

arnes 
povezujemo znanje



MREŽA ZNANJA

Ljubljana, 4 December 2024

Supercomputing in Slovenia – SLING (Slovenian National Supercomputing Network)

Samo Stanič (University of Nova Gorica)
SLING Coordinator

Goals and tasks of SLING



Slovenian National Supercomputing Network (SLING)

Consortium for **advancing high-performance computing usage and management of supercomputing Infrastructures in Slovenia**, established in 2009

Consortium Objective

Setting in place of permanent national HPC infrastructure with access to shared national and European resources for partner organizations and users, and **providing support for its utilization**

The structure of SLING



- **Members of the SLING consortium** can be **academic, research, development, educational, and other institutions under public or corporate law**, as well as associations and infrastructures, demonstrating interest and formally joining.
- **SLING Council** is the highest authority of the consortium, which sets guidelines for infrastructure development, participation in international organizations and infrastructures, and decides on the accession of new members
- **The Coordinator** and his team are responsible for the preparation and coordination of the work program's implementation
- **The legal representative** of SLING is **ARNES**

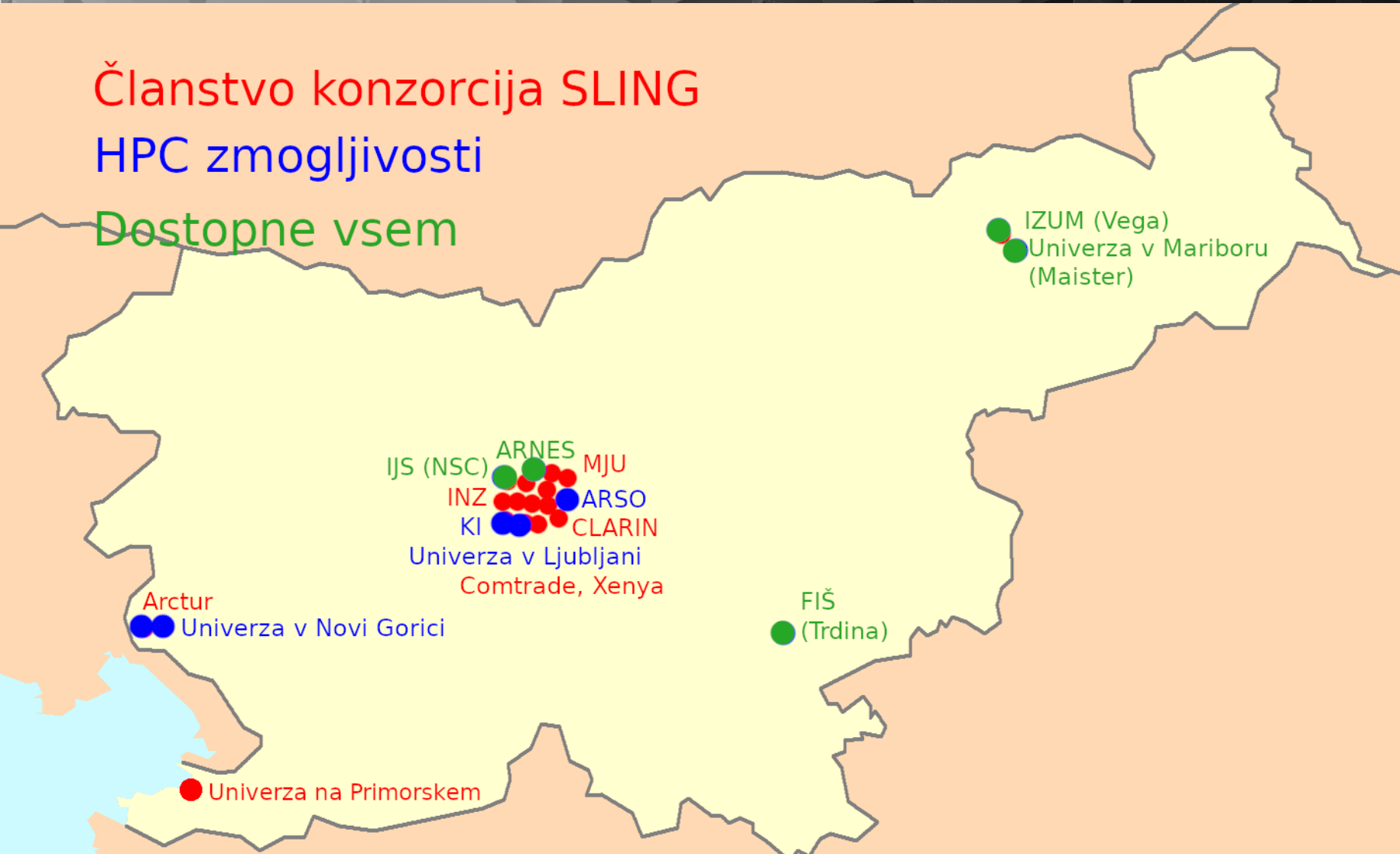
SLING Consortium



Članstvo konzorcija SLING

HPC zmogljivosti

Dostopne vsem



Člani SLING

- Agencija Republike Slovenije za okolje
- Akadska in raziskovalna mreža Slovenije - ARNES
- Arctur d. o. o.
- CLARIN Slovenija
- Comtrade
- Fakulteta za gradbeništvo in geodezijo Univerze v Ljubljani
- Fakulteta za informacijske študije Univerze v Novem Mestu
- Fakulteta za matematiko in fiziko Univerze v Ljubljani
- Fakulteta za računalništvo in informatiko Univerze v Ljubljani
- Fakulteta za strojništvo, Univerza v Ljubljani
- Institut informacijskih znanosti - IZUM
- Institut Jožef Stefan - IJS
- Inštitut za novejšo zgodovino
- Kemijski inštitut - KI
- Medicinska fakulteta Univerze v Ljubljani
- Ministrstvo za javno upravo - MJU
- Nacionalni inštitut za biologijo
- Rudolfovo – Znanstveno in tehnološko središče Novo Mesto
- Univerza v Mariboru
- Univerza v Novi Gorici
- Univerza na Primorskem
- Xenya d. o. o.

Recent activities



Main tasks

- Adoption of **new rules for open access** to national HPC capacities (2023)
- New SLING website and a portal for online application for open access at <https://www.sling.si/> (2023) and first call for projects using this portal was concluded
- **Upgrade of existing national HPC capacities** – construction of two data HPC centers by ARNES through the support of the Ministry of Higher Education, Science and Innovation
- Improvement of communication regarding the **strategy for the development of supercomputing in Slovenia** between users
- Contribution to the **Planning of HPC infrastructure investments** in interaction with the decision makers

https://www.sling.si



[SLING](#) [Competence Centre](#) [Users](#) [Trainings](#) [Contact](#)

Slovenian National Supercomputing Network

Slovenian National Supercomputing Network (SLING) is a consortium for the development of grid-computing and management of supercomputing infrastructures in Slovenia.

[LEARN MORE](#)

Supercomputing

for the industry

[LEARN MORE](#)

Grid network

technology

[LEARN MORE](#)

Competence centre

for HPC

[LEARN MORE](#)

Support



The support team at the SLING consortium level (in particular partners from JSI and IZUM) has set up:

