



**Croatian Participation Group**  
**University of Rijeka**  
**Department of Physics**

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# Croatian Participation Group @ LSST

1. Institute Ruđer Bošković, Zagreb  
(group leader Lovro Palaversa)



2. University of Zagreb

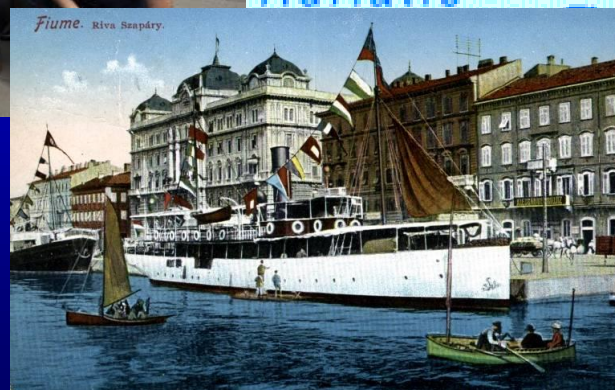


3. University of Rijeka



# Who are we?

ODJEL ZA FIZIKU  
DEPARTMENT OF PHYSICS



# Research interest

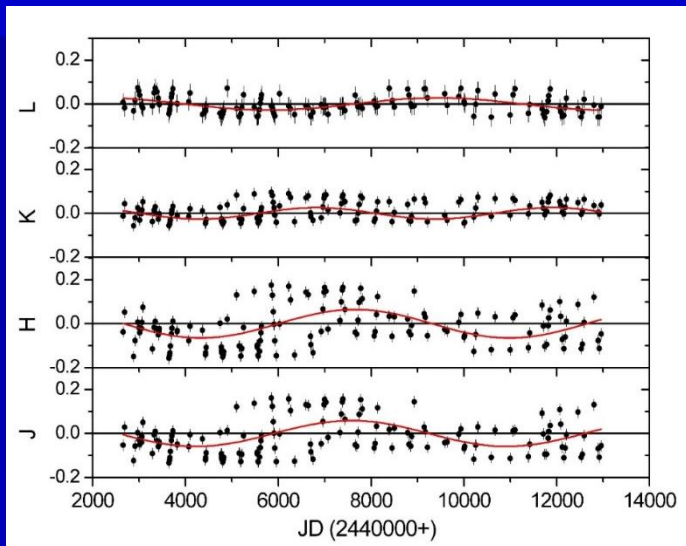
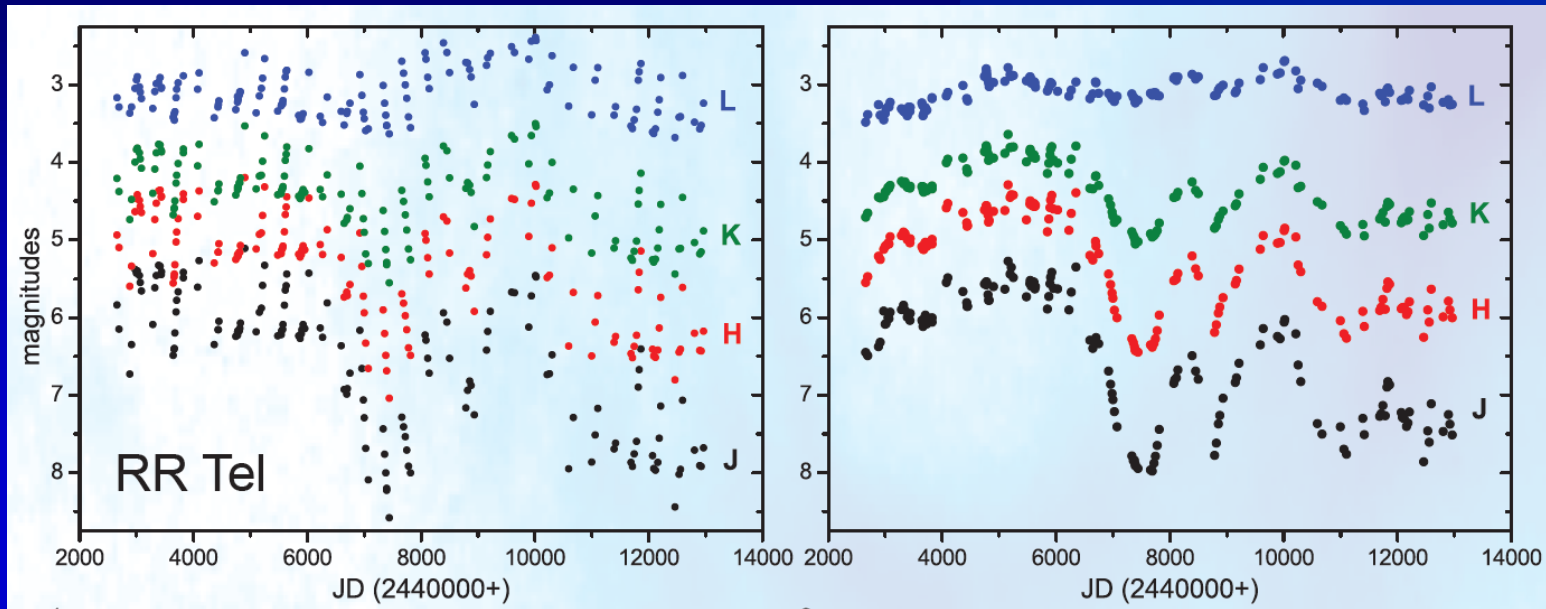
## Variable stars →

