

EPICS Archiver Appliance – Installation and Use at BESSY/HZB

Switching from Channel Archiver to the Archiver Appliance after 20 years of successful use.

Thomas Birke – Helmholtz-Zentrum Berlin für Materialien und Energie GmbH

ABSTRACT: The EPICS Archiver Appliance went into operation at HZB/BESSY in April 2018. After running for a year as an optional new archiver, the Archiver Appliance switched places with the old Channel Archiver and is now the central productive archiver in currently three installations at HZB. To provide a smooth transition from the Channel Archiver to the EPICS Archiver Appliance for end users as well as applications, some frontends like e.g. the ArchiveViewer and other applications needed some modifications to be fully usable. New retrieval frontends are also provided and will replace the ArchiveViewer in the future. In addition the versatile retrieval API rapidly improved the development of Python applications for analysis and optimization.

MOTIVATION

At the beginning of user operation at BESSY-II back in 1998, the Channel Archiver was the best choice to archive control system data in an EPICS based control system environment. This setup has been a reliable workhorse for many years and users gladly accepted the ease of use of the ArchiveViewer to access data from anywhere in the world, launching it using JavaWebStart from the central BESSY/HZB Archiver Web page.

With the amount of data growing over the years, managing the size-limited archive index files of 30 TB of archived data became a serious issue for administrators as well as for users.

In 2015, M. Shankar released a work-in-progress version of the EPICS Archiver Appliance [1]. Even this early implementation solved many problems showing up with the Channel Archiver. A first instance has been setup to archive a few high-volume PVs for about three months sliding window. It has been used since then mostly for post-mortem analysis of data that couldn't be archived with the main Channel Archiver due to insufficient hardware resources.

From day one on, scientists and engineers very much appreciated the ease of access to archived data from analysis applications written in python.

USER'S FAVOURITE



The **ArchiveViewer** – originally written by S. Chevtsov for the Channel Archiver – is still the favorite browser for archived data amongst users at HZB and hence needs to be maintained until an accepted replacement has been established!

It has been adapted by M. Shankar to optionally also retrieve data from the **EPICS Archiver Appliance**. A few local changes have been made to fix e.g. display of waveforms or to do proper data-reduction the way ArchiveViewer expects it.

Simplicity of using the ArchiveViewer resides in the installation-free start-mechanism **JavaWebStart**, that unfortunately has been discontinued.

