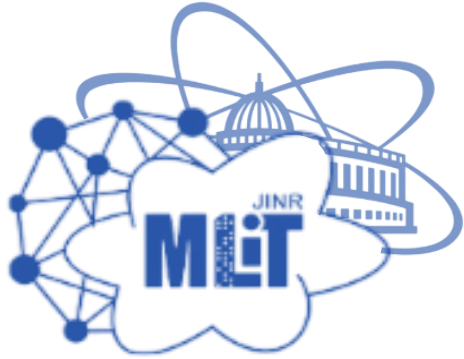




11th International Conference
"Distributed Computing and Grid
Technologies in Science and Education"
(GRID'2025)

Production manager control panel for the SPD experiment

Speaker:

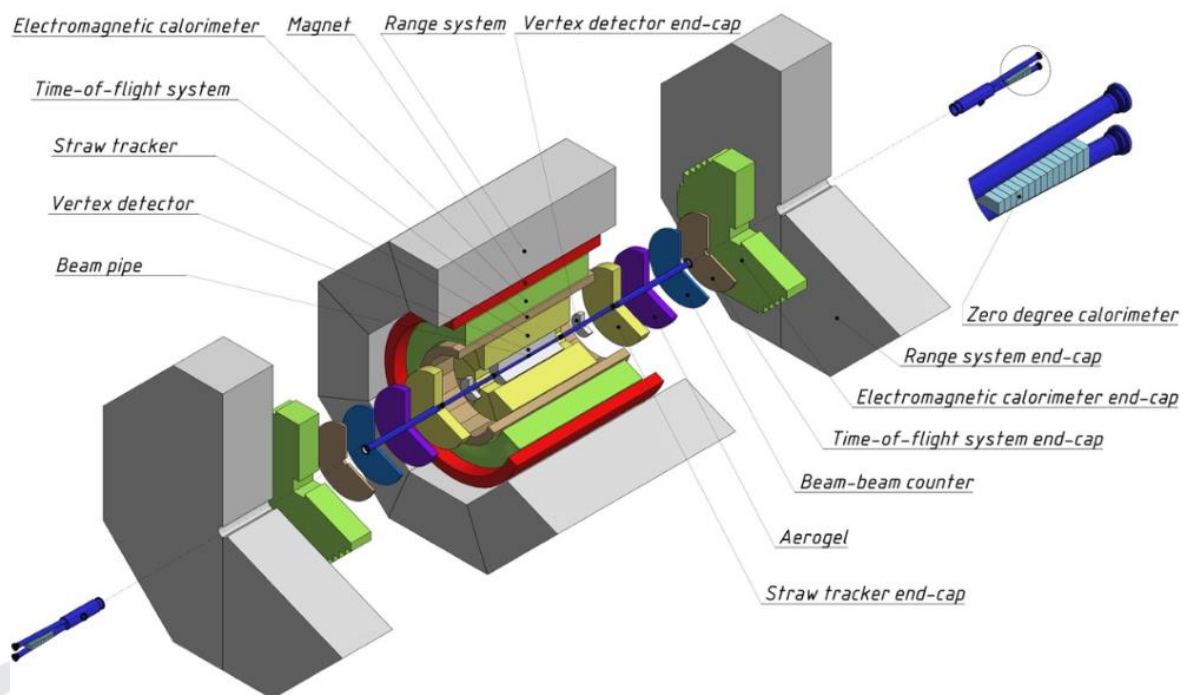
Monakov Nikita Glebovich
master's student, NRNU MEPhI
laboratory assistant, MLIT JINR