- Time-series analysis of light curves of variable stars (LPV, Miras, Blazhko effect)
- Circumstellar environment: dust in LPVs (Miras), giant stars, young stars; dust and gas in interacting binaries
- Interacting binaries (novae, symbiotic binaries...) (R. Jurdana-Šepić, I. Poljančić)

**High energy astrophysics** → MAGIC, CTA (see Marina talk; D. Dominis-Prester, M. Manganaro, T. Terzić, S. Mićanović)  
→ **synergy with LSST** (alerts, historic light curves...)

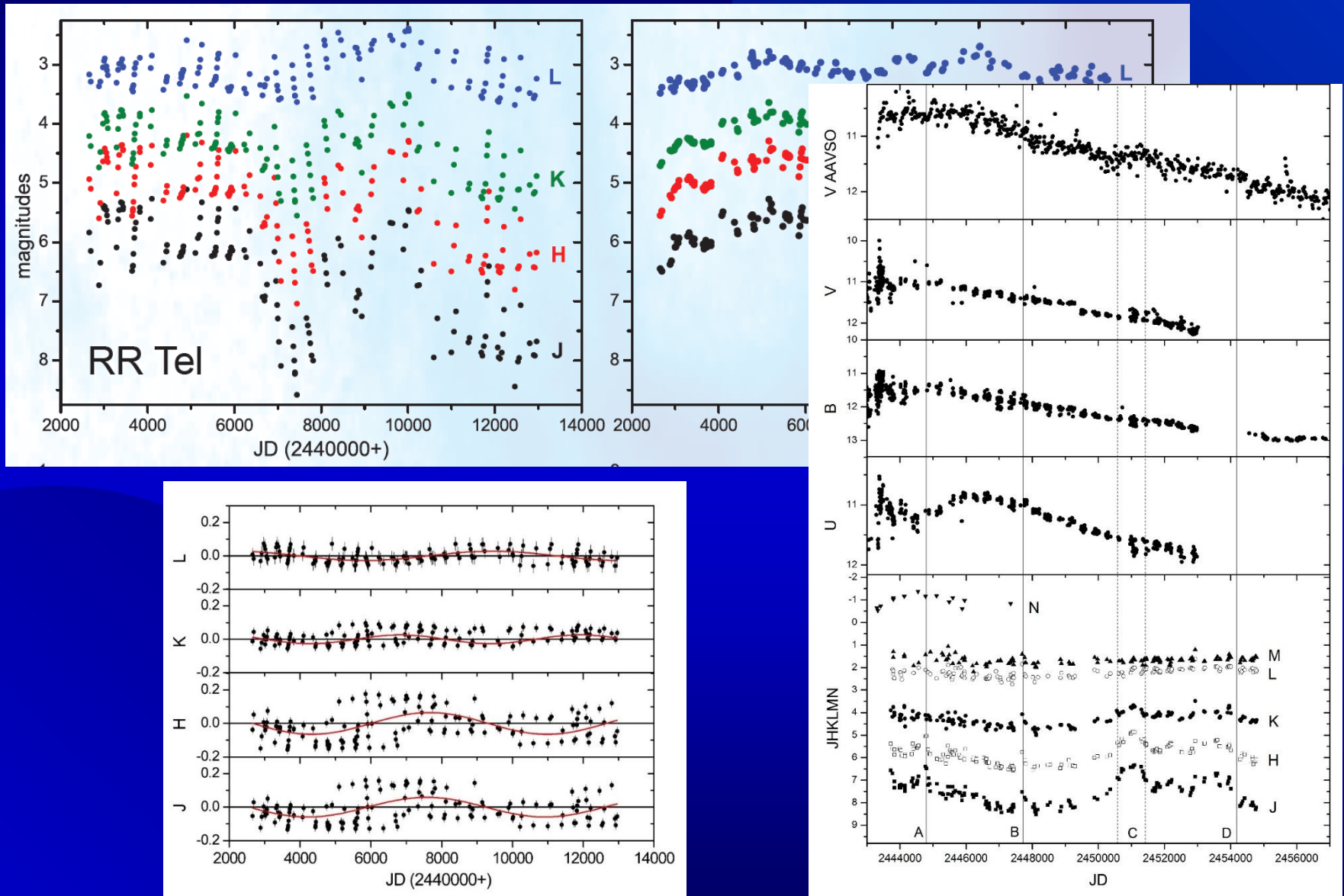
**Solar physics** (I. Poljančić)