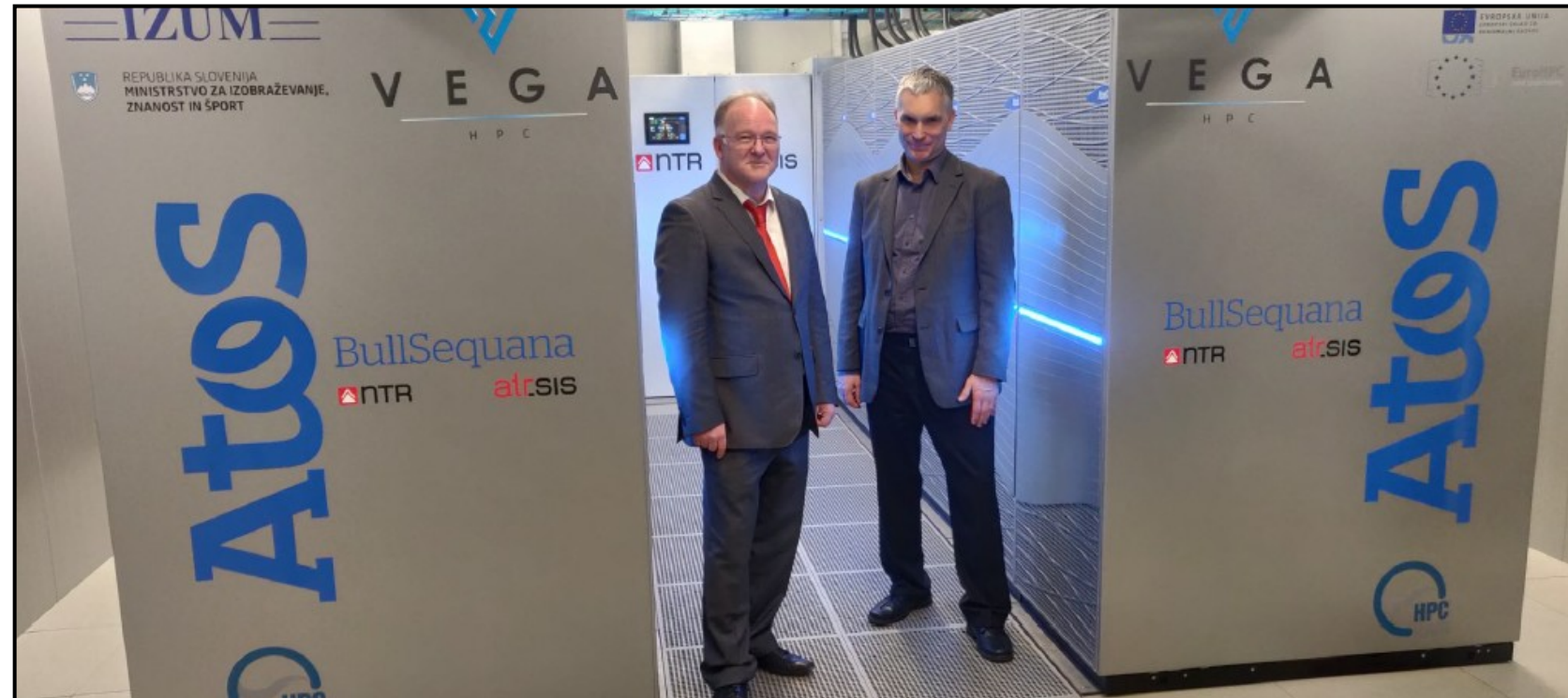
Multiple federative services (**including the use of the same user identity across all HPC clusters**)

- Utilization of support services such as GitLab, Nextcloud, etc.

HPC Vega



- Operational since 2021 at IZUM in Maribor
- 6.9 PFLOPS, with a peak performance of 10.1 PFLOPS
- Ranked among the top 50 most powerful machines at startup
- Expected end of operation in 2026
- HPC Infrastructure 17 M EUR, est. avg. op. Costs 4 M EUR / year



Prof. Dr. Andrej Filipčič and Dr. Jan Jona Javoršek (JSI)



