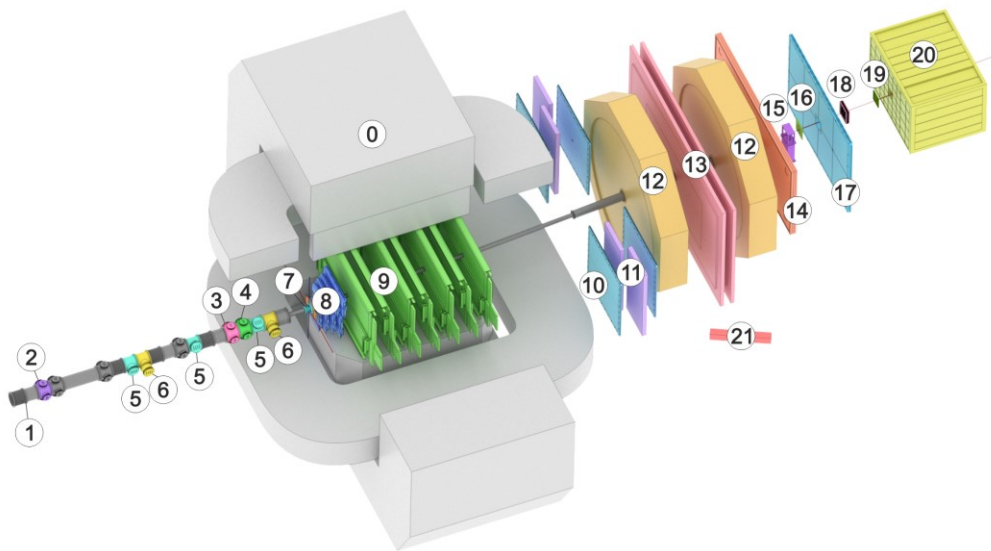# BM@N 11th collaboration meeting
