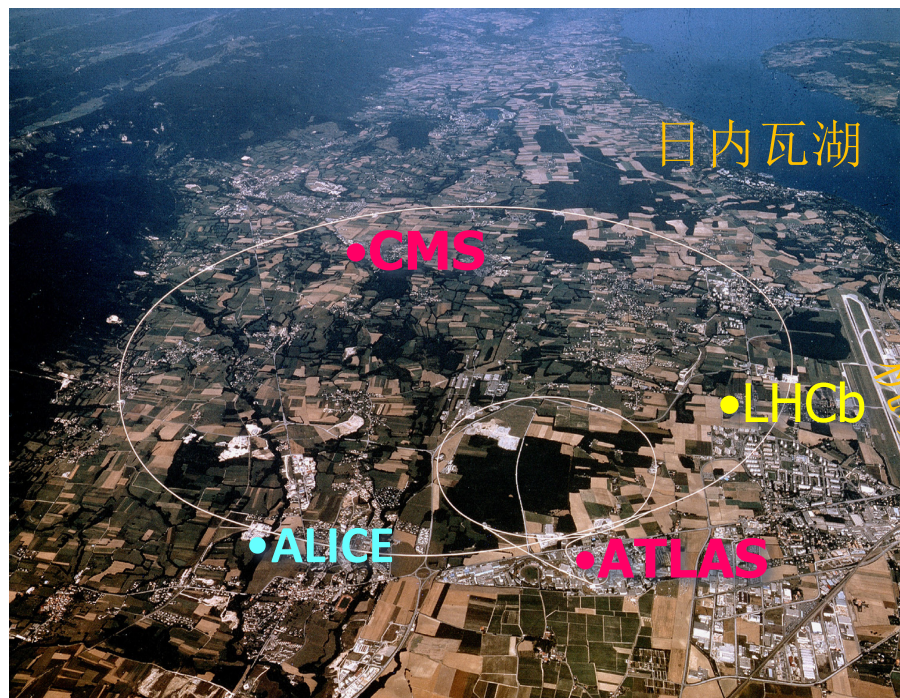


高能所ATLAS组computing用户报告

梁志均

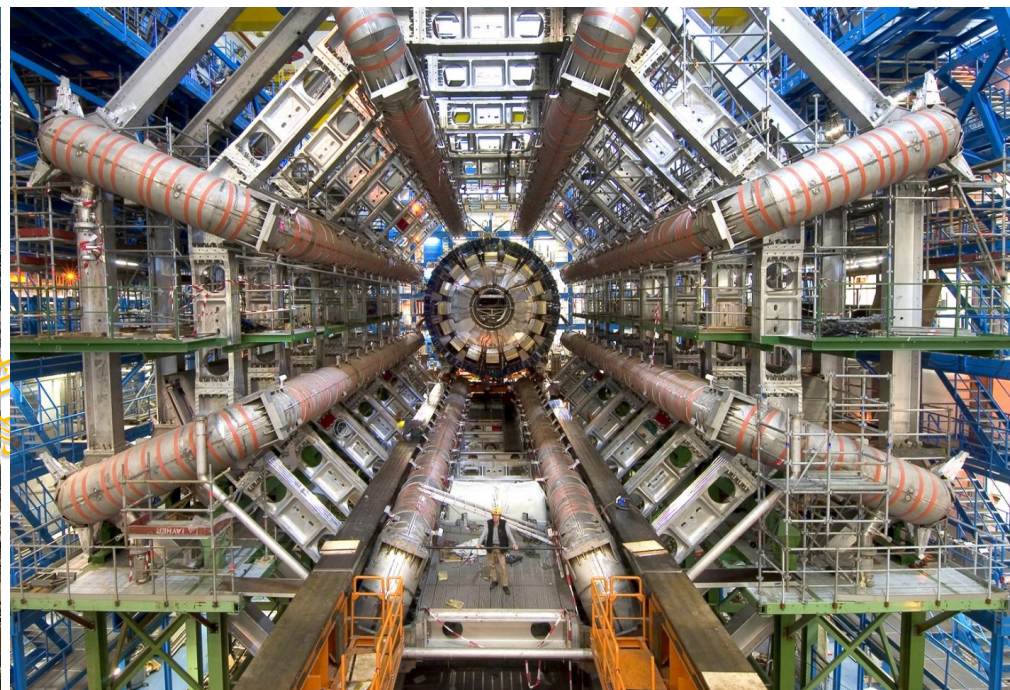
中国科学院高能物理研究所

大型强子对撞机与ATLAS实验



大型强子对撞机

- 周长**27km**，总投资**40亿美元**
- 世界能量**最高**的加速器
- 质心系能**14TeV** ($14 \times 10^{12} \text{eV}$)
- 位于瑞士与法国边境