EuroHPC
Joint Undertaking



REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION,
SCIENCE AND SPORT

National resources Vega / usage

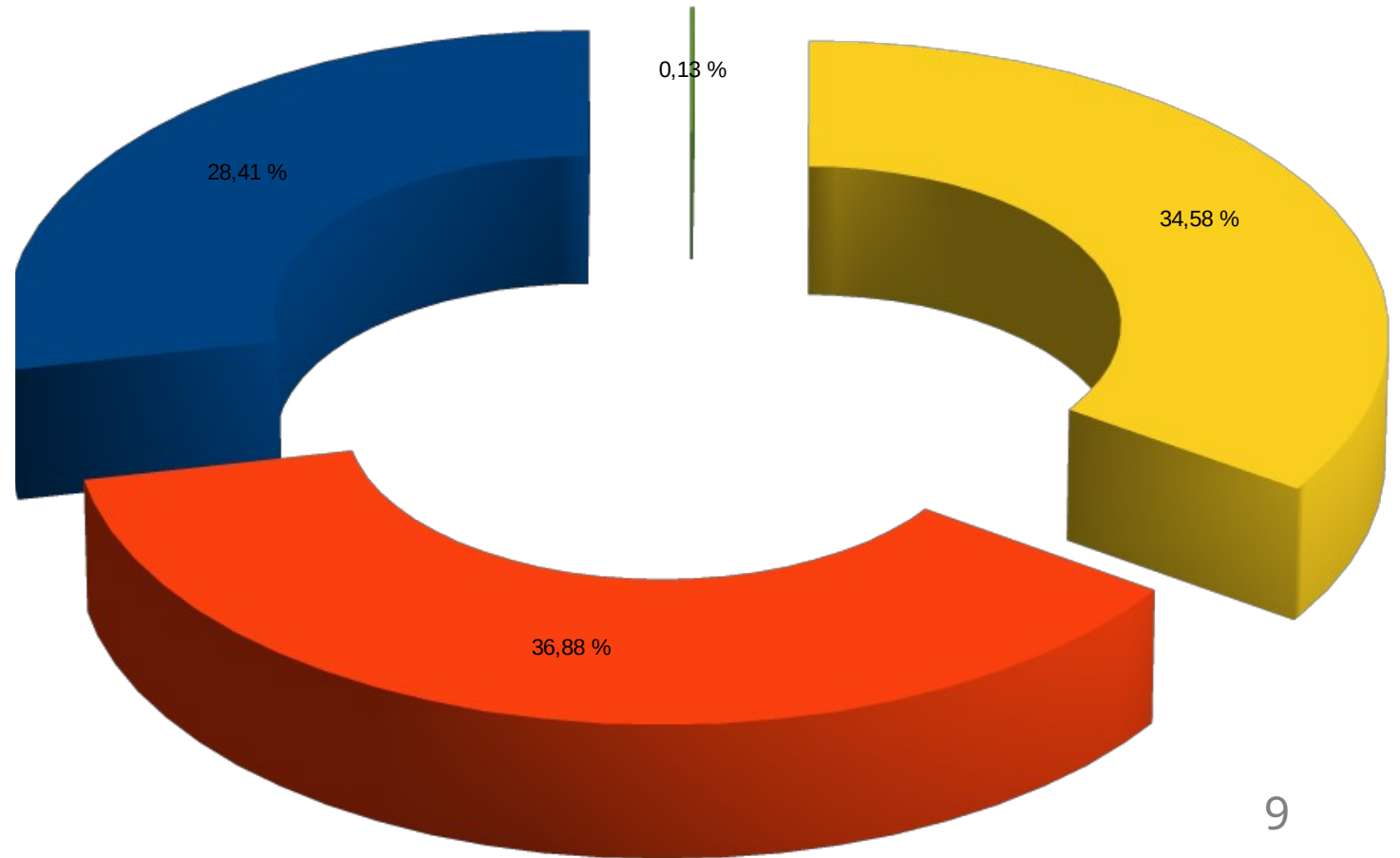