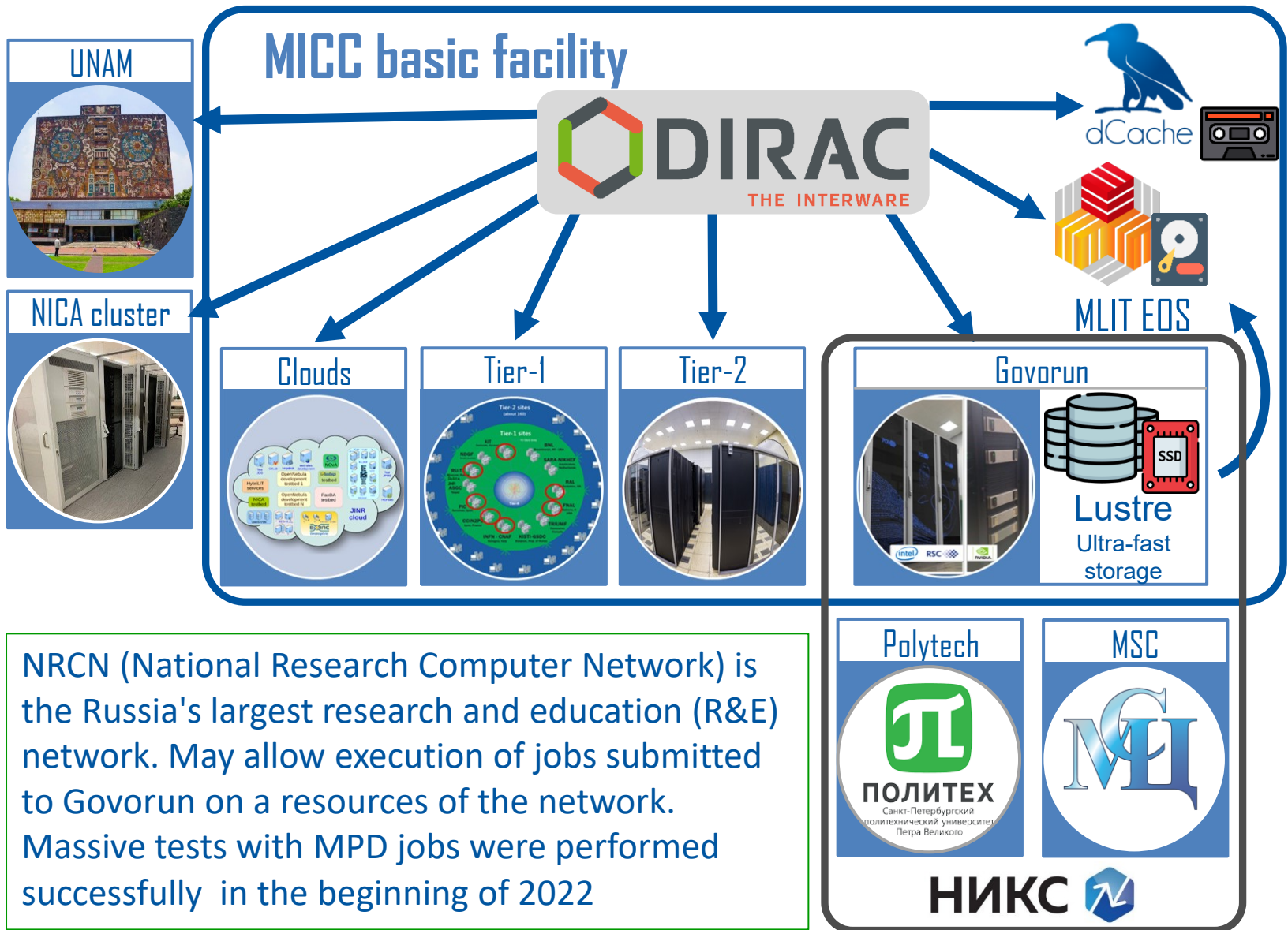
BM@N distributed computing status and analytics