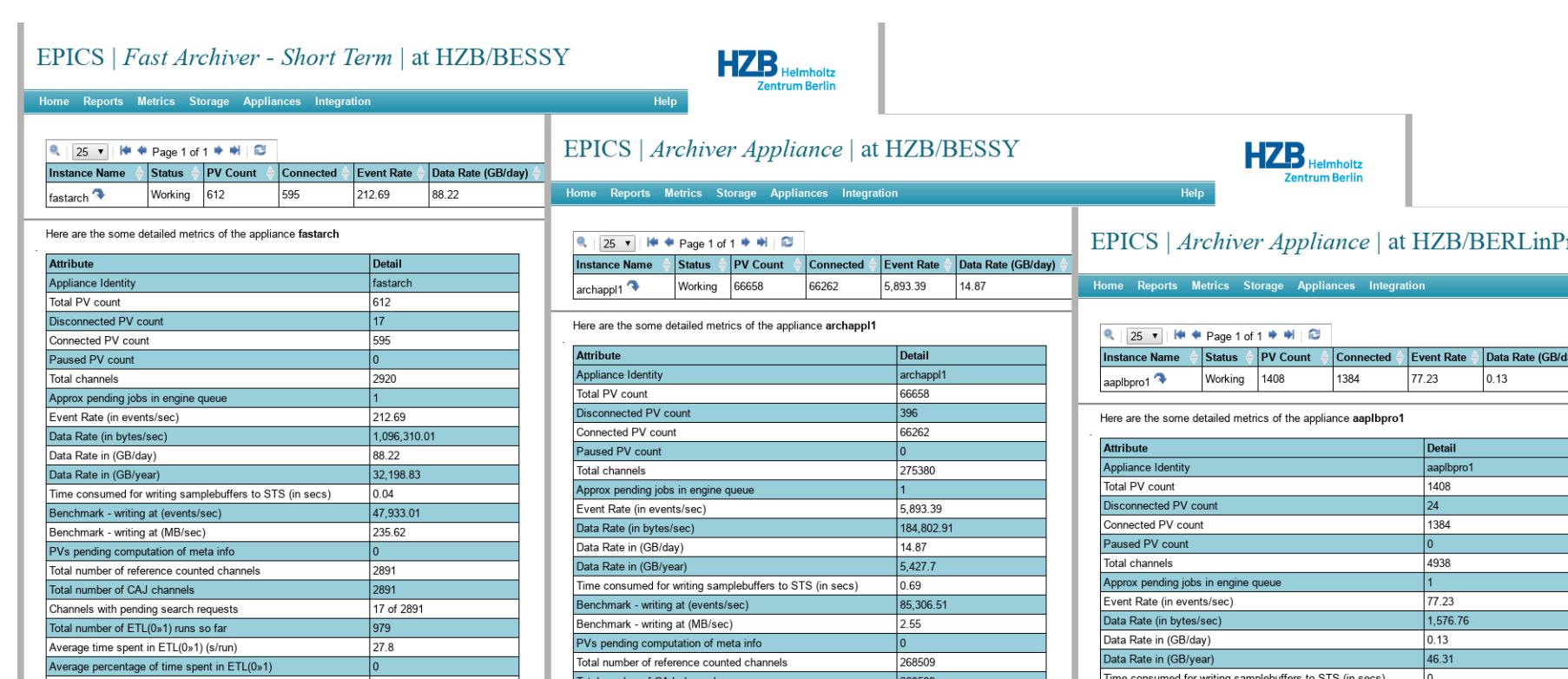
KEY REFERENCES

- (1) The EPICS Archiver Appliance, https://slacmshankar.github.io/epicsarchiver_docs/, Murali Shankar, SLAC, CA, USA.
- (2) Status of the Control System for the Energy Recovery Linac bERLinPro at HZB, Thomas Birke et al., Pres. at this conference: FRAPP06.
- (3) Adding Machine Learning to the Analysis and Optimization Toolsets at the Light Source BESSY II, Luis Vera Ramirez et al., Pres. at this conference: TUCPL01.

CURRENT INSTALLATION @ HZB

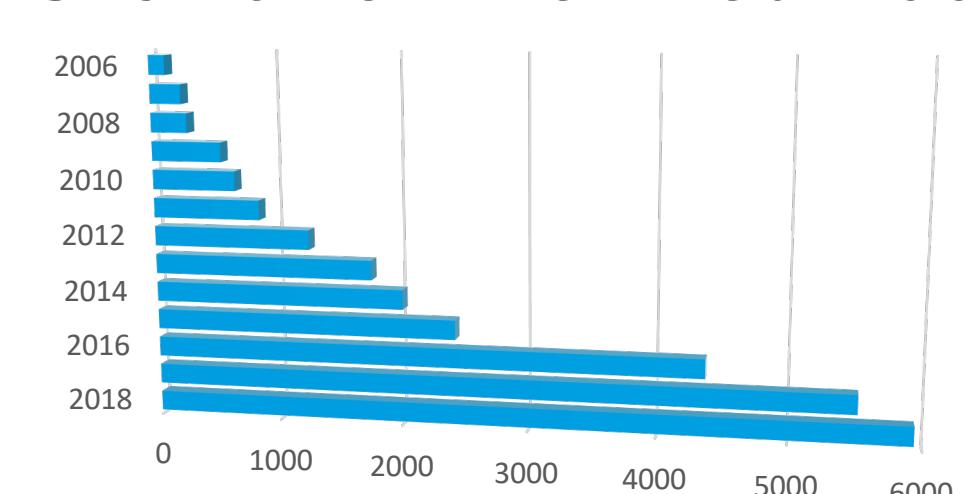
Running instances of Archiver Appliance

Instance	# of PVs	GB/year	comment
FASTZC	612	32200	High volume PVs, only 3 months kept
BESSY	66658	5900	
bERLinPro	1408	50	Rapidly increasing [2]
MLS	13515	560	Planned for beginning of 2020