# Time-domain analysis of light curves (symbiotic Miras, LPV)



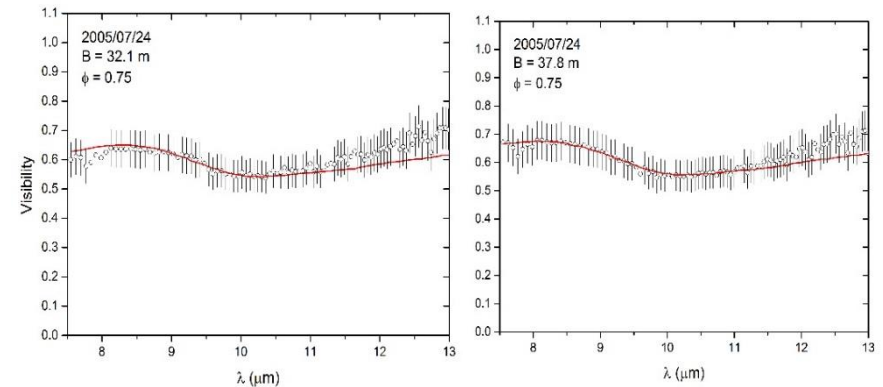
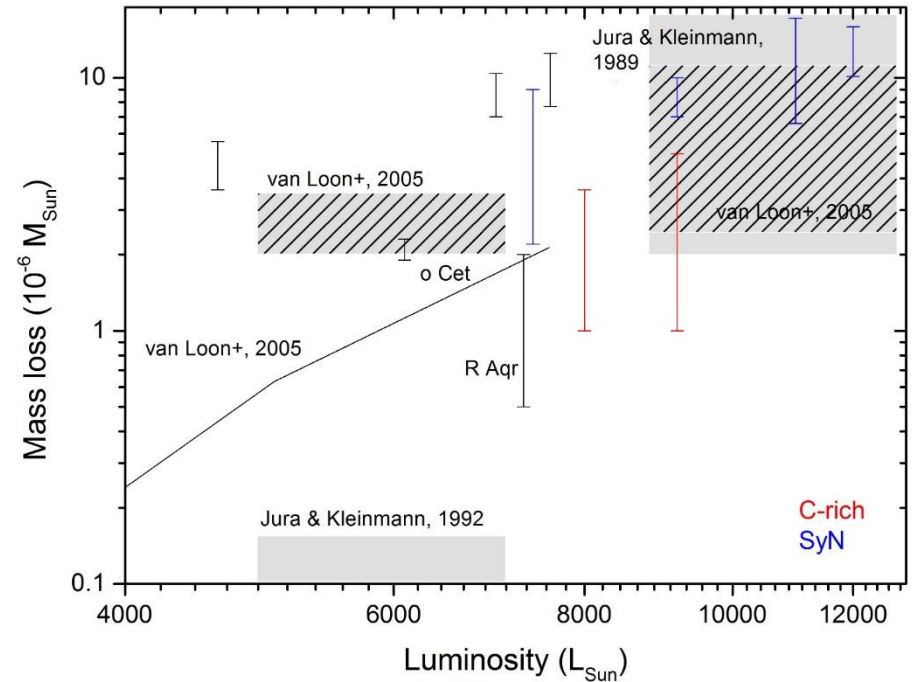
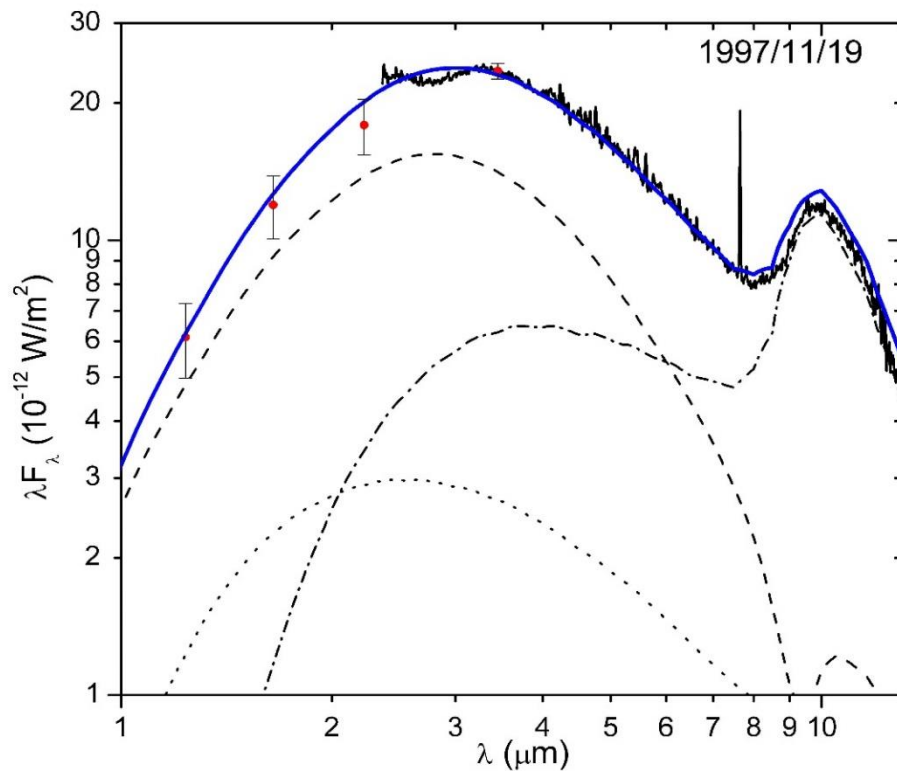
Jurkic & Kotnik-Karuza (2018)