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LHEP   **MLIT**

**Status report
30.11.2023**

DIRAC in JINR

MICC basic facility

UNAM

NICA cluster

dCache

MLIT EOS

Clouds

Tier-1

Tier-2

Govorun

Lustre
Ultra-fast storage

Polytech

MSC

НИКС

NRCN (National Research Computer Network) is the Russia's largest research and education (R&E) network. May allow execution of jobs submitted to Govorun on a resources of the network. Massive tests with MPD jobs were performed successfully in the beginning of 2022

Summer EOS Failure®

- July-August 2023: Fail occurred due to the bug in the EOS source code. This bug activates only during high load, so it is not observable during initial functionality tests.

  - All files larger than 500 MB were in risk.

  - Around 3-7 % of files under DIRAC Data Management system were affected(subjectively). This had great effect on BM@N production process

  - Partial BM@N data processing chain was performed for half of runs

From BM@N the last Software and Analysis meeting

Summer EOS Failure®

Current status

- **Files are not corrupting anymore!**

At least 30000 files with the size of 3 GB were 100% correct after 1 month after creation

- Real corruption ratio could be around 15%

But, in BM@N we just removed all data from EOS in LIT and reuploaded them from NICA cluster during a day.
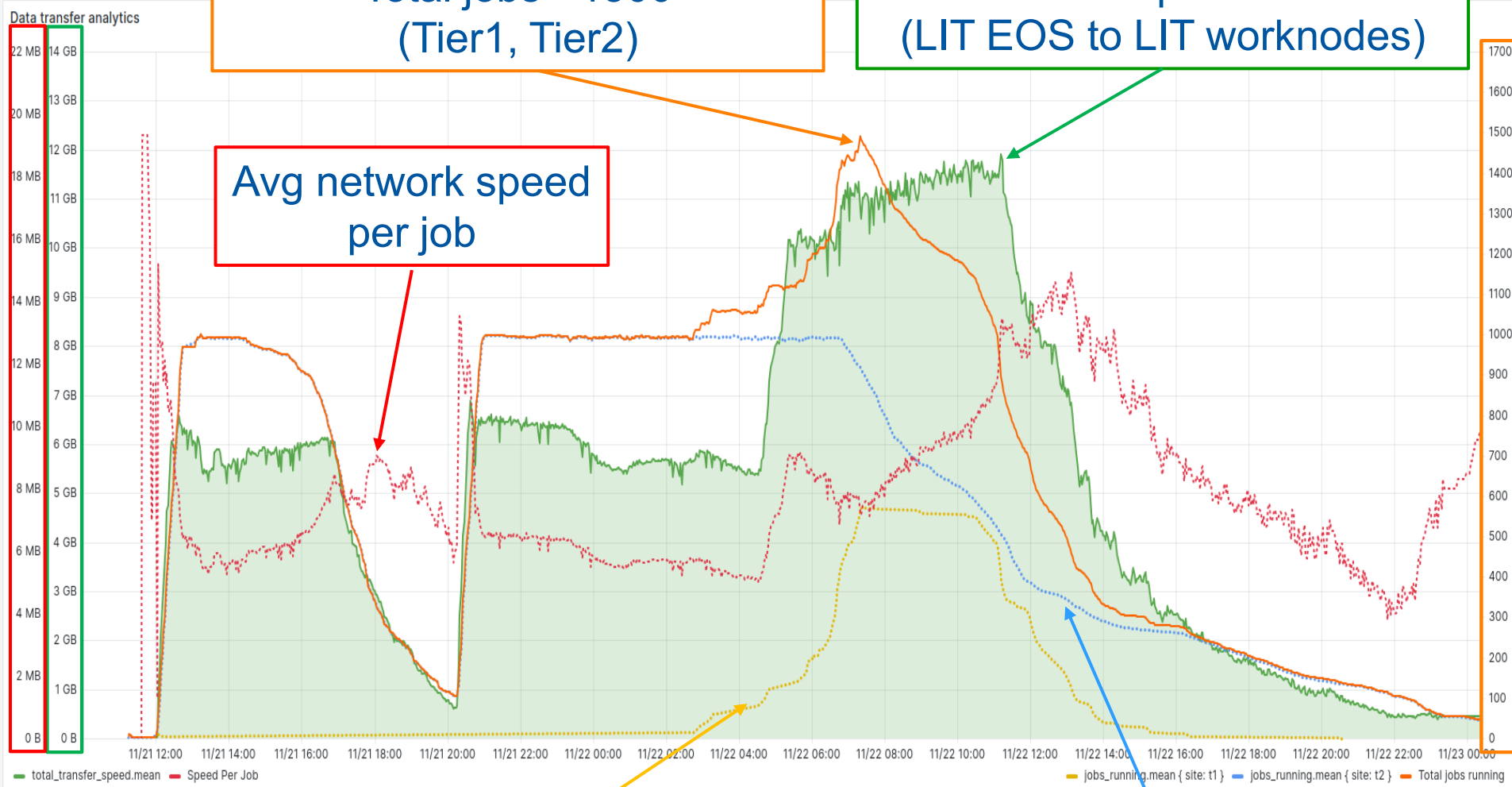
- Data integrity check approach was developed to speedup search and detection of any possible corruptions

Integrity check load

Total jobs - 1500
(Tier1, Tier2)

