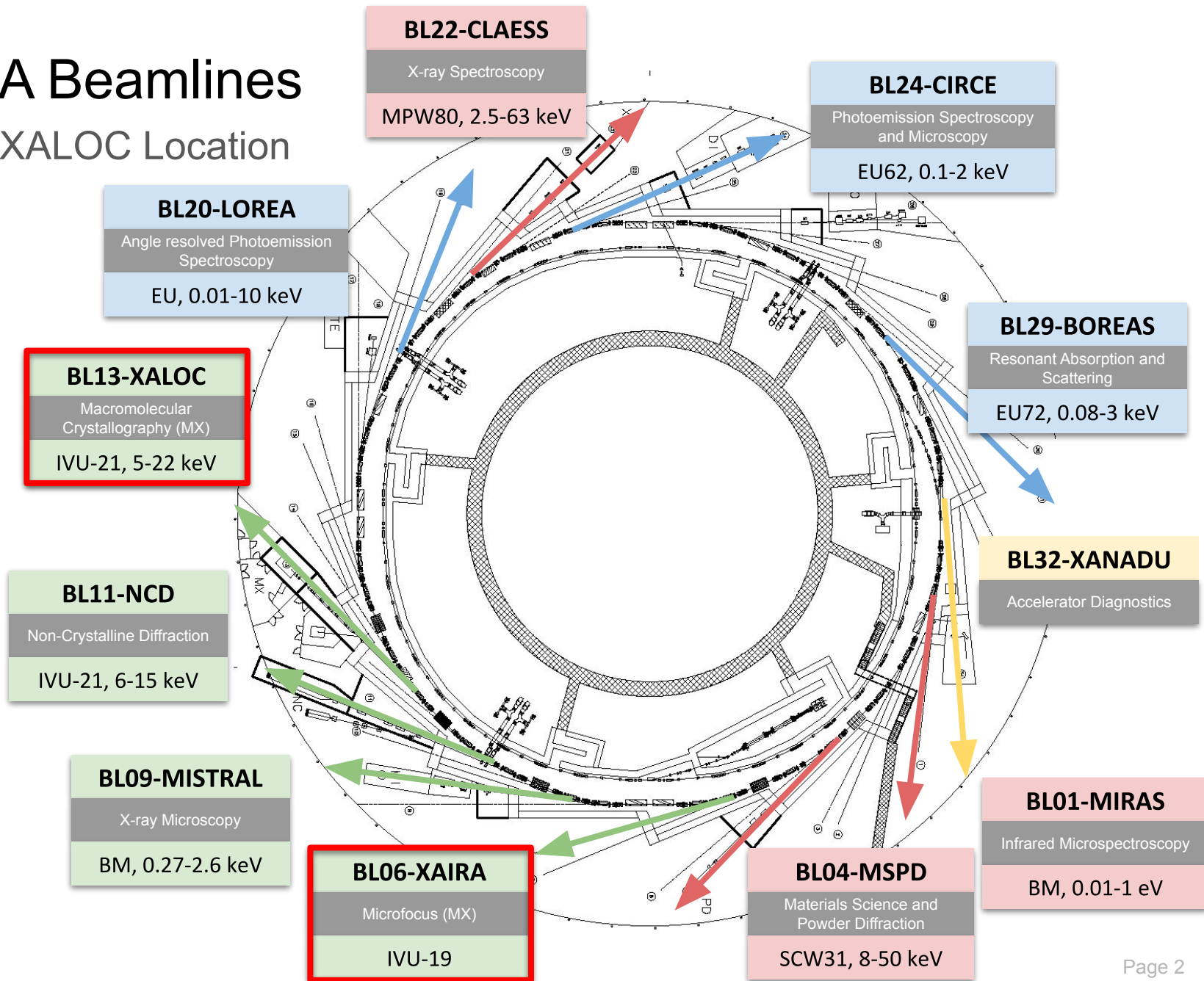# MXCuBE 2 @ ALBA
status report

Jordi Andreu,
On behalf of the controls group

MXCuBE meeting, 29 October 2019,
Berlin

ALBA Beamlines

BL13-XALOC Location

BL22-CLAESS
X-ray Spectroscopy
MPW80, 2.5-63 keV

BL24-CIRCE
Photoemission Spectroscopy and Microscopy
EU62, 0.1-2 keV

BL20-LOREA
Angle resolved Photoemission Spectroscopy
EU, 0.01-10 keV

BL29-BOREAS
Resonant Absorption and Scattering
EU72, 0.08-3 keV

BL13-XALOC
Macromolecular Crystallography (MX)
IVU-21, 5-22 keV

BL11-NCD
Non-Crystalline Diffraction
IVU-21, 6-15 keV

BL32-XANADU
Accelerator Diagnostics

BL09-MISTRAL
X-ray Microscopy
BM, 0.27-2.6 keV

BL06-XAIRA
Microfocus (MX)
IVU-19

BL04-MSPD
Materials Science and Powder Diffraction
SCW31, 8-50 keV

BL01-MIRAS
Infrared Microspectroscopy
BM, 0.01-1 eV

BL13 - XALOC Beamline

MX experiments

Detector: Pilatus2 6M (Dectris) LimaCCDs (Core 1.7) OS openSuSE 10.3.
Diffractometer: MD2M (Arinax) Icepap driven (no server).
Sample Changer: CATS (Irelec) spine/unipuck (double gripper) + plates.
Intrumentation control: Sardana/Taurus + Tango 7/9.
OS platform: Linux (openSuSE 11.1/12.1/Debian9)
Remote connection: NX Enterprise (No Machine)

MXCuBE 2 Qt4 @ BL13-XALOC

MXCuBE app snapshot

J. Andreu | Controls Group · MXCuBE status report | BL13 beamline | ALBA synchrotron · Berlin | 29.10.2019

MXCuBE 2 @ BL13-XALOC
MXCuBE running in a conda environment

- **mxcube:** (master frozen + local changes)
- **hwr:** (master frozen + local changes)
- **Miniconda3:** 4.6.14

```
# Name                   Version                  Build   Channel
python                   2.7.13               heccc3f1_16
pytango                  9.2.1             py27he9270ad_0    tango-controls
pyqt                     4.11.4                    py27_4
gevent                   1.1.2                     py27_0
numpy                    1.11.3             py27h3dfced4_4
scipy                    0.18.1               np111py27_1
