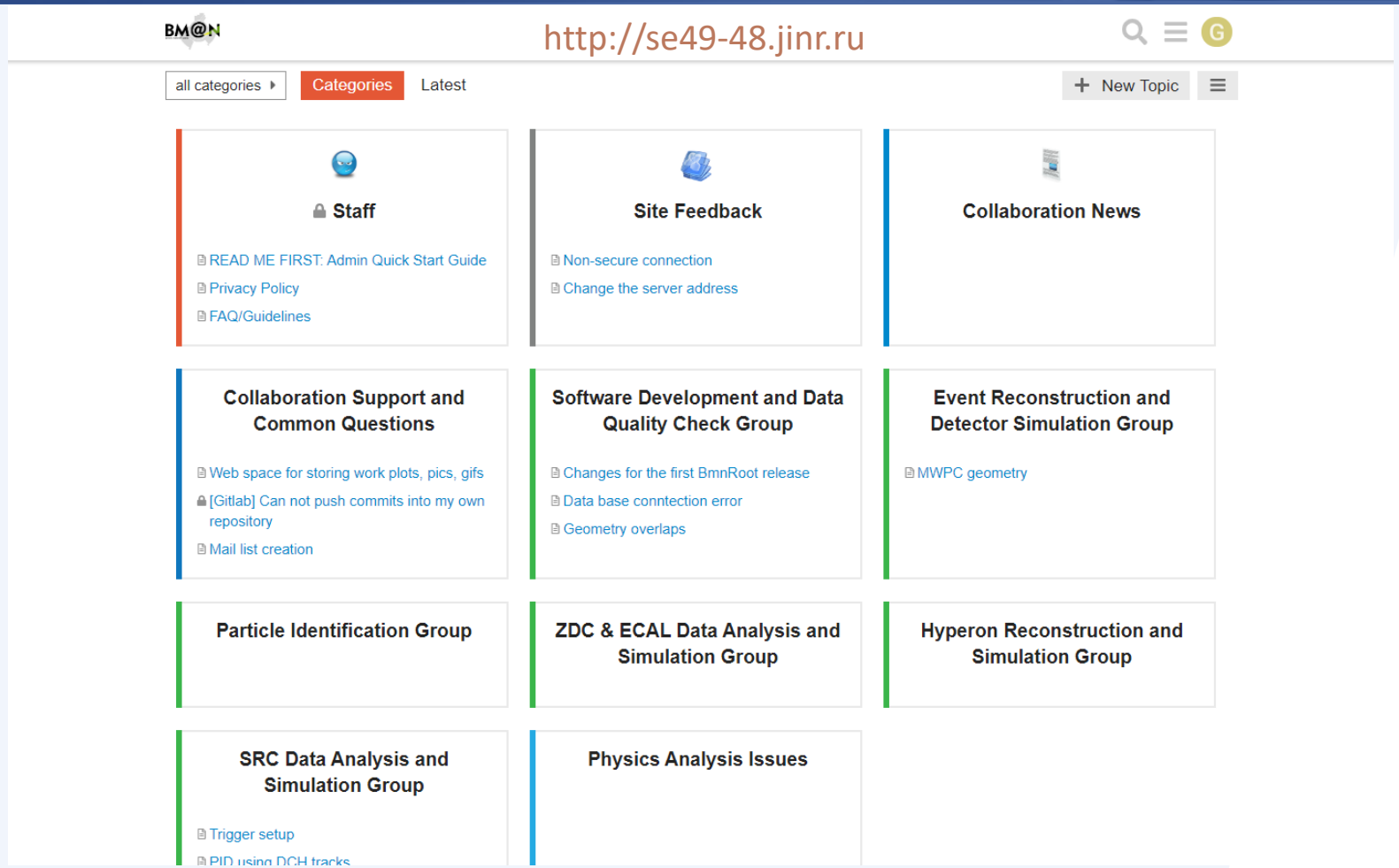
Web-services for the BM@N experiment

Official BM@N Web-site: *bmn.jinr.ru*



- ✓ ***Information***
- ✓ ***Documents***
- ✓ ***Software***
- ✓ ***Databases***
- ✓ ***Computing Section (NICA Cluster, MICC Complex, HybriLIT & Govorun)***
- ✓ ***Tests dashboard***
- ✓ ***Guides***
- ✓ ***Forum***
- ✓ ***Vidyo***
- ✓ ***BM@N Mail-lists (updates, errors…)***
- ✓ ***etc.***