Total network speed – 12 GB/s
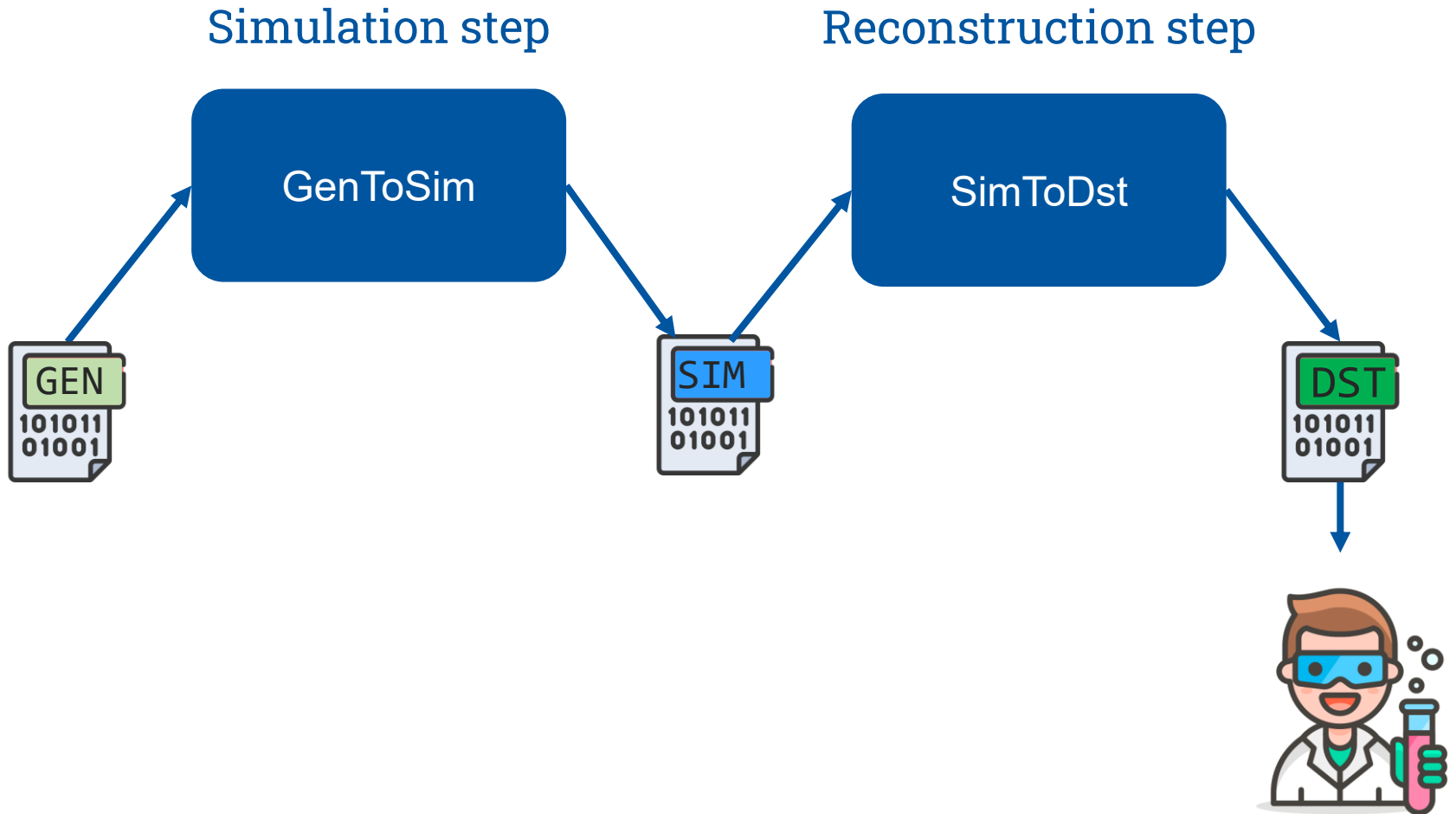