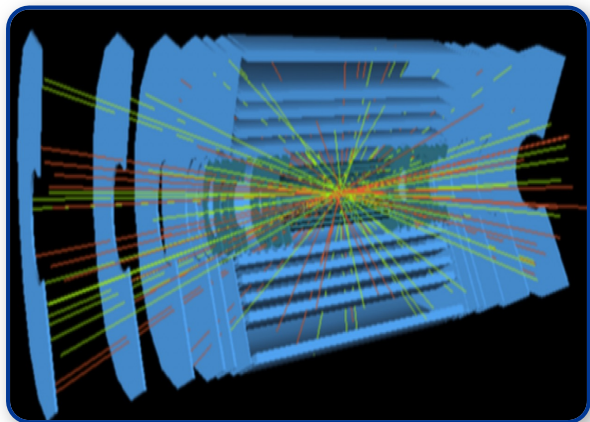
ATLAS探测器

- 大约**3000人**的一个实验组
- **6层楼高** (**25米**) 的大型探测器
- 探测对撞产生粒子能量与动量

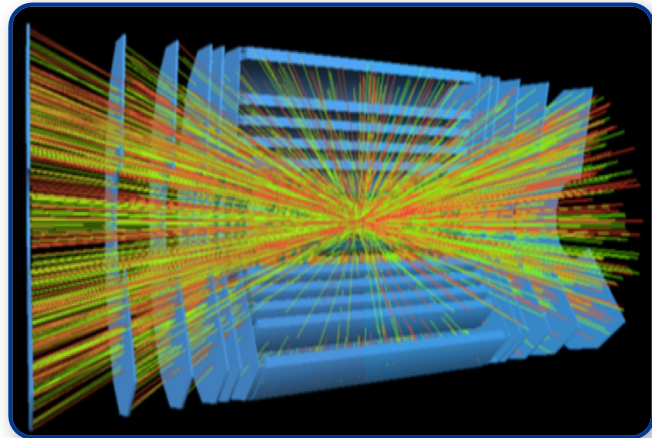
大型强子对撞机与ATLAS实验第二期升级

- 未来5年内，大型强子对撞机将进行高亮度升级（HL-LHC）
- 瞬时亮度将提高5倍以上
- 将需要更多的计算资源

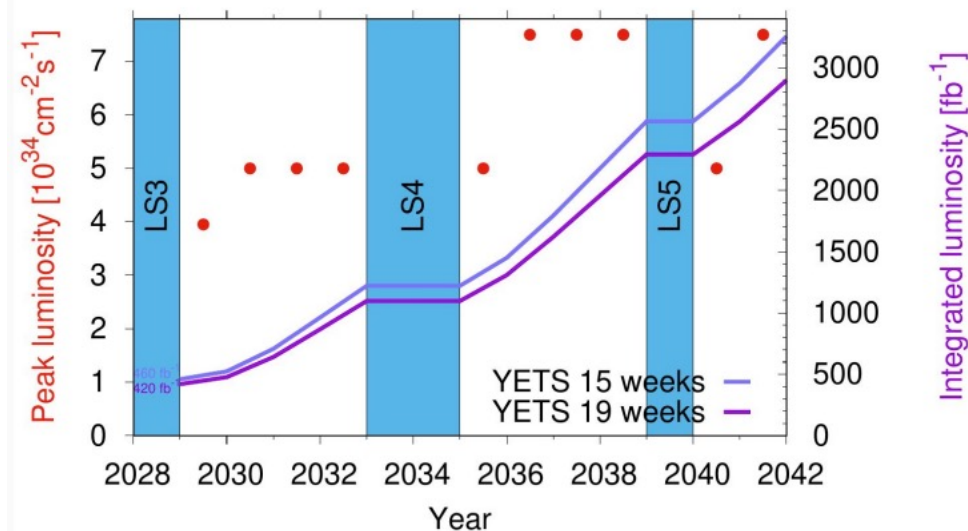
目前的ATLAS探测器



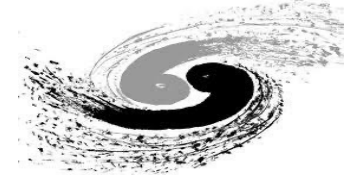
高亮度LHC升级后的ATLAS探测器



LHC luminosity forecasts

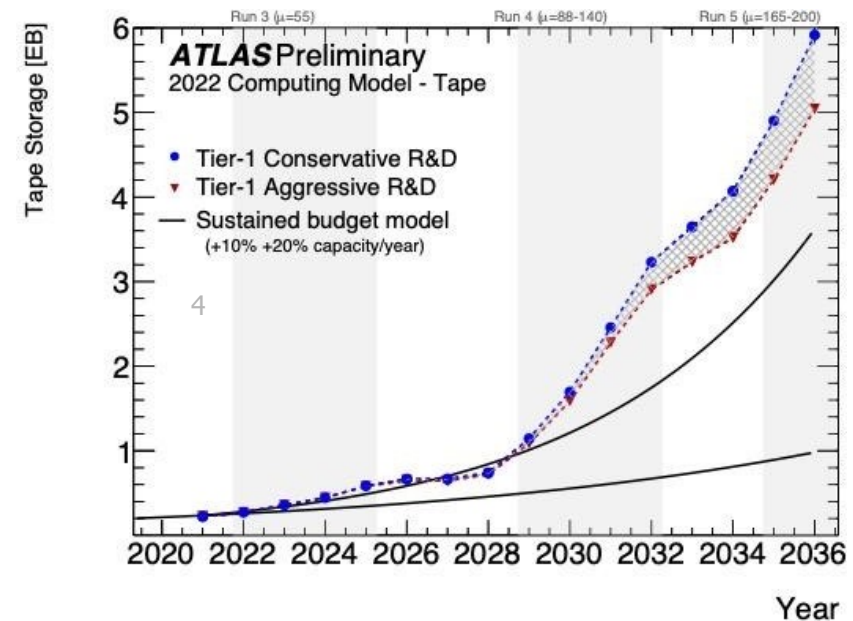
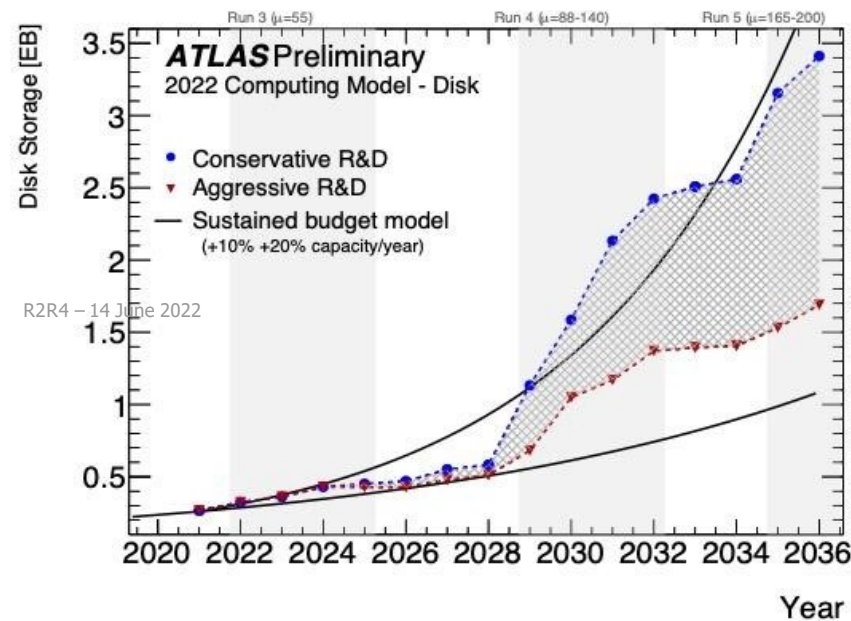
