



Data Preservation Hardware Resources

June 3, 2025

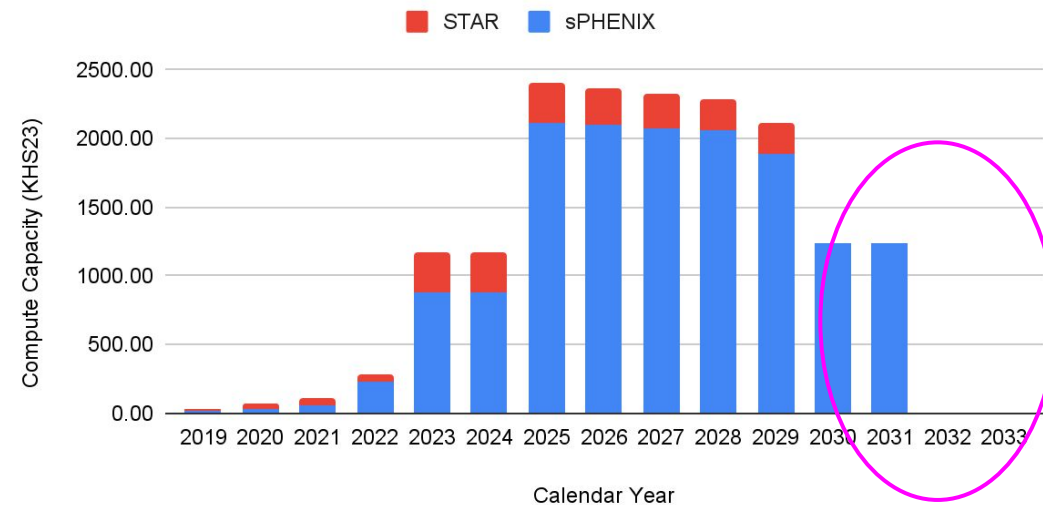


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Evolution of CPU/Disk Resources

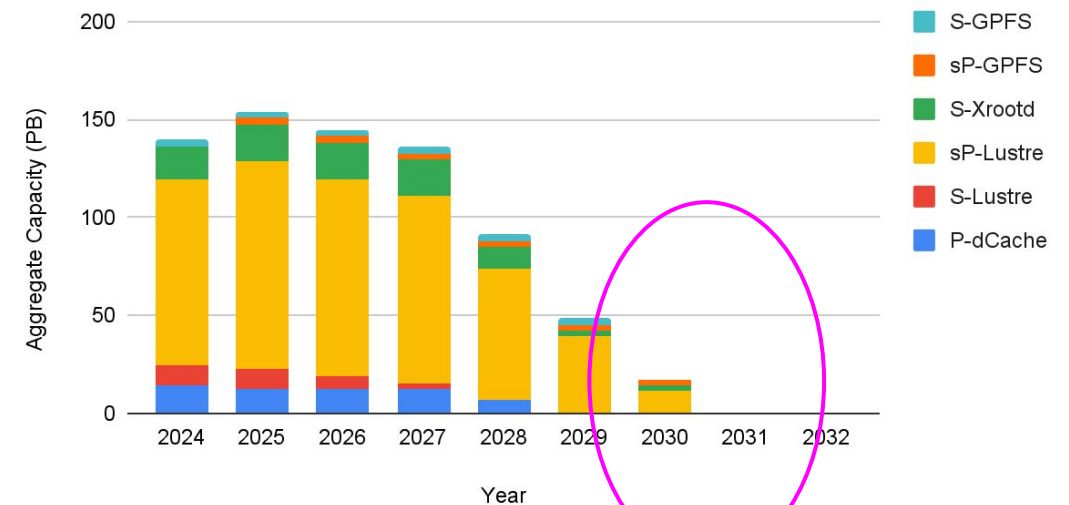
sPHENIX and STAR CPU Resources (KHS23)

Assumes server lifespan of 7 years



RHIC Aggregate Storage Capacity vs Time

P-dCache, S-Lustre, sP-Lustre, S-Xrootd, sP-GPFS...



Requirements After 2030

- CPU
 - Total CPU requirement > 2030 - 52.8 kHS23
 - CPU refresh cost 2031 = \$348,000
 - @ \$6600/kHS23 (current cost of CPU + network + integration)
- Disk
 - Assume 30PB required for analysis beyond 2030
 - Refresh required in 2030/2031 time frame
 - Cost for 30PB assuming “JBOD” cost:
 - \$1.83M @ \$61K/PB at current pricing
 - \$1.414M @ \$47.2K/PB assuming 5% per year reduction in \$/TB
 - Cost of network and metadata servers not included

Major Storage Costs Post Run

	\$2,026	\$2,027	\$2,028	\$2,029	\$2,030	\$2,031	\$2,032	\$2,033
CPU	\$0	\$0	\$0	\$0	\$0	\$348,000	\$0	\$0
Disk	\$0	\$0	\$0	\$0	\$707,409	\$707,409	\$0	\$0
Library + Drive Support	\$350,000	\$450,000	\$450,000	\$450,000	\$450,000	\$550,000	\$250,000	\$250,000
New Drives	\$0	\$0	\$0	\$0	\$300,000	\$0	\$0	\$0
DST (1 Copy)	\$0	\$0	\$0	\$0	\$395,104	\$395,104	\$0	\$0
RAW (1 Copy)	\$0	\$0	\$0	\$0	\$790,209	\$790,209	\$0	\$0
Total	\$350,000	\$450,000	\$450,000	\$450,000	\$2,642,723	\$2,790,723	\$250,000	\$250,000

- Note: Cost estimate for Library+Drive support is likely an upper limit, as # drives will decrease when current media migration plans are completed

Media Cost: Multiple Scenarios

	# Tapes	Cost
DST	2605	\$790,209.00
2xDST	5210	\$1,580,418.00
RAW + DST	10422	\$3,161,370.66
2xRAW + DST	18240	\$5,532,532.32
2xRAW+2xDST	20845	\$6,322,741.32

Note RAW data volume ~ 2xDST volume

- RHIC IBM Library capacity ~32K cartridges, in Bldg 725
- RHIC Oracle Libraries ~ 70K cartridges - EOL risk, high tape drive cost, in 515

Tape Drive Cost

- 45 LTO-11 tape drives required to copy RAW data in one year assuming LTO-6/8 drive read performance @ 400MB/sec
- 15 LTO-11 tape drives required to copy DST data in one year
- Tape drives ~\$5K
 - \$225K LTO-11 for RAW
 - \$75K LTO-11 for DST
- Additional tape drives required for concurrent data access
- Dual copy doubles tape drive cost*
 - May impact HPSS disk cache cost depending on implementation
- Doubling copy time halves tape drive cost