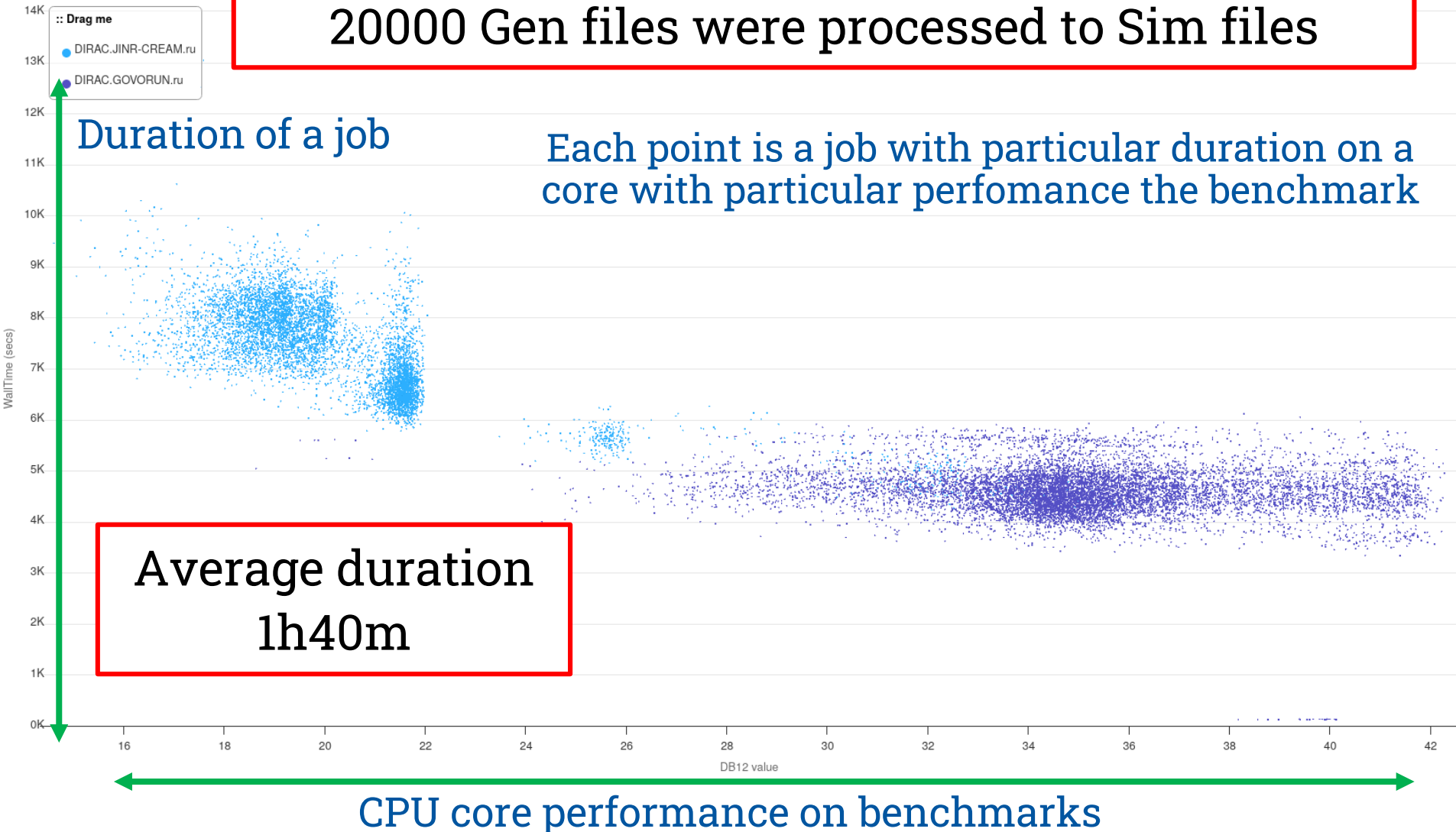(LIT EOS to LIT worknodes)