SPD experiment

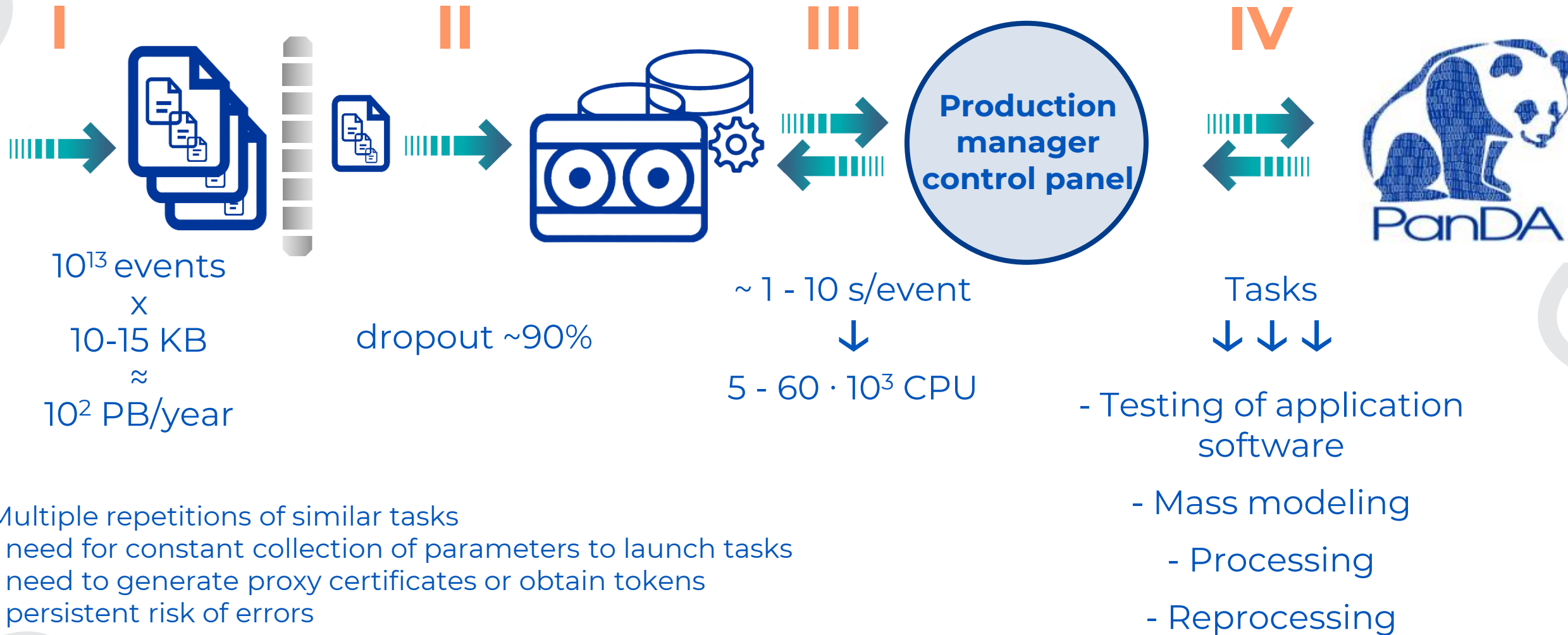
The SPD facility, located at one of the two beam intersection points of the NICA collider, was created for a comprehensive study of the spin structure of the **proton** and **deuteron**

- $\sqrt{s}$ up to 27 GeV
 - L up to $10^{32} \text{ sm}^{-2} \text{ s}^{-1}$
- $10^{13} \text{ events} \times 10\text{-}15 \text{ KB}$
 $\approx$
 10^2 PB/year