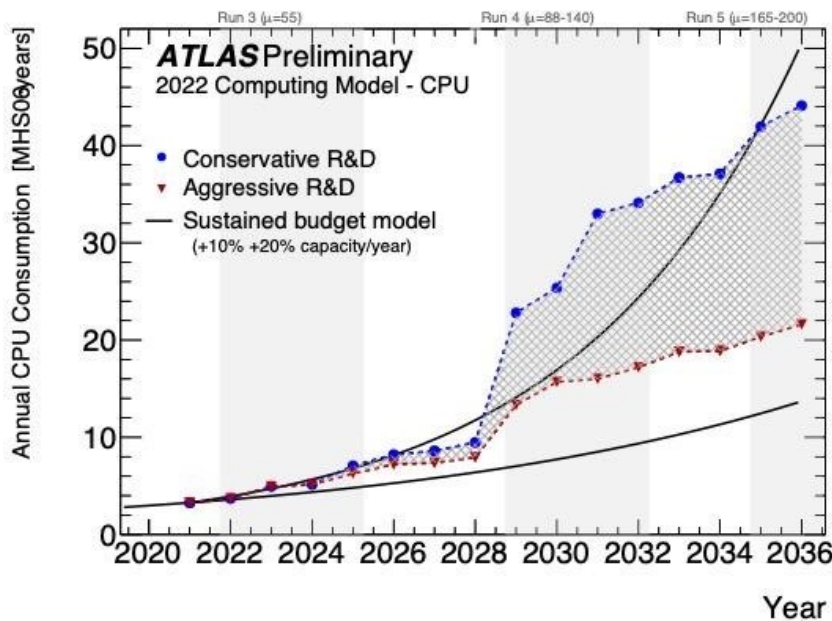


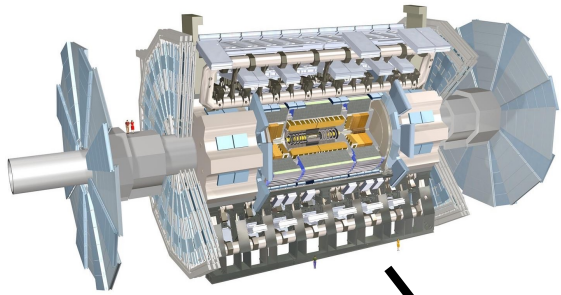
Targeting $\sim 3000 \text{ fb}^{-1}$ of data
or 180 million Higgs bosons



(HL-LHC) Software and Computing

- S&C is ~450 people contributing ~150 FTEs
 - About 1/4 the total Class 3 OTP of ATLAS
 - FTEs roughly double when sites (Class 4) are included, though spread over fewer humans
- We have a long road to travel to make it to the HL-LHC!
Resource try to keep these resource projections up to track our progress