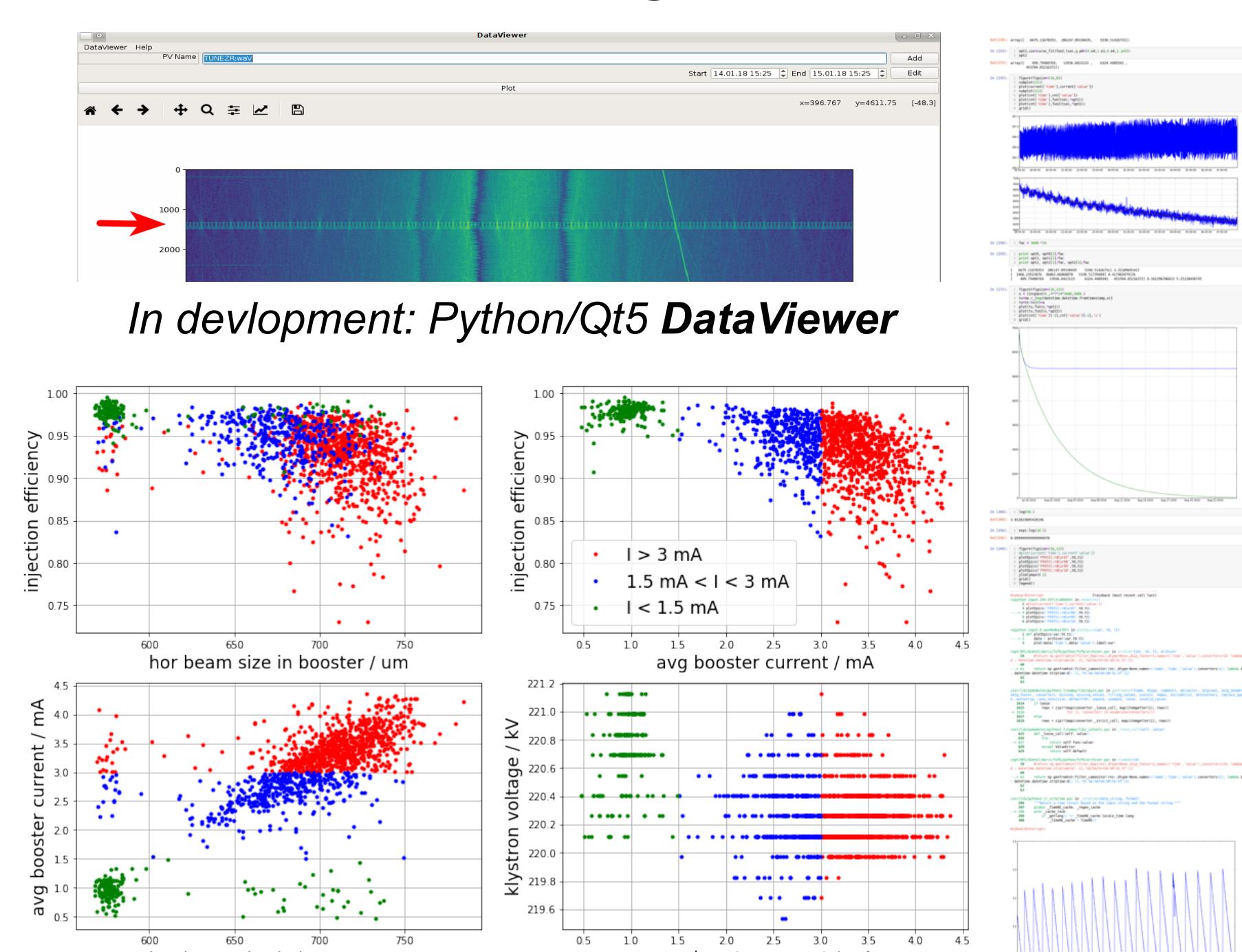
Screenshots: Metrics screens of all running instances