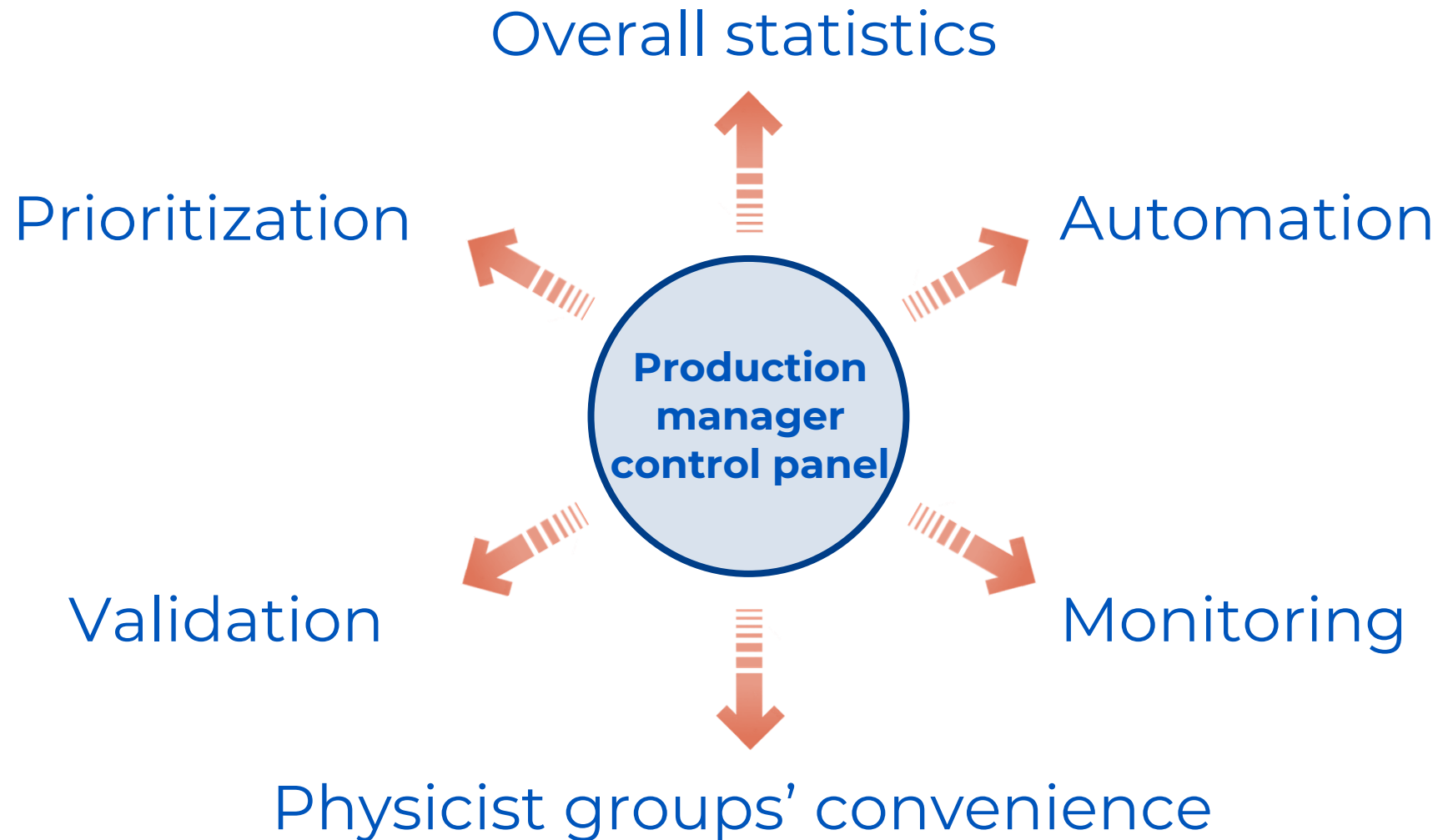


- The main focus will be on the study of
- polarized gluon component in reactions of inclusive charmonium production
 - open charm
 - direct photons
 - other spin-dependent phenomena in p-p / d-d collisions