Data

TRIGGER

RECONSTRUCTION

DERIVATION

ANALYSIS

GENERATION

SIMULATION

DIGITIZATION

RECONSTRUCTION

DERIVATION

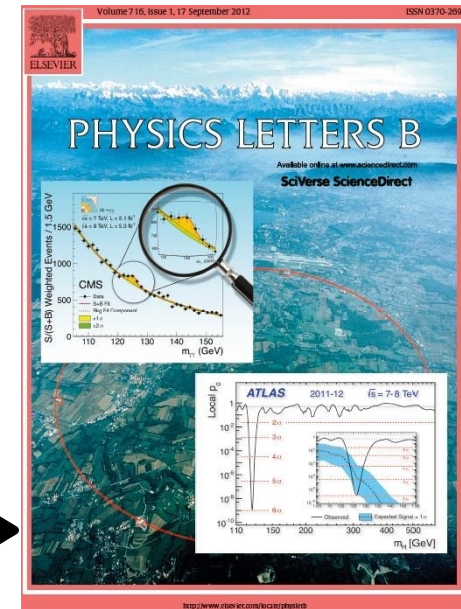
Monte Carlo

Online

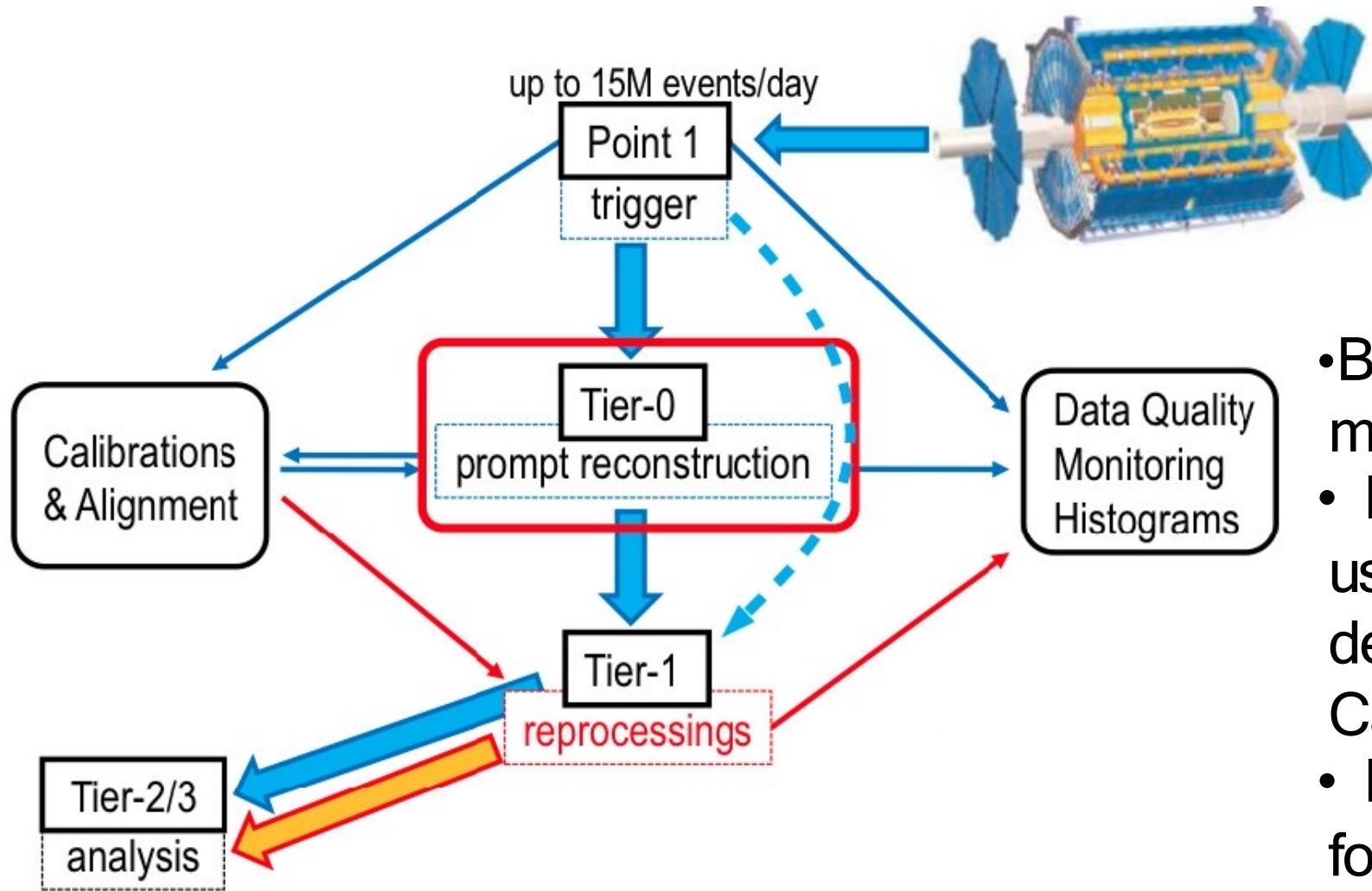
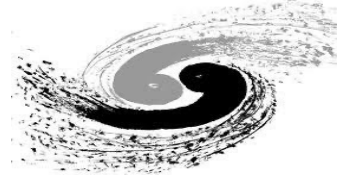
Tier-0