pydispatcher             2.0.5                     py27_1
jsonpickle               1.1                         py_0
lxml                     4.3.3                     pypi_0    pypi
matplotlib               1.5.1                np111py27_0
pillow                   4.2.1                     py27_0
pyyaml                   5.1               py27h7b6447c_0
suds-jurko               0.6                       py27_3
openldap                 2.4.36                         1
tabulate                 0.8.3                     py27_0
enum34                   1.1.6                     py27_1
lucid2                   1.0                       pypi_0    pypi
opencv-python            4.1.0.25                  pypi_0    pypi
sardana                  2.5.0                     pypi_0    pypi
taurus                   4.5.1                     pypi_0    pypi
bl13-modules             1.9.0                     pypi_0    pypi
albaclusterclient        2.0.0                      dev_0    <develop>
```

MXCuBE 2 @ BL13-XALOC

General controls system issues

Controls System General Update:

- Change OS:
  - OpenSuSE 11/12 -- > Debian9 (adapt scripts)
  - Native Debian packages (no more Bliss Packages , rpm).
  - New CI pipelines: from push to deployment.
  - New deployment tools: SALT.
  - Replace hardware by new machines..
- Upgrade Tango7/Tango8 → Tango9 (Debian packages).
- Upgrade Taurus3 → Taurus4. Supports PyQt4/PyQt5 and Py2/Py3.
- Upgrade Sardana Py2 → Sardana Py3 (no longer support to Py2 version.

Ongoing projects @ XALOC:

- Integrate new OAV system (BZoom, Arinax).
- MXCuBE/ISPyB user experience improvements.
- Improve post-processing cluster access/performance.

Integration of MXCuBE 2 @ BL13-XALOC

Architecture

LDAP		LIMS		ALBA Cluster
Authentication		ISPyB web & db		EDNA plugins

MXCuBE application

Tango	Taurus	Sardana
Diffractometer DS Beamline Supervisor DS CATS DS ...	Taurus Device Taurus Attribute	Door Device (macros) Generic Scan Framework