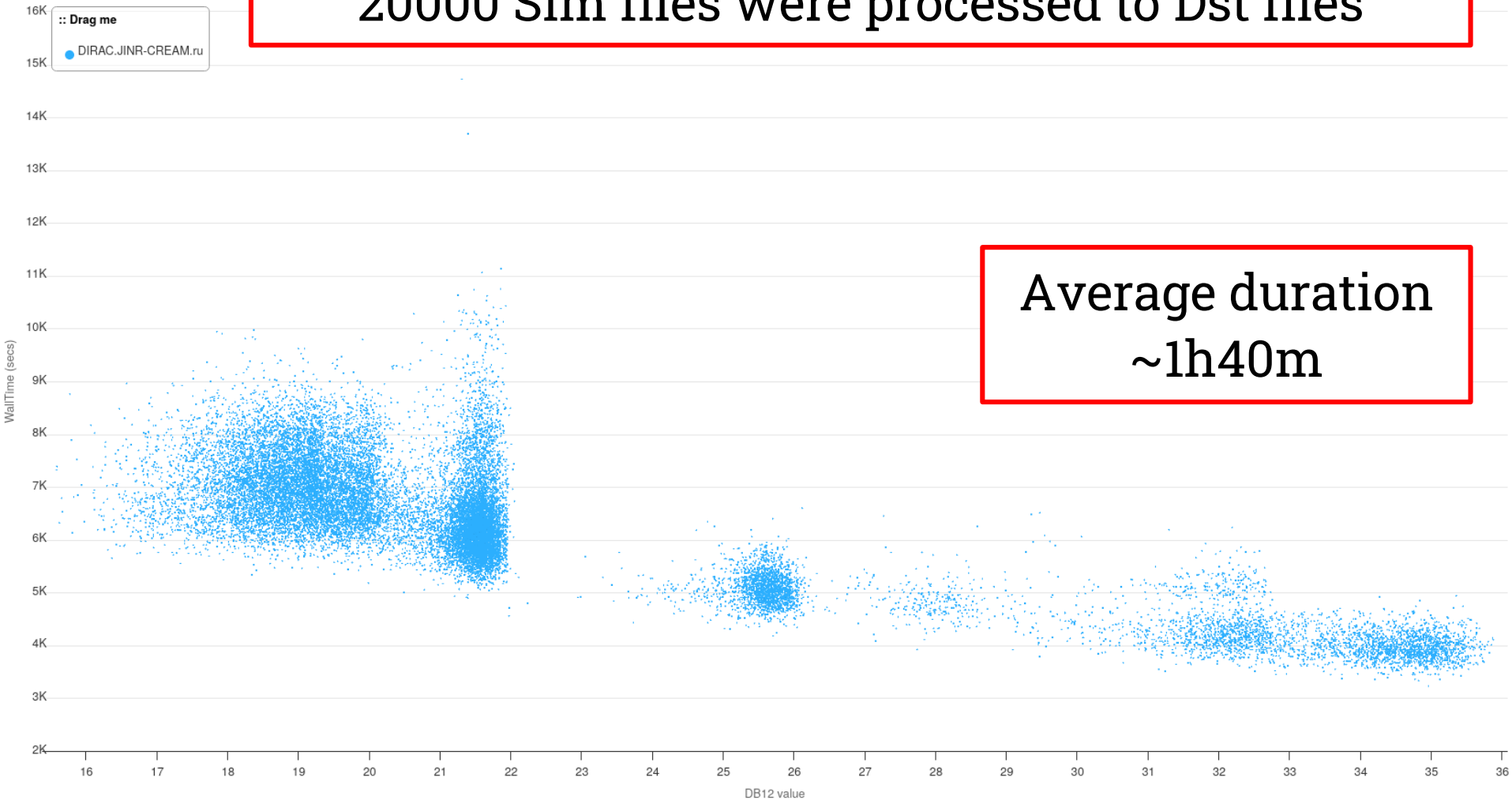
Avg network speed per job