Grid

Local



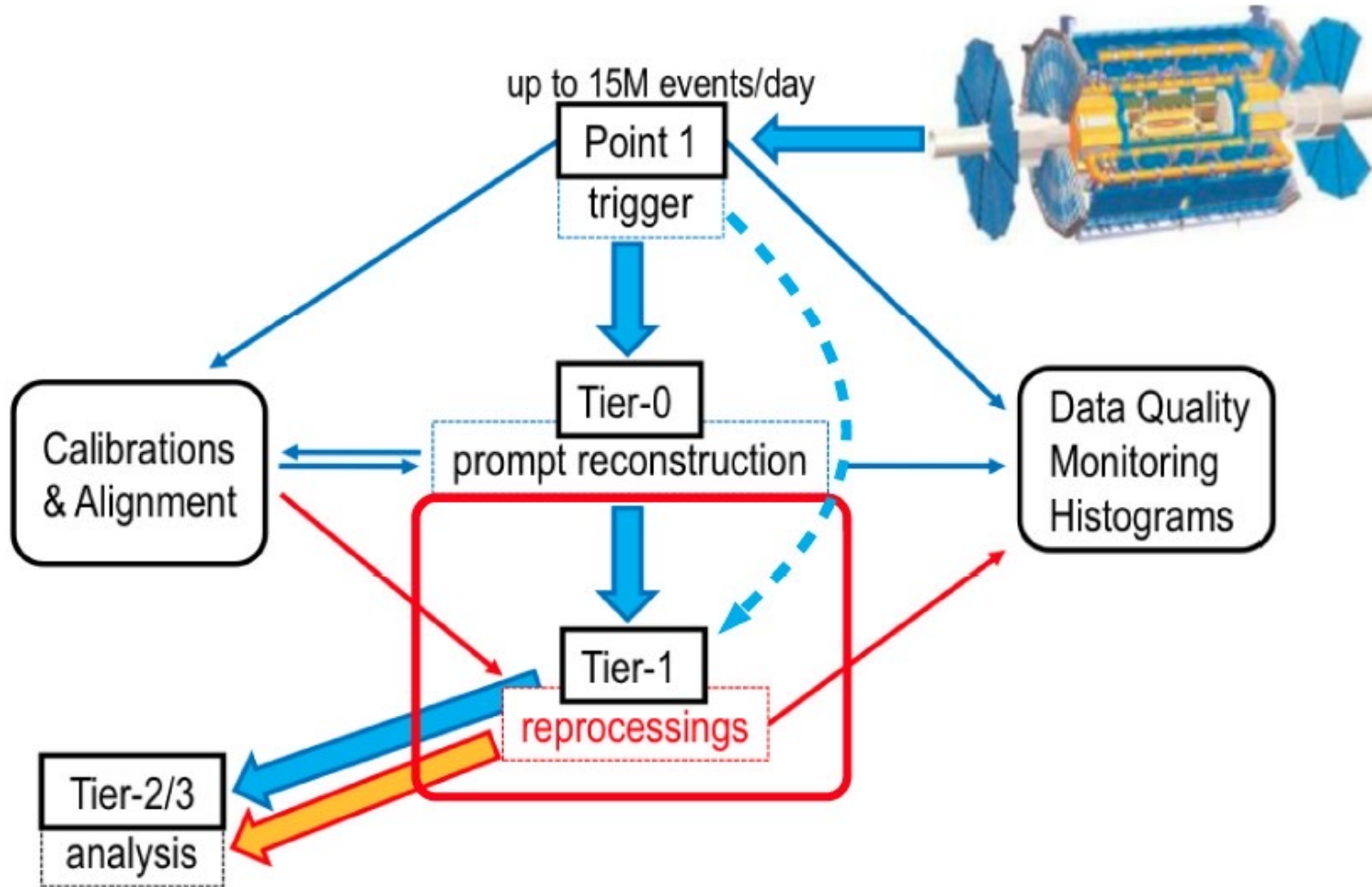
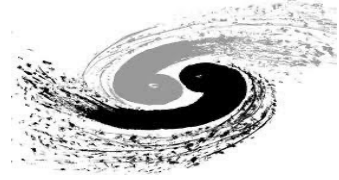
ATLAS实验网格计算模型



- Bulk reconstruction uses the majority of the Tier0 resources
- Processes the RAW data using updated calibrations determined in the Prompt Calibration
- Produces many outputs used for a variety of purposes, the most important being the AOD