Growth of Archived Data Volume 2006 – 2018



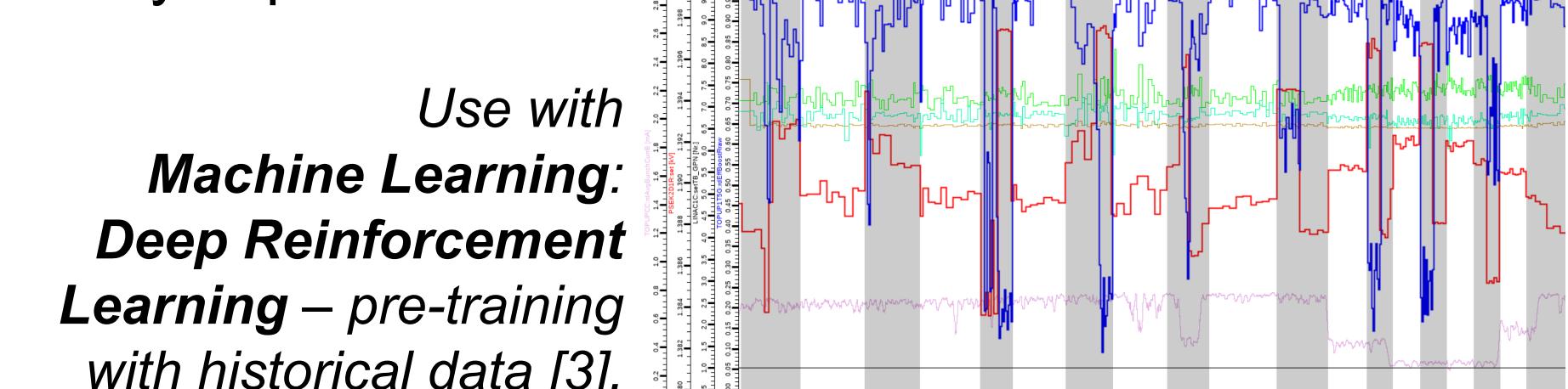
Over the past 12 years, the per year volume of archived data in the main archiver has grown to almost 6TB/year.

New Applications using Archiver Data



Example plots created using jupyter notebooks analyzing machine performance.

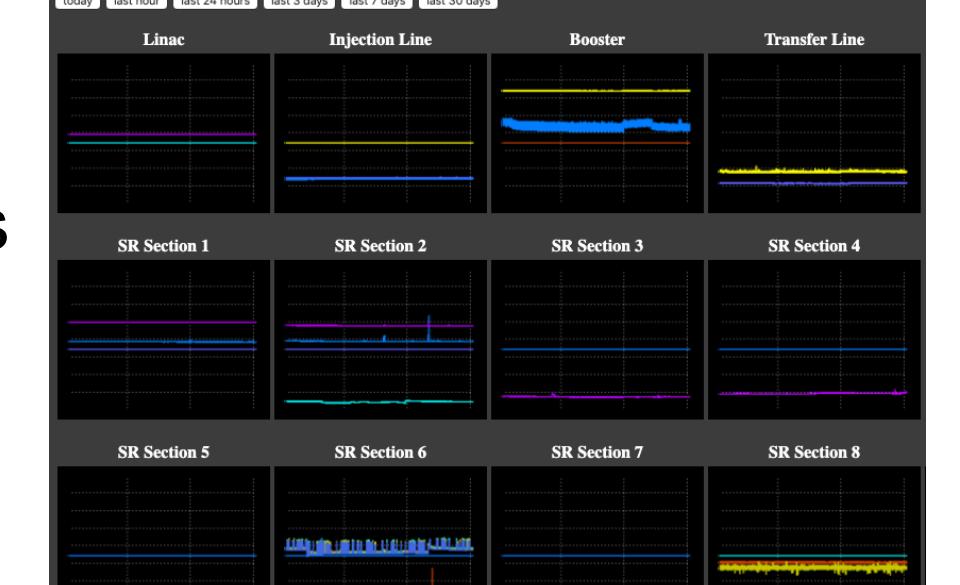
Offline and Post Mortem Data-Analysis and the use of archiver data for **Machine Learning** in python have vastly improved.



Use with
Machine Learning:
Deep Reinforcement
Learning – pre-training
with historical data [3].