# Time-domain analysis of light curves (symbiotic Miras, LPV)



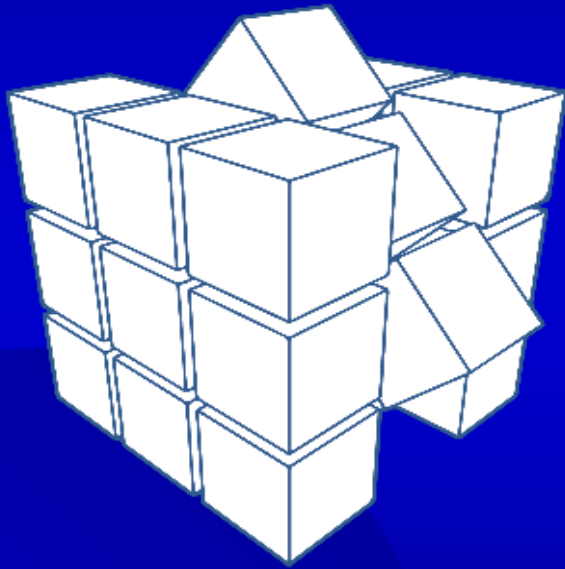
Jurkic & Kotnik-Karuza (2018)

# Circumstellar dust: numerical modelling (interacting binaries, LPVs – Miras)

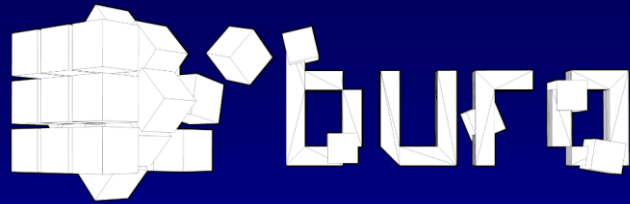


# "Bura" supercomputer

High performance computing facility → top 500



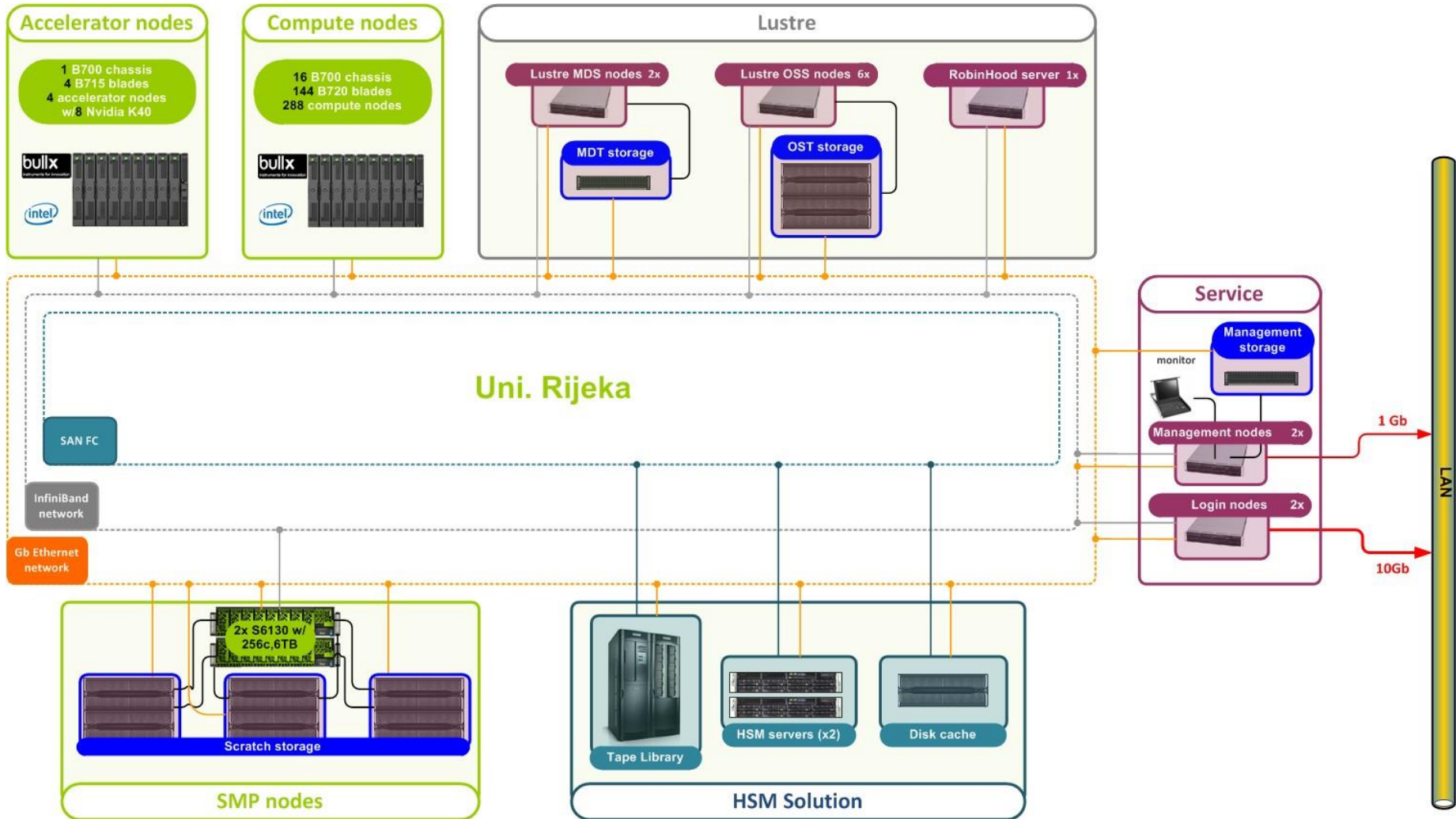




Rmax: 233.565 TFlop/s  
Rpeak: 287.539 TFlop/s  
Peak Power (kW): 108.48  
Processor: Xeon E5-2690v3  
(12 cores @ 2.6 GHz)  
Sockets per Node: 2  
Cores per Socket: 12  
Nodes: 288  
Primary Interconnect: InfiniBand FDR



# Schematic Architecture



# HPC resources @ Bura

## Cluster (compute nodes)

- 288 nodes, 2 x Xeon E5-2690 (12c 2.6 GHz)/node, 24 cores/node → **6912 cores**
- **64 GB** memory/node, **320 GB** disk space/node → **18 TB total memory, 95 TB total disk space**

## SMP (2 nodes)

16 x Xeon E7-8867 (16c 2.5 GHz)/node → **512 cores, 12 TB total memory, 245 TB total disk space**

## GPGPU (4 accelerator nodes)

Each node: 2 x Xeon E5-2650 CPUs (8c 2.6 GHz) + 2 x Nvidia TeslaK40, 64 GB memory, 320 GB disk space

## **OS**

Redhat Linux + Slurm Workload Manager

## **Data centre:**

**1 PB** (Lustre scratch file system)

**Archive: 2.5 PB** (tape library)

# HPC Bura: Lite IDAC

## HPC Bura as a **science-specific Lite IDAC**

- Object Lite Catalogue (~75 TB after 10 years)