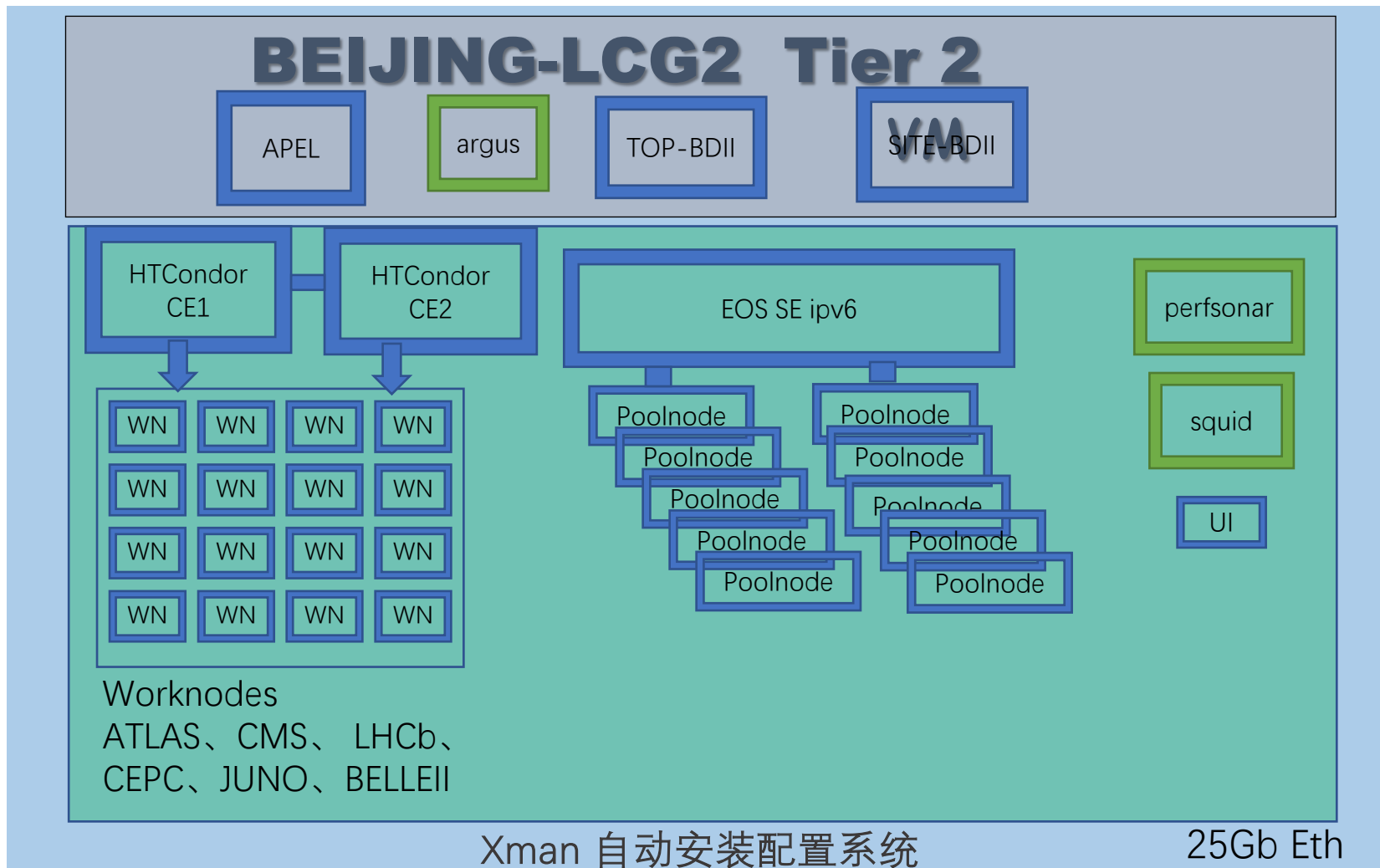
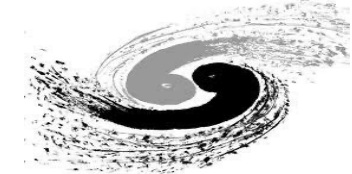
ATLAS实验网格计算模型: Reprocessing

Reprocessing at Tier-1s

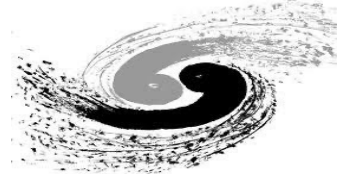


- Over time we improve our knowledge of the conditions
- We may make improvements to the reconstruction performance or find and fix bugs
- After a time, we reprocess the existing raw data with the improved software/conditions
- This has to be done on the Grid since the Tier-0 will be busy with prompt data processing
- Once we start a reprocessing, we also switch the Tier-0 to the new software to ensure a consistent dataset

北京Tier2 网格站点 BEIJING-LCG2 GRID Site Services



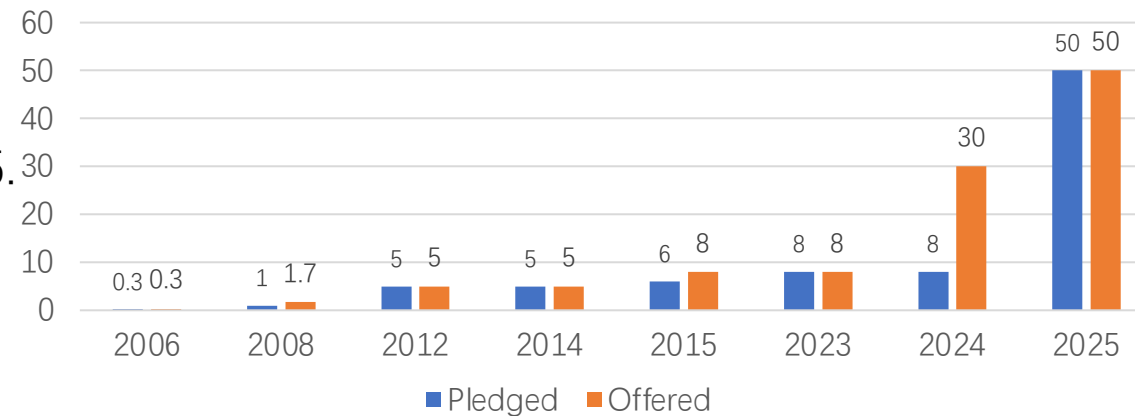
ATLAS Beijing Tier-2 site deployed at IHEP