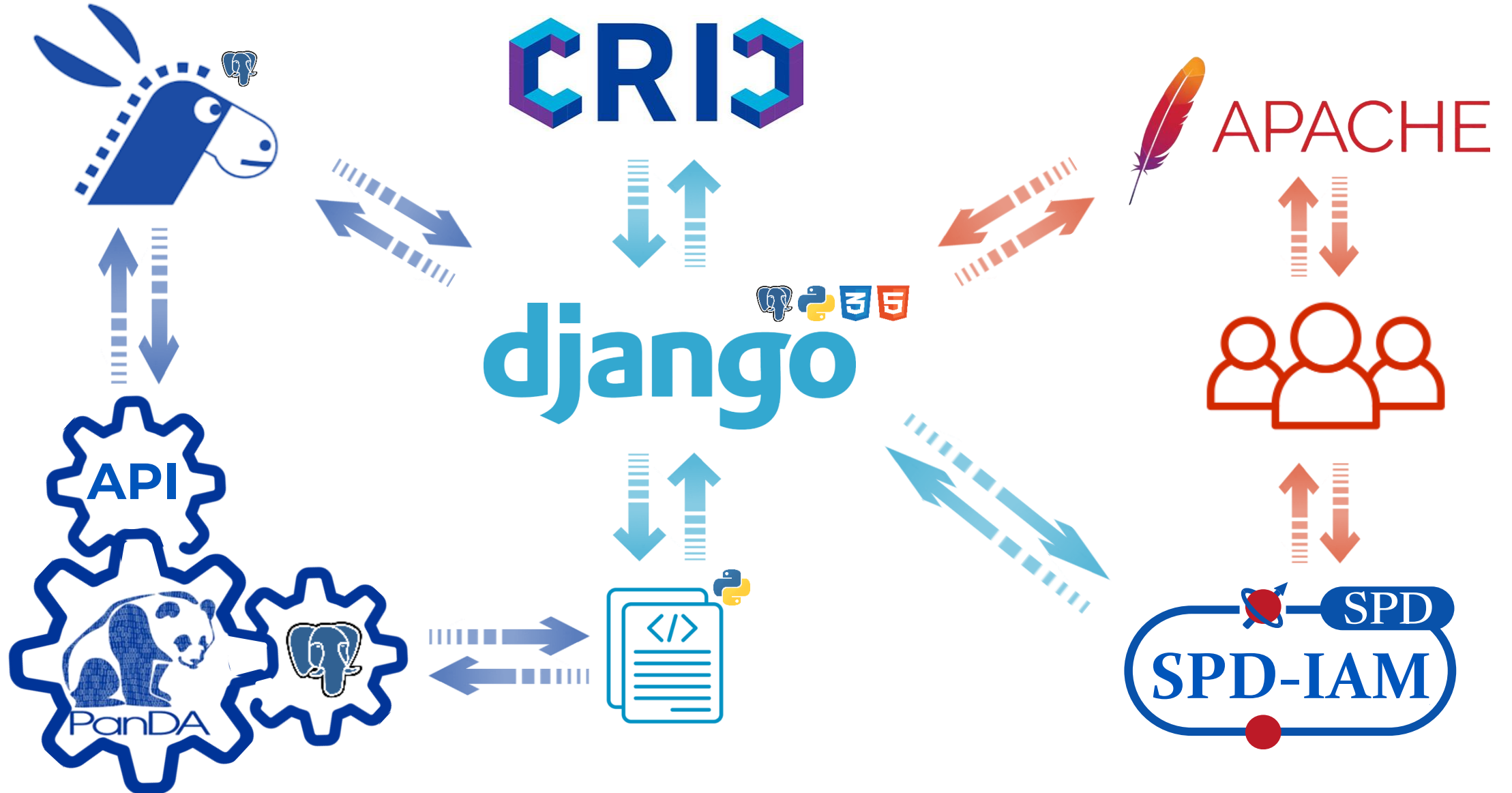
Motivation for developing the system



Current service concept



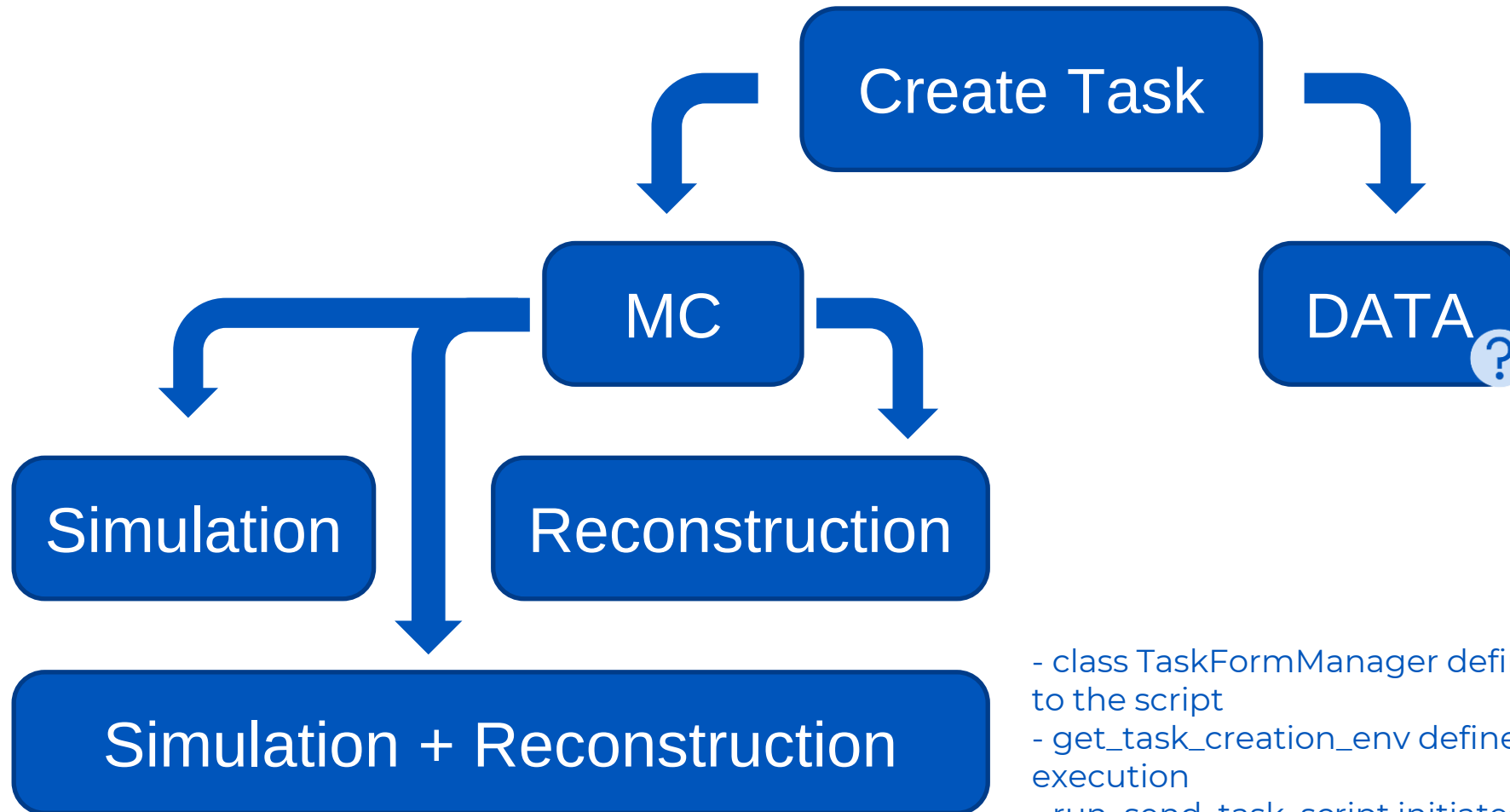
Technology stack





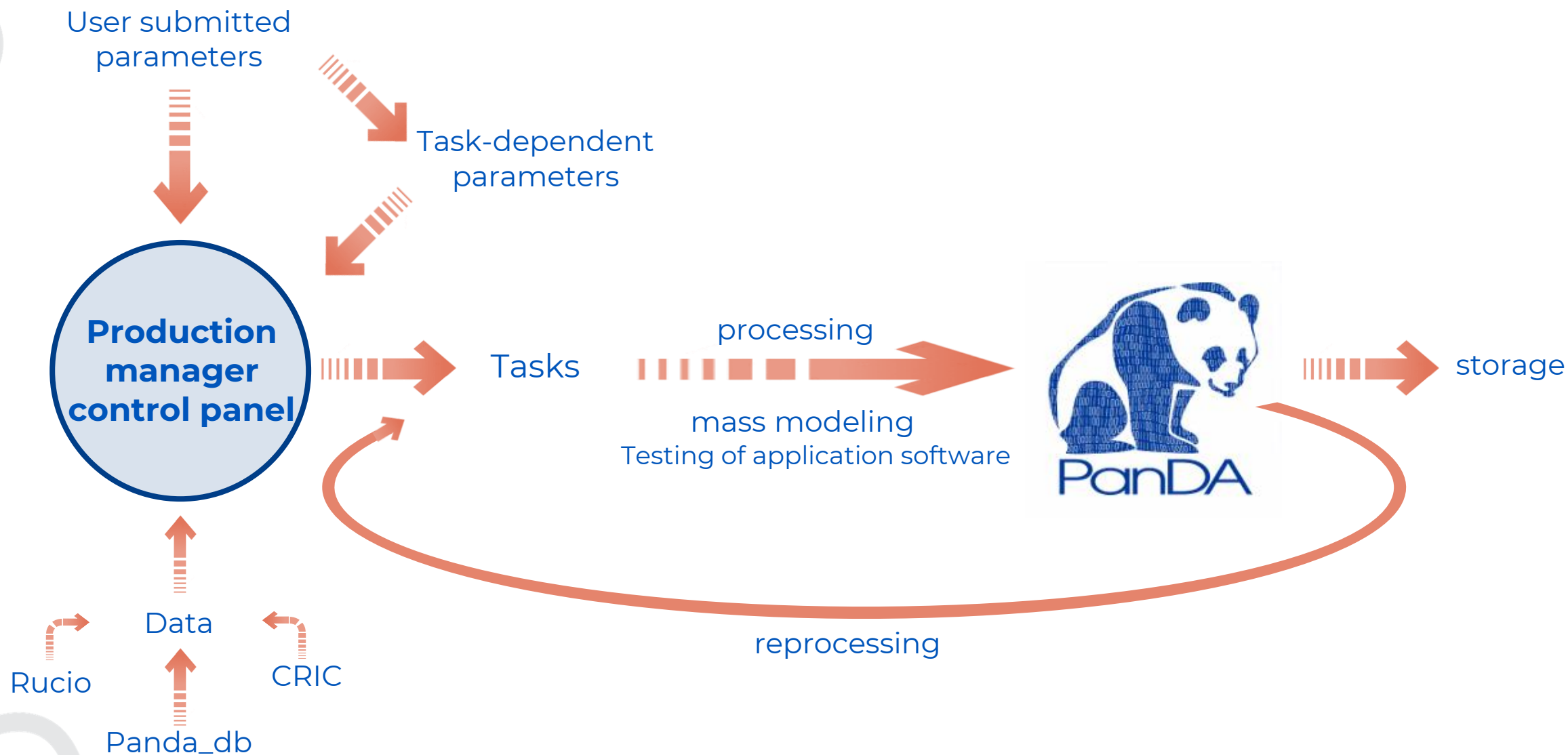
- A web application prototype has been developed
 - User authentication via SPD-IAM
 - Task creation following naming conventions
 - Job status tracking with filtering and sorting capabilities
 - Configured decorators and middleware
 - First version of cloning mechanism
- Implementation of automation scripts
- Integration with PanDA WMS using JWT
- Logging interactions with PanDA WMS