Yearly average

10.2022 - 11.2023

Vega is being fully utilized

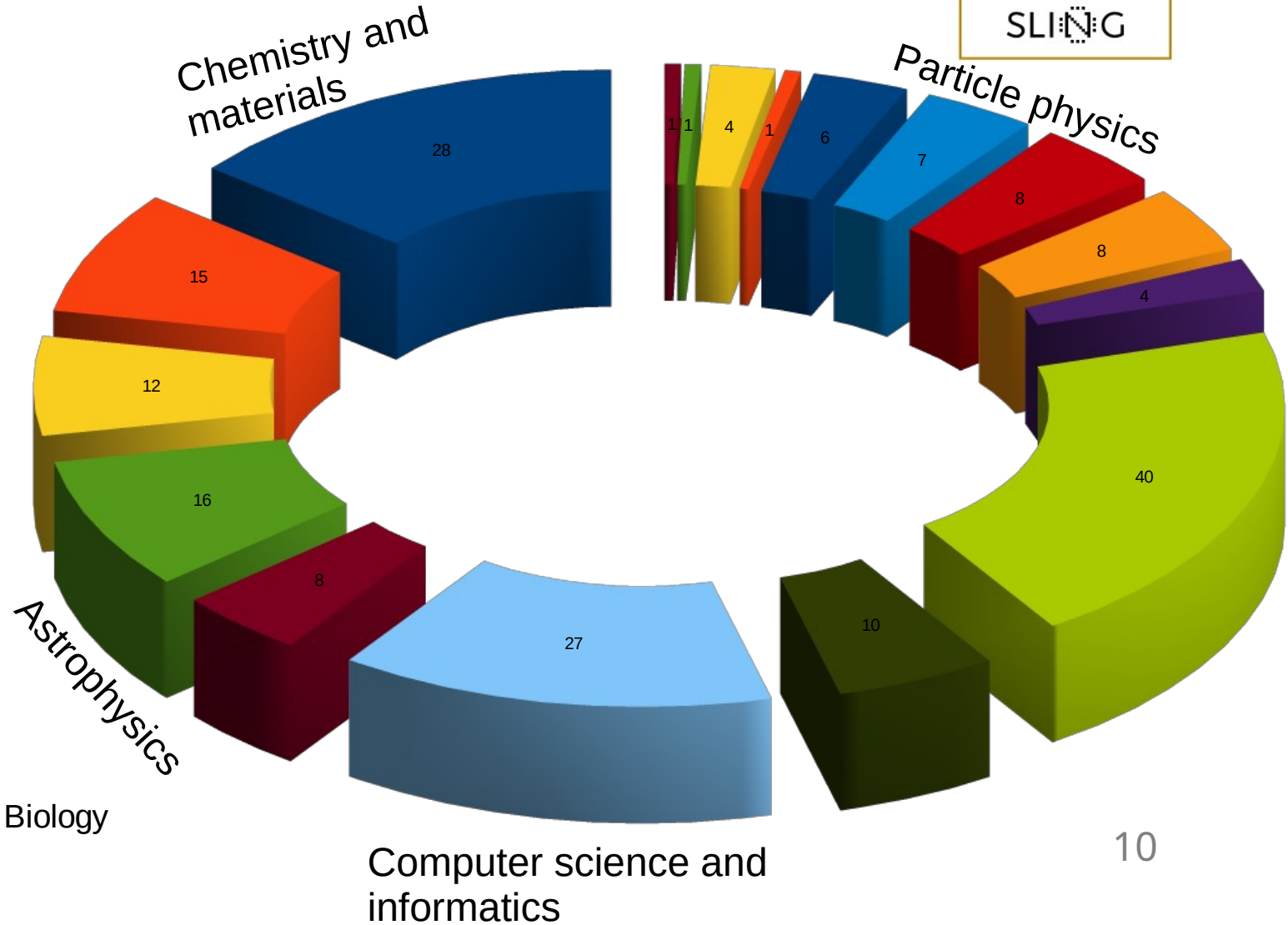
- EuroHPC share
- Slovenian share
- Atlas / CERN
- Comercial share