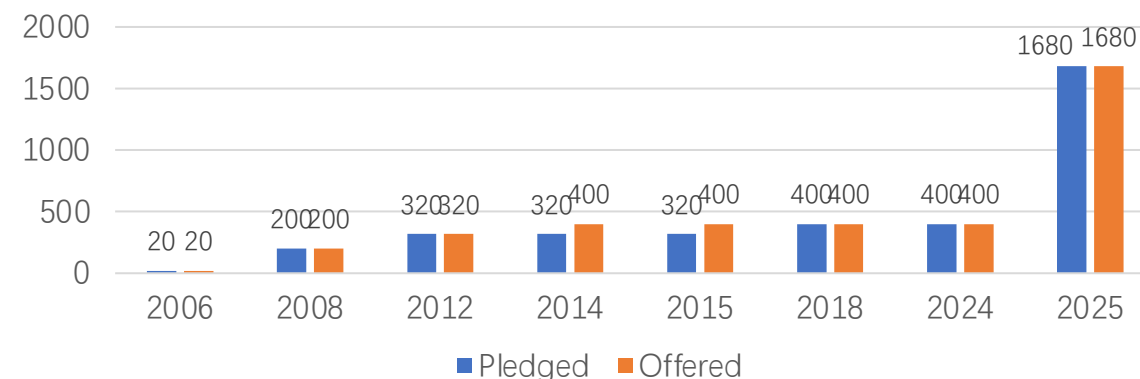
by Xiaofei Yan

- ATLAS Beijing T2 upgrades plan
 - New budget (3M RMB) application has been approved for upgrading ATLAS and CMS
 - To replace old resources provisioned in 2011 and 2015.
 - 8k HS23, 400 TB for ATLAS.
 - Upgrades will be done in 2024.
 - 20k HS23(250%[↑]), 1.6 PB(400%[↑]) for ATLAS

Computing (kHS06/kHS23)



Storage (TB)



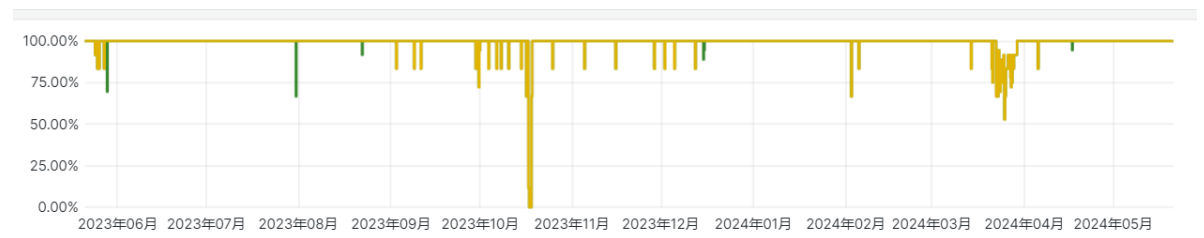


by Xiaofei Yan

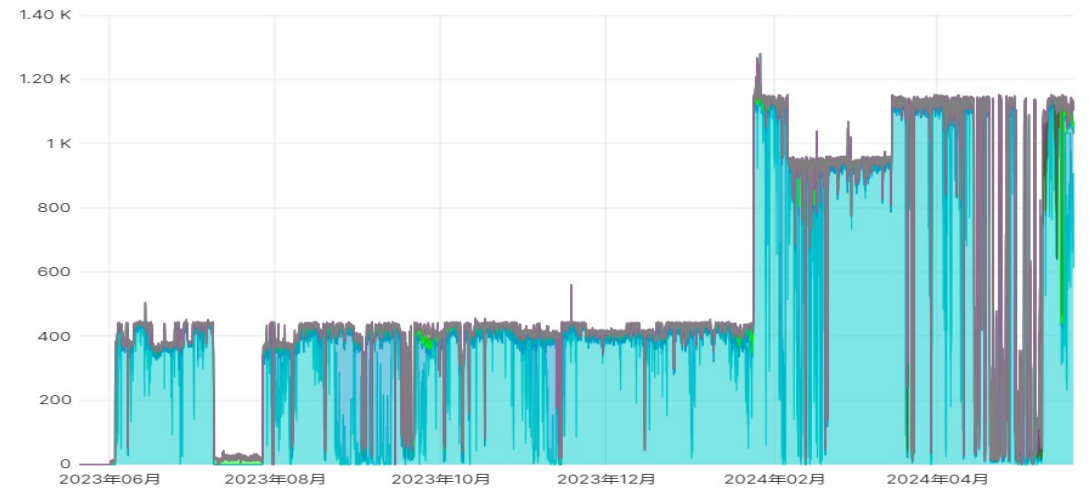
Status of BEIJING-LCG2 ATLAS Tier-2

- Site Running Status of the last **years**:

		Rank
Computing	30000 H23	Tier2: 26st/40
Storage	400TB	Tier2: 37st/40
Reliability	99%	Tier0,1,2,3: 35st/100

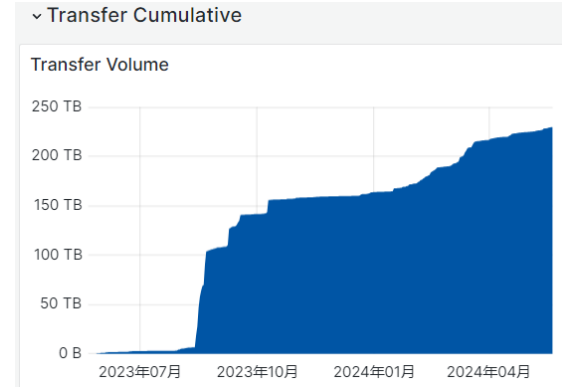
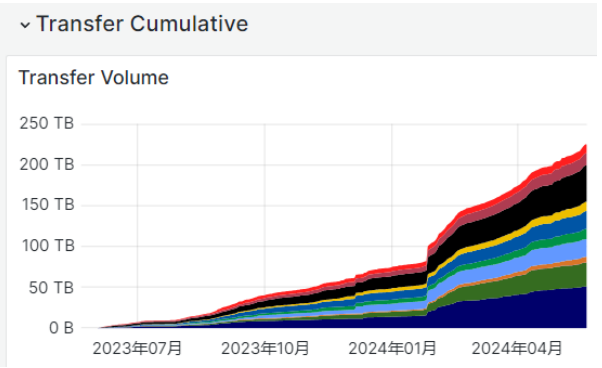