Tier1 jobs

Tier2 jobs

Data transfer analytics

total_transfer_speed.mean   Speed Per Job   jobs_running.mean { site: t1 }   jobs_running.mean { site: t2 }   Total jobs running

5

Workflow of Monte-Carlo

Simulation step

Reconstruction step

GenToSim

SimToDst

GEN
101011
01001

SIM
101011
01001

DST
101011
01001

Step 1: Gen to Sim

20000 Gen files were processed to Sim files

Duration of a job

Each point is a job with particular duration on a core with particular perfomance the benchmark

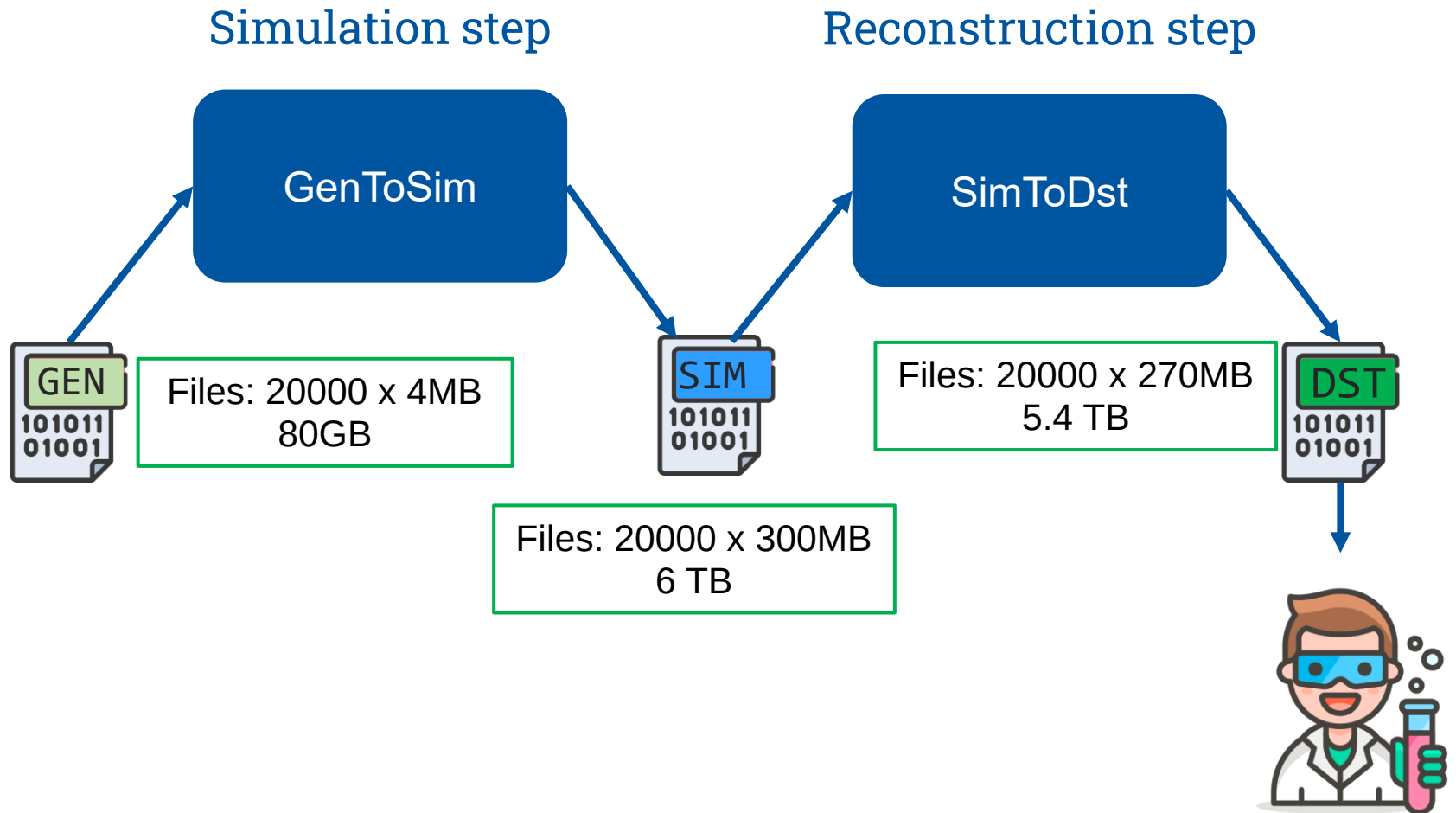Average duration
1h40m

CPU core performance on benchmarks

Step 2: Sim to Dst

20000 Sim files were processed to Dst files

Average duration
~1h40m

Workflow of Monte-Carlo

Simulation step

Reconstruction step

GenToSim

SimToDst

GEN
101011 01001

Files: 20000 x 4MB
80GB

SIM
101011 01001