Task creation 1/3



- class TaskFormManager defines the set of parameters passed to the script
- get_task_creation_env defines environment variables for execution
- run_send_task_script initiates the execution of the script, logs, passes data necessary for chains

Task creation 2/3



Task creation 3/3



Simulation

Task Creation

Task name:

Output dataset name:
[Naming convention here](#)

Total events:

Events per job:

Cloud:

Data disk:

Skip scout: ☐

Offset:

Path to execution files:
smth like -> /cvmfs/spd.jinr.ru/production/MC/minbias-P8-spdroot417-dev.10GeV.V01

Path to container:
smth like -> /cvmfs/spd.jinr.ru/images/spdroot-dev-4.1.7.sif

Create task

Reconstruction

Task Creation

Task name:

Input dataset name:
[Naming convention here](#), note that no extension expected

Output dataset name:
[Naming convention here](#)

Files per job:

Cloud:

Data disk:

Skip scout: ☐

Offset:

Path to execution files:
smth like -> /cvmfs/spd.jinr.ru/production/MC/minbias-P8-spdroot417-dev.10GeV.V01

Path to container:
smth like -> /cvmfs/spd.jinr.ru/images/spdroot-dev-4.1.7.sif

Create task

Monitoring



Select field

Enter value

Filter

Task ID	Task name ↑ ↓	Parent ID	Creator	Status	Done jobs	Default/Current priority	Total events	Submit time ↑ ↓	Start time ↑ ↓	End time ↑ ↓
343	PROD2025-008.RECO	343	Elena Zemlyanichkina	finished	9997	900/900	0	12:40, 06 Apr 2025	12:48, 06 Apr 2025	03:56, 07 Apr 2025
342	PROD2025-008.SIM	342	Elena Zemlyanichkina	done	10000	900/900	0	03:06, 05 Apr 2025	06:08, 05 Apr 2025	11:38, 06 Apr 2025
341	PROD2025-007.RECO	341	Elena Zemlyanichkina	finished	9993	900/900	0	03:40, 04 Apr 2025	06:46, 04 Apr 2025	01:41, 05 Apr 2025
340	PROD2025-006.RECO	340	Elena Zemlyanichkina	aborted	0	900/900	0	03:21, 04 Apr 2025	None	03:35, 04 Apr 2025
339	PROD2025-007.SIM	339	Elena Zemlyanichkina	done	10000	900/900	0	12:42, 03 Apr 2025	12:50, 03 Apr 2025	22:57, 03 Apr 2025
338	PROD2025-006-RECO	338	Elena Zemlyanichkina	done	1535	900/900	0	04:08, 03 Apr 2025	04:11, 03 Apr 2025	12:04, 03 Apr 2025
337	PROD2025-006-SIM	337	Elena Zemlyanichkina	running	1231	900/900	0	12:22, 01 Apr 2025	12:24, 01 Apr 2025	None
336	PROD2025-006	336	Elena Zemlyanichkina	aborted	0	900/900	0	11:27, 01 Apr 2025	None	12:10, 01 Apr 2025
335	PROD2025-005-RECO.1	335	Artem Petrosyan	finished	1221	900/900	0	12:15, 25 Mar 2025	12:18, 25 Mar 2025	16:35, 25 Mar 2025
334	PROD2025-005.1	334	Artem Petrosyan	done	1250	900/900	0	10:16, 25 Mar 2025	10:18, 25 Mar 2025	12:25, 25 Mar 2025