BM@N Forum & News system



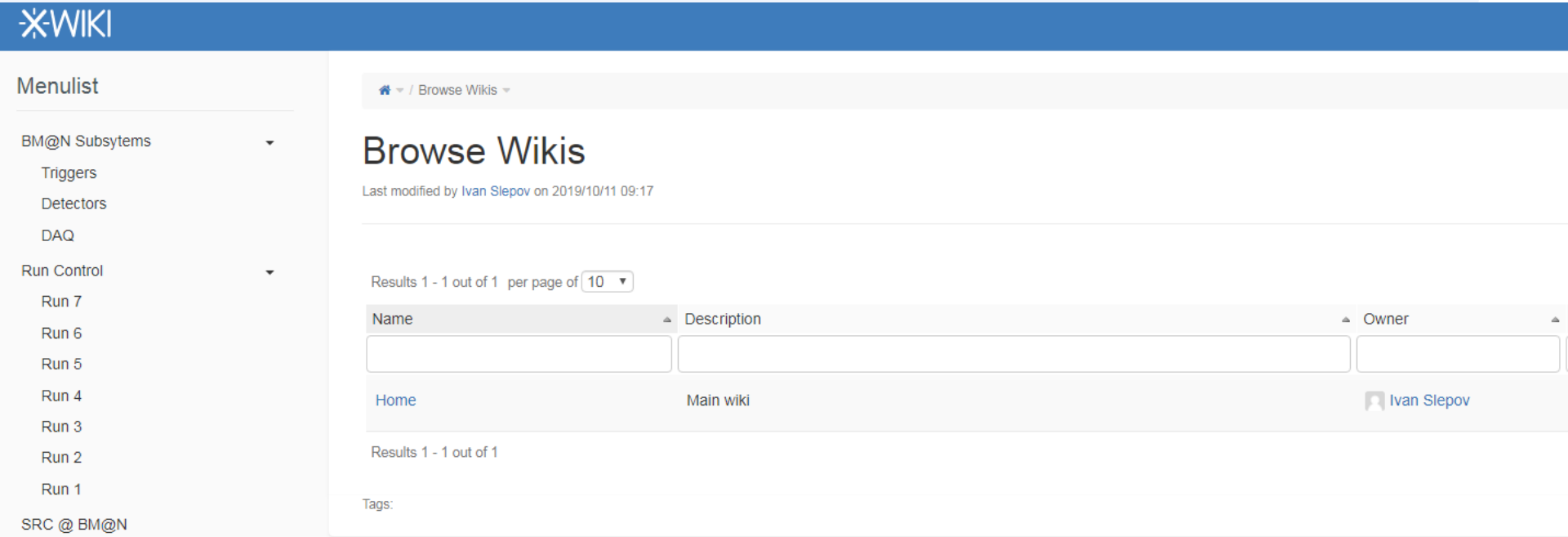
BM@N Forum & News system (built on Discourse) for a quick communication and discussions between collaboration members and groups:
various topics for different groups, subscriptions, comments…

BM@N Document Server

Main purposes:

- Document Server should contain all reports, meetings, posters, proceedings materials, articles, theses, grants, video materials, TDR, technical documentation for all experiment systems (manuals, graphics, work detector illustrations), etc.
- It allows cataloging hierarchically all the data for quick access to the desired BM@N section
- Document Server provides a quick search by the desired criteria and sections (keywords, authors, themes…)
- Many convenient tools are highly desirable: subscriptions, favourites for sections and documents…
- It also provides an opportunity to analyze the latest achievements on selected BM@N systems and activities of collaboration members