Files: 20000 x 270MB
5.4 TB

DST
101011 01001

Files: 20000 x 300MB
6 TB

Small summary on previous productions
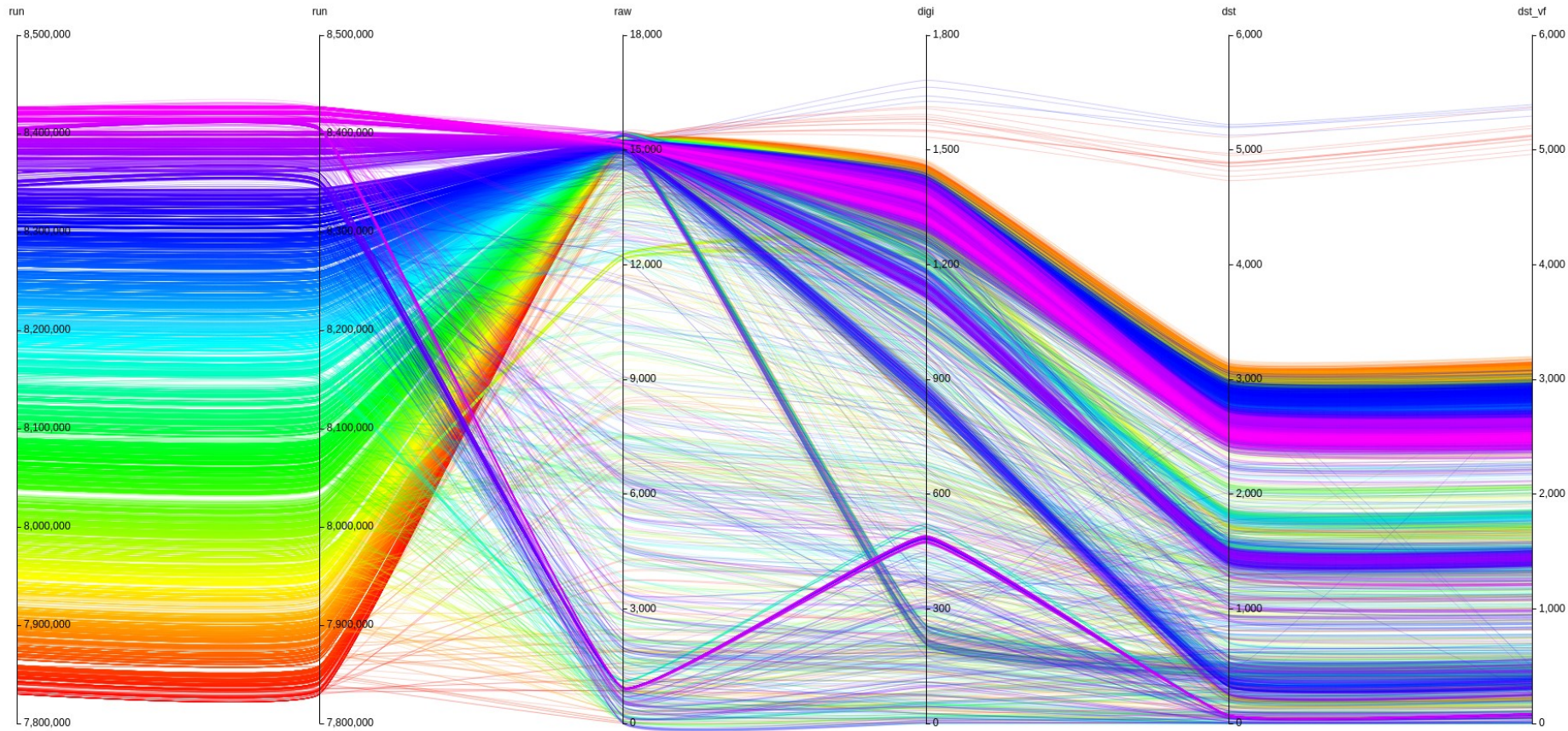
List of participants

DIRAC: Igor Pelevanyk
BM@N: Konstantin Gertsenberger

Responsible for resources:
Tier-1,Tier-2, EOS: Valery Mitsyn
Govorun: Dmitry Podgainy, Dmitry Belyakov, Aleksandr Kokorev
NICA cluster: Ivan Slepov
Network: Andrey Dolbilov

Results

- Summer EOS Failure hit us hard, a lot of time and efforts invested in investigation and working with the issue.

- 7 minor productions and 5 major productions were performed since the last BM@N Collaboration meeting(14-17 May 2023)

- Requirements to the computing capabilities grows. Especially when BM@N and MPD prepare for collaboration meetings

- Monte-Carlo looks like relatively simple workload for the DIRAC infrastructure