Page: 1 2 3 ... 25 26 27

← Current tasks

Successful tasks



Select field

Enter value

Filter

Task ID	Task name ↑ ↓	Status	Start date	End date	Walltime	Total events	Events per job	Total jobs	Out DS size, GB	Out Log size, GB
343	PROD2025-008.RECO	finished	06 Apr 2025	07 Apr 2025	30	None	None	9997	3390.70	3.94
342	PROD2025-008.SIM	done	05 Apr 2025	06 Apr 2025	0	40000000	4000	10000	3214.03	1.06
341	PROD2025-007.RECO	finished	04 Apr 2025	05 Apr 2025	38	None	None	9993	3389.51	3.97
339	PROD2025-007.SIM	done	03 Apr 2025	03 Apr 2025	0	40000000	4000	10000	3214.65	1.07
338	PROD2025-006-RECO	done	03 Apr 2025	03 Apr 2025	15	None	None	1535	1138.59	0.62
335	PROD2025-005-RECO.1	finished	25 Mar 2025	25 Mar 2025	26	None	None	1221	413.70	0.48
334	PROD2025-005.1	done	25 Mar 2025	25 Mar 2025	0	5000000	4000	1250	401.83	0.13
333	PROD2025-004-RECO.1	finished	24 Mar 2025	25 Mar 2025	17	None	None	9993	7869.24	4.04
331	PROD2025-004-1	done	20 Mar 2025	22 Mar 2025	10524	40000000	4000	10000	7674.93	1.59
329	TEST_S1-001-SIM.1	done	18 Mar 2025	18 Mar 2025	0	100	10	10	0.03	0.00

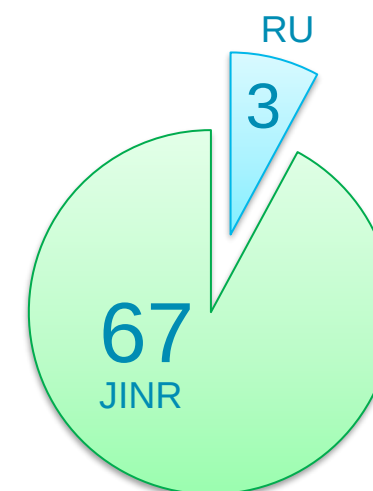
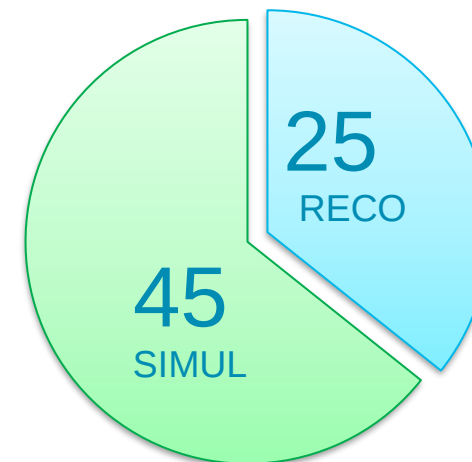
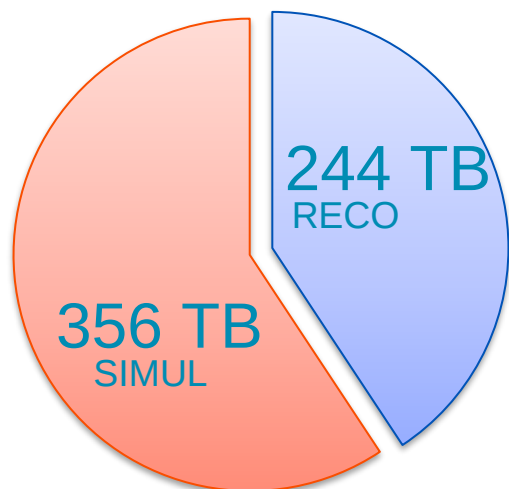
Page: 1 2 3 4 5