BM@N XWiki as Document Server



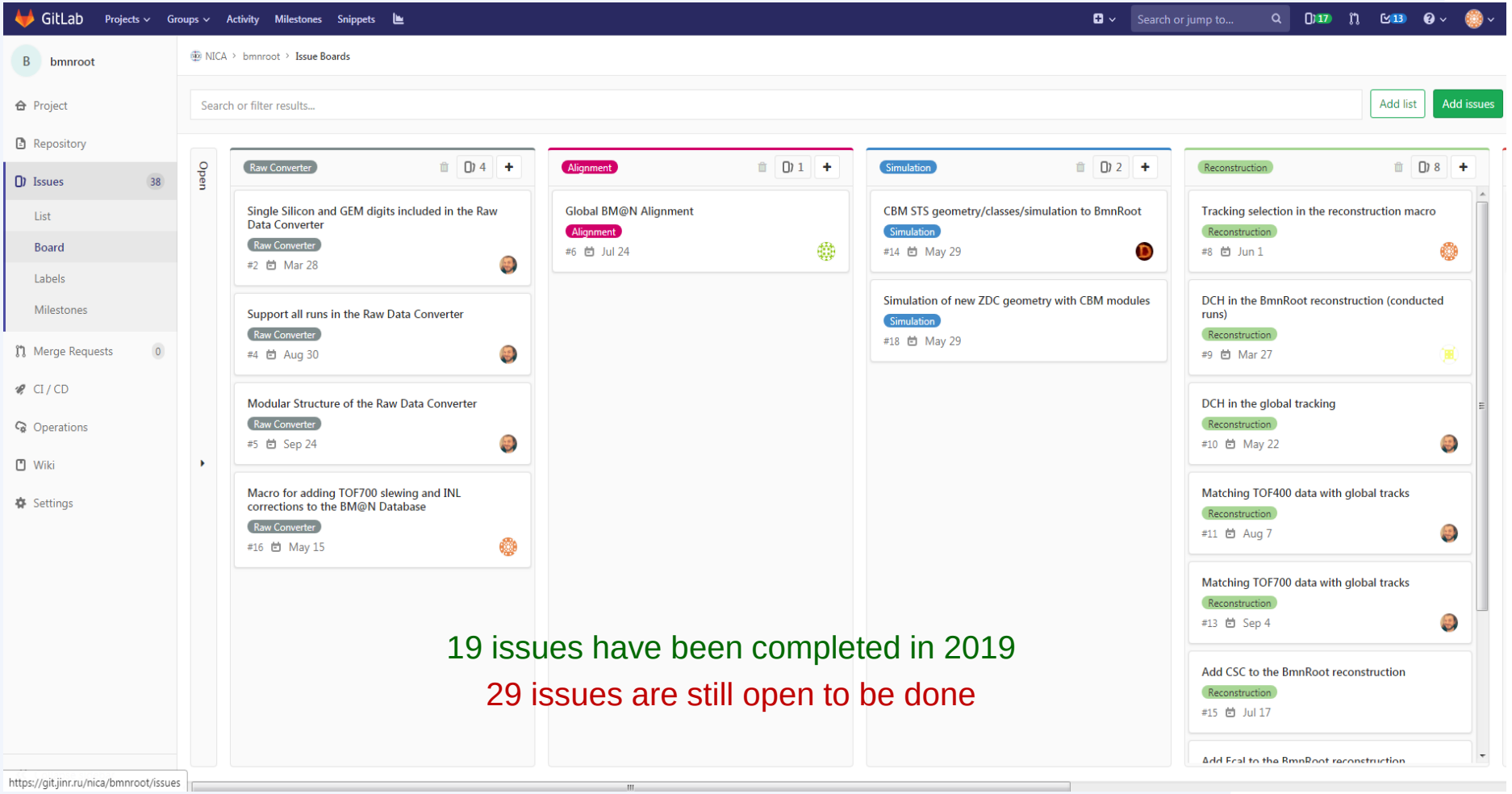
Disadvantages of the current Wiki:

1. Complex structure
2. No explicit hierarchical cataloging
3. No search by specified criteria
4. No personalizing (e.g. baskets)
5. No subscriptions
6. Some unstable conditions

Summary

- Because of the absence of the manpower for the BM@N software development, the search for external software contributors (students, PhD, tenure) will continue in BM@N collaboration and beyond. Many thanks to the current contributors!
- BmnRoot Release 19.10.0 has been issued. The mass production of the BM@N digits and DST files for Run 7 and Run 6 will be completely performed in a couple of weeks.
- The architecture of the BM@N mass data processing is under active development, and all related workflow services are under deployment now.
- RFBR support with the NICA three-year grant (18-02-40125) enables to significantly improve the Information Systems for BM@N online and offline data processing.
- Many offline and online software systems have been developed, but a lot of packages and services should be implemented for BM@N data processing. The list of software tasks is containing about 30 problems of different priorities.

Software Management via GIT Issues



19 issues have been completed in 2019

29 issues are still open to be done

GIT Issues:

Milestones → Issue List → Boards with Labels

Global Development Issues

Distributed and High-Performance Computing	Implementing Distributed Data Flow | Cluster Performance Evaluation Parallelization in ROOT (RDataFrame, PROOF) and Geant4 (CUDA) Search-profiling-parallelizing: OpenMP, MPI, CUDA/OpenCL… MPD-Scheduler evolution Workload Manager for Big Data: Panda, DIRAC, ALFA…
Visualization	Event Display as a Web-service: offline & online systems Training course for the BM@N event display…
Databases and User Interfaces	Selection of the framework for BM@N File Catalog: RUCIO… Converting existing text and table data to the Database view Web-monitoring of the Database…
Web-services & Online Systems	Online Monitoring System implementation via DDS system Distributed Processing via the Web-service…
Simulation and Reconstruction	New methods for track reconstruction (GenFit…) Implementation of fast event reconstruction for online processing Global Alignment based on Millepede II…

Thank you for your attention!

More information: bmn.jinr.ru
nica.jinr.ru

Forum: http://se49-48.jinr.ru

Email: *gertsen@jinr.ru*