Vega Projekti po panogah



- Chemical Sciences and Materials
- Mathematics and Computer Sciences
- Engineering
- Universe Sciences and Astrophysics
- Biochemistry, Bioinformatics and Life sciences
- Computer Science and Informatics
- Condensed Matter Physics
- Other
- Fundamental Physics
- Physical and Analytical Chemical Sciences
- Earth System Sciences
- Fundamental Constituents of Matter
- Molecular and Structural Biology and Biochemistry
- Diagnostic Tools, Therapies and Public Health
- Genetics, Genomics, Bioinformatics and Systems Biology
- Linguistics, Cognition and Culture
- Physiology and Medicine





LEONARDO'S NUMBERS

- Ranking **fourth** in the **Top500 list**, with a predicted peak HPL of 240 pFlops
- **Slovenia is a partner**, intermediate step between Vega and new national HPC/AI machine
- **Resources for Slovenia** include
 - **Leonardo Booster** (module designed for extremely compute-intensive tasks, such as large-scale simulations, artificial intelligence, and big data analytics)
 - **Leonardo DCGP** (module tailored for general-purpose computing tasks that require high versatility and involve large-scale data processing, rather than the extreme parallelism handled by the Booster)
- Available for Slovenia In 2024 (end date 28th February 2025) and 2025 (from 1 March 2025)
 - Leonardo Booster: 113.254 / 103.249 node hours
 - Leonardo DCGP: 49.931 / 45.889 node hours
- **SLING call for Leonardo will be issued in next days**

155
SYSTEM RACKS

4992
COMPUTING NODES

250
PETAFLUPS

2800
TB OF RAM

6
MW IN OPERATIONS

110
PB OF STORAGE

600
M² FOOTPRINT

>95%
HEAT DISSIPATION VIA DLC



National HPC in the near future (2026)



- Two new national data and HPC centers (Maribor, Ljubljana) under way
 - The location in Maribor is final and will be funded from Recovery and Resilience Plan of the EC
 - Lengthy administrative process regarding the location in Ljubljana, not yet under way
- A new, more powerful HPC/AI Factory system is aimed at in 2026/2027
 - Located at the new Maribor site and operated by IZUM



Plans for a new HPC/AI Factory



SLING

- General consensus of the SLING community is to aim at an AI enabled HPC hardware
- Support not only for the academia, but also for SME and businesses in general
- Slovenia's efforts bring together professional communities and three related ministries (MDP, MVZI and MGTŠ)
- Aim at 50% co-funding of the project by the EuroHPC JU, same as Vega