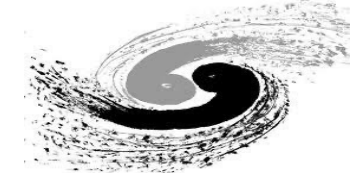
Slots of Running jobs by ADC activity



Upload:

Download:



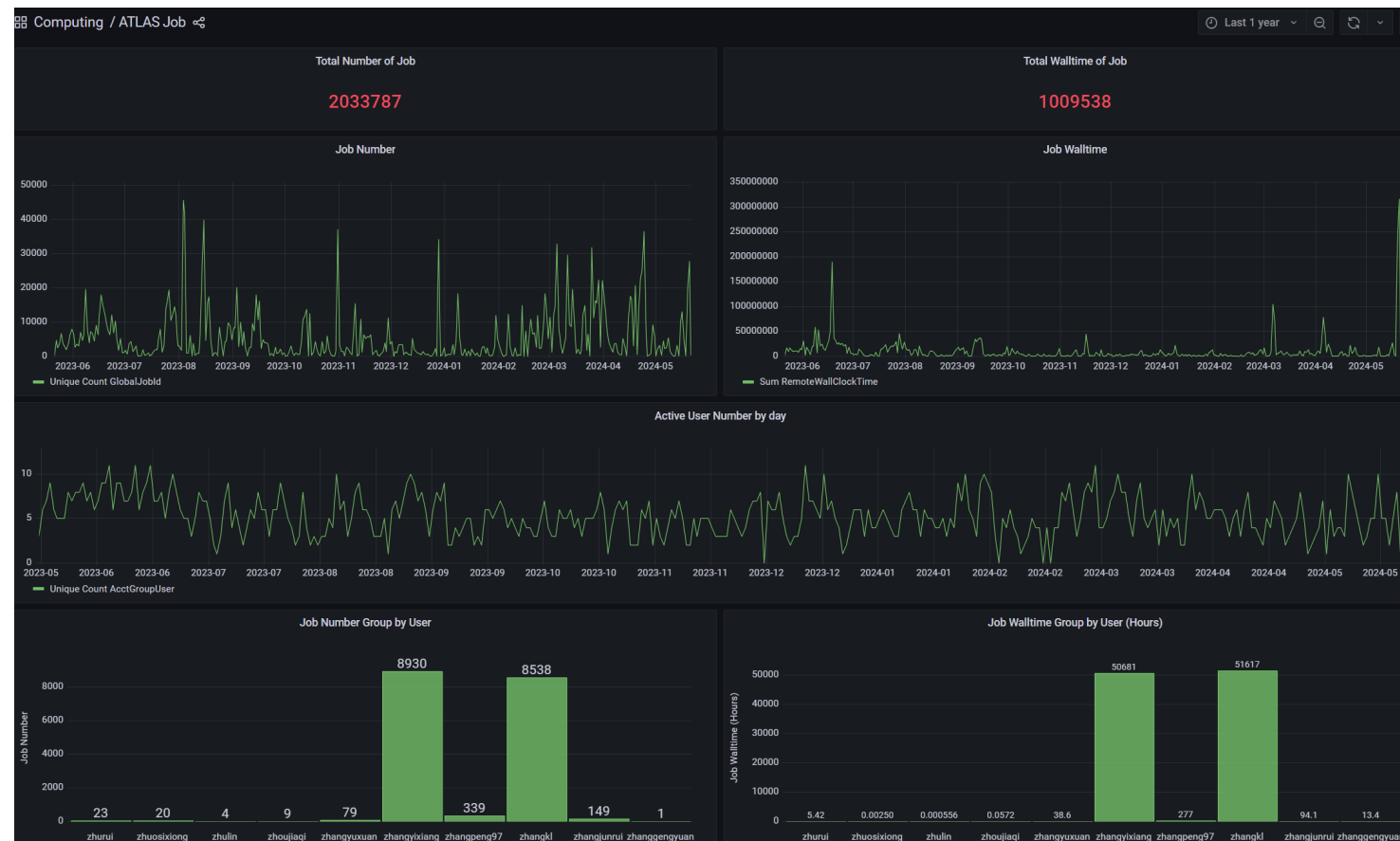


by Xiaofei Yan

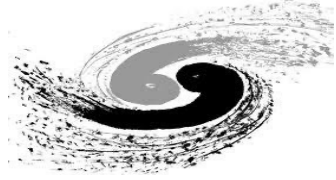
ATLAS T3网格站点情况

ATLAS Tier3 jobs accounting

- Tier3 Resource
- CPU:
 - aws150-aws161(2012-11) 192 cores (16 cores 32GB)
 - aws162-aws177(2014-06) 256 cores (16 cores 32GB)
 - Awsbm001-004 (2022-11) 256 core (64 cores 512GB)
- Resource in condor : 308+256 2.6GB per core
- Storage:
 - /publicfs/atlas (1.4PB)
 - lfs df -h -p acfs.atlaspool /publicfs (to check space usage)



https://omat-grafana.ihep.ac.cn/d/kzfk_Sb7k/atlas-job?orgId=1&from=now-1y&to=now



小结

- 未来5年大型强子对撞机高亮度升级后，亮度将提高5倍以上
- ATLAS实验对世界各地的网格站点的计算资源有更高的要求
- ATLAS中国组的Tier2网格站点将升级以维持对ATLAS实验computing的服务