Export csv

*Filtering & sorting
functionality available



- Successfully processed about 400k jobs across 70 tasks

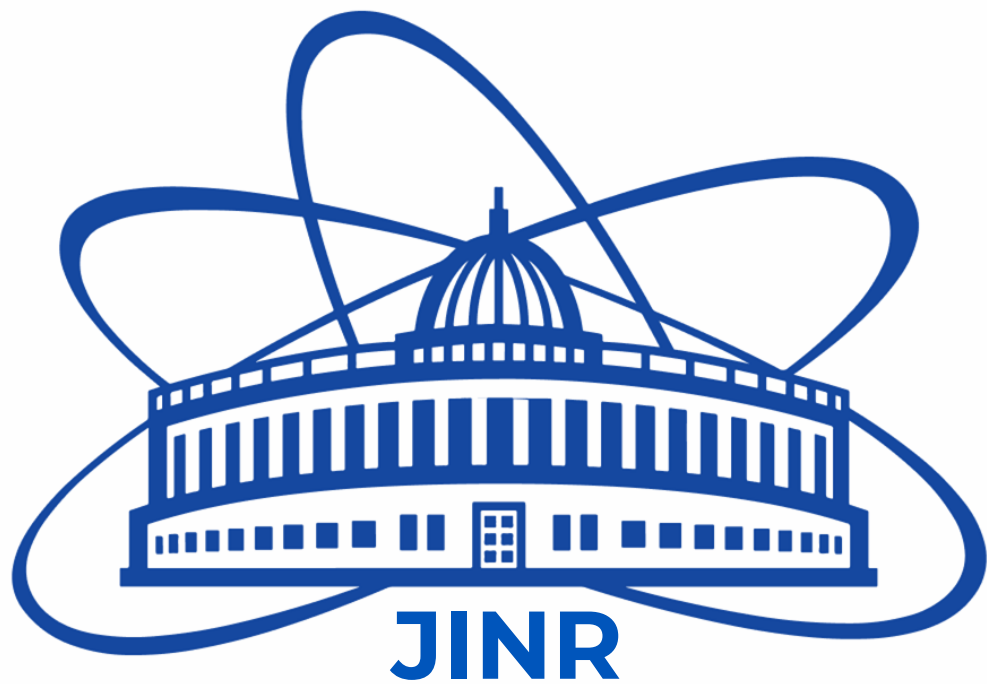


- Total output datasets volume – more than 600 TB

Current tasks and upcoming plans



- Second version of cloning mechanism
- Asynchronous task submitting
- Further automation of task creation and validation
- Expansion of job monitoring capabilities
- Extra collection layer for big tasks



**Thanks for
attention**



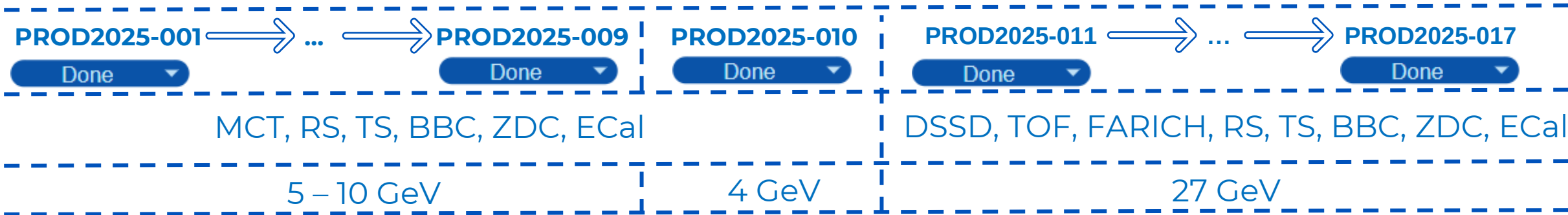
Task content

Modeling and reconstruction are made for p-p collisions with SpdRoot framework.

Framework includes:

- geometric description of SPD detector
- particle propagation with Geant4
- simplified simulation of detector response
- reconstruction algorithms

At the current stage of development, redundant information about particle interactions within the detector is still being retained; this will be subject to future event-size optimization as well as optimization during the modeling and reconstruction phases.



- МСТ - центральный трекер на базе Micromegas для восстановления импульса заряженных частиц
- RS - мюонная система;
- TS - трековая система для идентификации и восстановления импульсов заряженных частиц;
- BBC - внутренний и внешний счетчики столкновений для контроля поляризации и светимости;
- ZDC* - калориметры нулевых углов по обе стороны установки для контроля поляризации и светимости;
- ECal - электромагнитный калориметр для регистрации фотонов;
- DSSD - кремниевый вершинный детектор для реконструкции вторичных вершин распадов мезонов
- TOF - время-пролетная система для разделения π/K и K/p ;
- FARCH - аэрогелевый детектор для разделения π/K и K/p .