Futuristic AI-enabled high-performance computing (HPC) system, designed to emphasize the integration of advanced AI technologies with cutting-edge computing infrastructure as imagined by LLM (ChatGPT 4)

Exploiting the science potential of the HPC

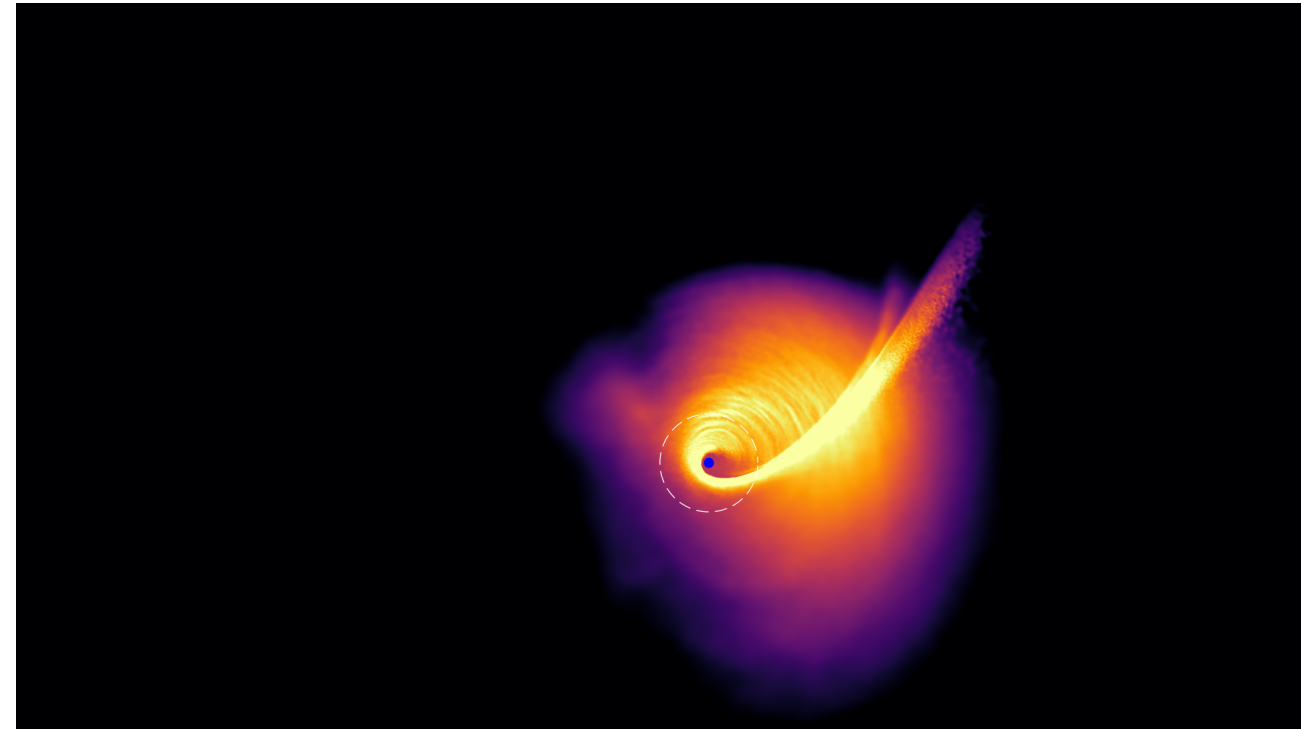


(the case of UNG)

- **Simulations of tidal disruption events close to a black hole**
- Prediction of neutrino flux from interactions of UHECR traveling through intergalactic magnetic fields
- Simulation of electronic properties of 2D heterostructures

Numerous other research projects at other SLING members

HPC extremely important also for smaller research institutions



Tidal disruption of a star close to a black hole.

Author: Dr. Taj Jankovič

<https://youtu.be/grBZVgmNGk8>

MSCA COFUND - SMASH



(S)MAchine learning for Science And Humanities

<https://smash.ung.si/>

Machine learning and other advanced IT methods can help to deliver answers to open questions in science

- Innovative, career-development training program centered on developing cutting-edge **machine learning applications for science and humanities**
- Duration: **1.7.2023-30.6.2028**
- **50 postdoctoral fellows** at a number of SLING members
- High demand for positions, only one call left
- Co-funded by the EC (5M EUR) and MVZI (5M EUR)
- **All projects will have access to HPC Vega**
- **New ideas (LSST) for the future!**



SMASH

machine learning for science and humanities postdoctoral program