- Stellar only object catalogue
- Rubin Science Platform for computing and visualisation
- Possibility to offer computation time for collaboration
- Hosting specific user-generated datasets

## Recipients:

- Rubin IDACs Coordination Group
- Transients and Variable Stars Science Collaboration

**Thank you for your attention!**

**Tomislav Jurkic**

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University of Rijeka

Croatia

**SMP1:** 16x CPU (Intel E7-8867, 16c 2.5GHz), 6 TB RAM, 8x 600GB SAS HDD ,120 x 2TB SAS 7.200 rpm

**SMP2:** 16x CPU (Intel E7-8867, 16c 2.5GHz), 6 TB RAM, 8x 600GB SAS HDD ,120 x 2TB SAS 7.200 rpm

**HPC1 = HPC3:** 4 blade chassis, 36 compute blades, 72 compute nodes, each with 2 CPUs (Intel E5-2690, 12c 2.6GHz), 64GB memory ,320GB HDD, IB FDR

**HPC2:** 4 blade chassis , 36 compute blades, 72 compute nodes, each with 2 CPUs (Intel E5-2690, 12c 2.6GHz ), 64GB memory, 320GB HDD, IB FDR

**HPC4:** 4 blade chassis , 36 compute blades, 72 compute nodes, each with 2 CPUs (Intel E5-2690, 12c 2.6GHz), 64GB memory, 320GB HDD, IB FDR

1 x blade chassis, 4 compute blades, each with 2 x nVidia K40 and 2 x CPUs (E5-2650, 8c 2.6Ghz), 64GB memory, 320GB HDD