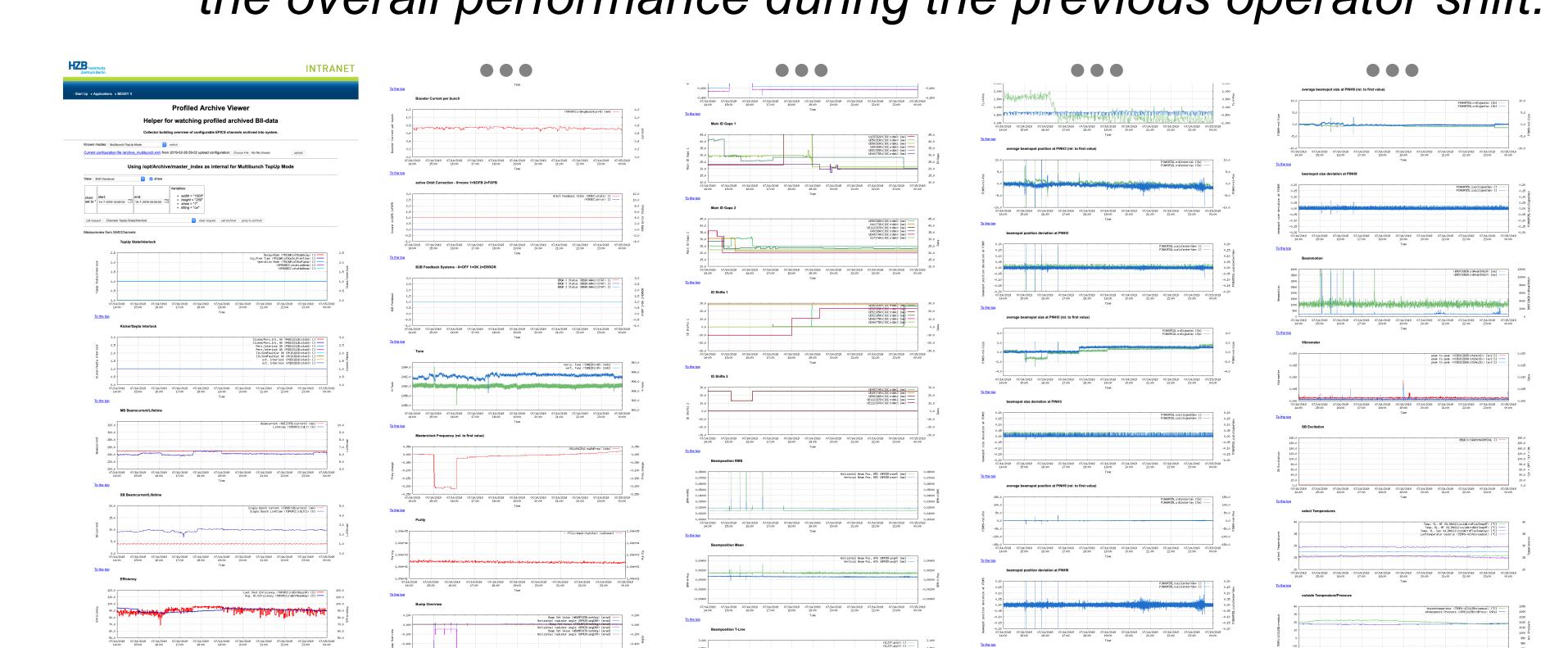
Automatized web requests

Over the years using the ChannelArchiver, several specialized web-based views have evolved. Some of these applications still have to be adapted to use the Archiver Appliance instead of the Channel Archiver as a data providing backend.



Above: Overview of vacuum system status.

Below: Showing a shift-overview of the main PVs to assess the overall performance during the previous operator shift.



SHORT TERM PLAN

- Problems with backup-system!
Choice of **PARTITION_YEAR** for LTS granularity causes >60000 files to change every day
– almost breaks daily incremental backups!
Switch to **PARTITION_MONTH** is imminent.
- Still work to do** adapting all client scripts and applications to abandon Channel Archiver and completely switch to Archiver Appliance.
- Provide **accepted alternative to ArchiveViewer**.

CONCLUSION

- Overall a **full success** and a giant **leap forward** compared to Channel Archiver.
- Help** from Murali Shankar (SLAC) in understanding and fixing problems was very instructive and very much appreciated.
- Instant **advantages gladly accepted** by users:
 - response time** of queries improved,
 - no more split archives** due to limited index size (no need to pick the „right one“),
 - data-retrieval and -analysis with python applications** increased by a magnitude.
- Maintenance effort** has vastly decreased.

MORE INFORMATION



Thomas Birke

thomas.birke@helmholtz-berlin.de
Fon: +49 30 8062-14934
www.helmholtz-berlin.de