Beamline Hardware Layer

Sample Changer
Diffractometer
Detector
Motors
Actuators
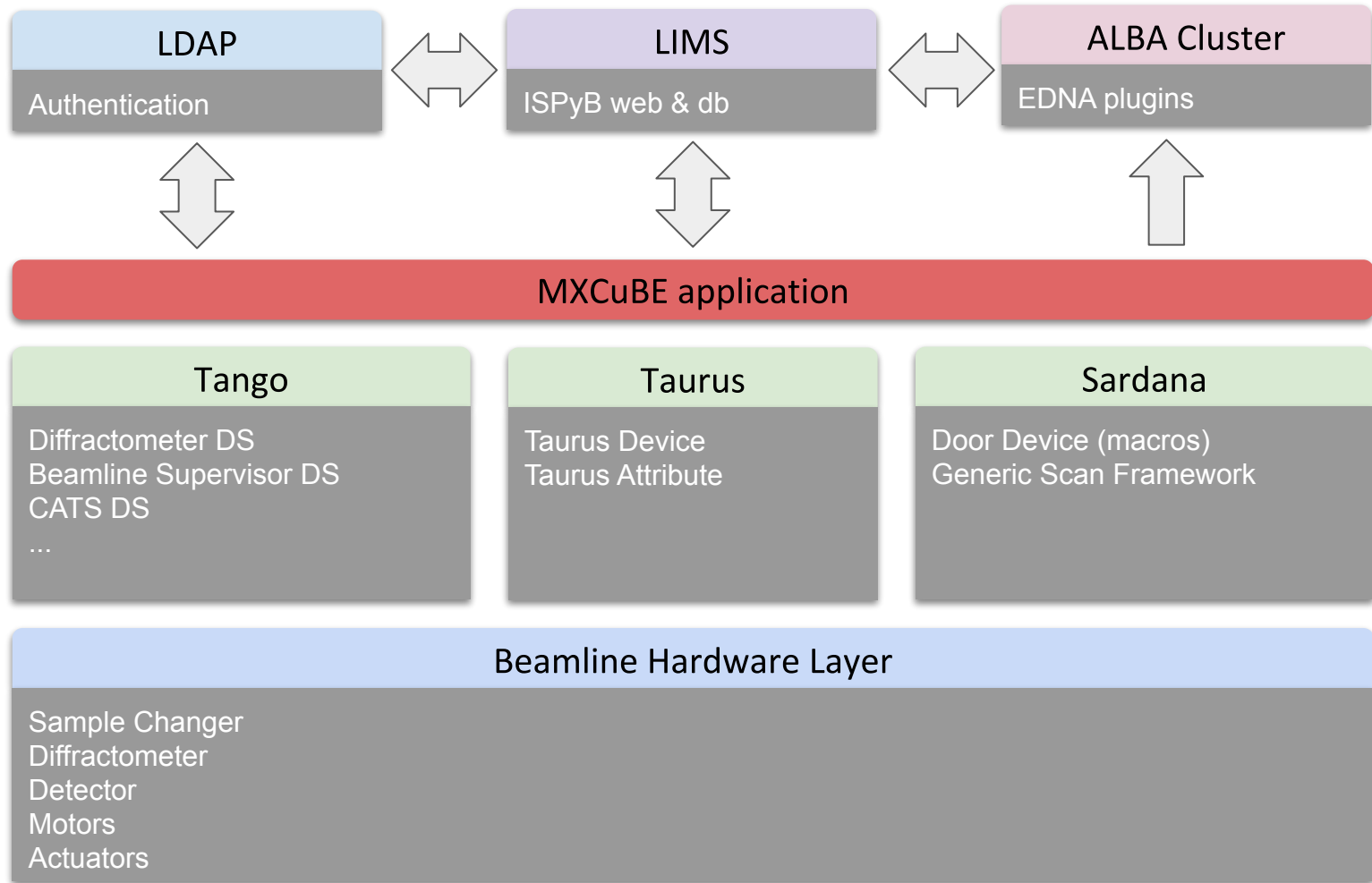
MXCuBE 2 @ BL13-XALOC

General controls system migration

	pcbl1307* (Control host)	tbl13 (Tango DataBase)	ibl1303 (Arinax Server)	ibl1304 (Tango DS)
Debian 9	x	x	x	x
Tango 9	client	x	x	x
Taurus 4	x**	-	-	x
Sardana Py2	client	-	-	x

*QuadCore Intel(R) Xeon(R) W-2123 CPU @ 3.60GHz, 32Gb.
*Taurus 3 in a pyenv for old GUIs.

+ Pyhton 3

Acknowledgements

The people

Thank you for your attention

BL13-XALOC

Roeland Boer

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Barbara Machado

Xavi Carpena

Controls

Guifre Cuni

Jordi Andreu

IT Systems

Sergi Puso

Ramon Escriba

MIS

Daniel Salvat

Daniel Sanchez

Phases for MXCuBE 2 @ ALBA

Diffractometer TANGO DS

Diffractometer TANGO DS

Control the diffractometer and sample environment for safety operations.

Any access to the equipment is done through this DS (when available).

Goniometer
omega
omegax
omegay
omegaz
centx
centy
kappa

Aperture
aperx
aperz

Fixed Beamstop
bstopx
bstopz

Moveable Beamstop
bsx
bsy
bsz

Detector table
diftabx
diftabz

DUSP
yagy
yagz

PLC signals
Sample on magnet, …

BL parameters
Pinlength, …

Actions
GoBeamViewPhase
GoSampleViewPhase
GoTransferPhase
GoCollectPhase

Phases for MXCuBE 2 @ ALBA

Beamline Supervisor TANGO DS

Beamline Supervisor TANGO DS

Coordinate the beamline elements for safety phase transitions.

Prepare the beamline elements according to the phase description.

Instruments
diffractometer
sample changer
shutters
cryostream

PLC signals
DetDistanceSafe
DetCoverOpen
CryoPosition
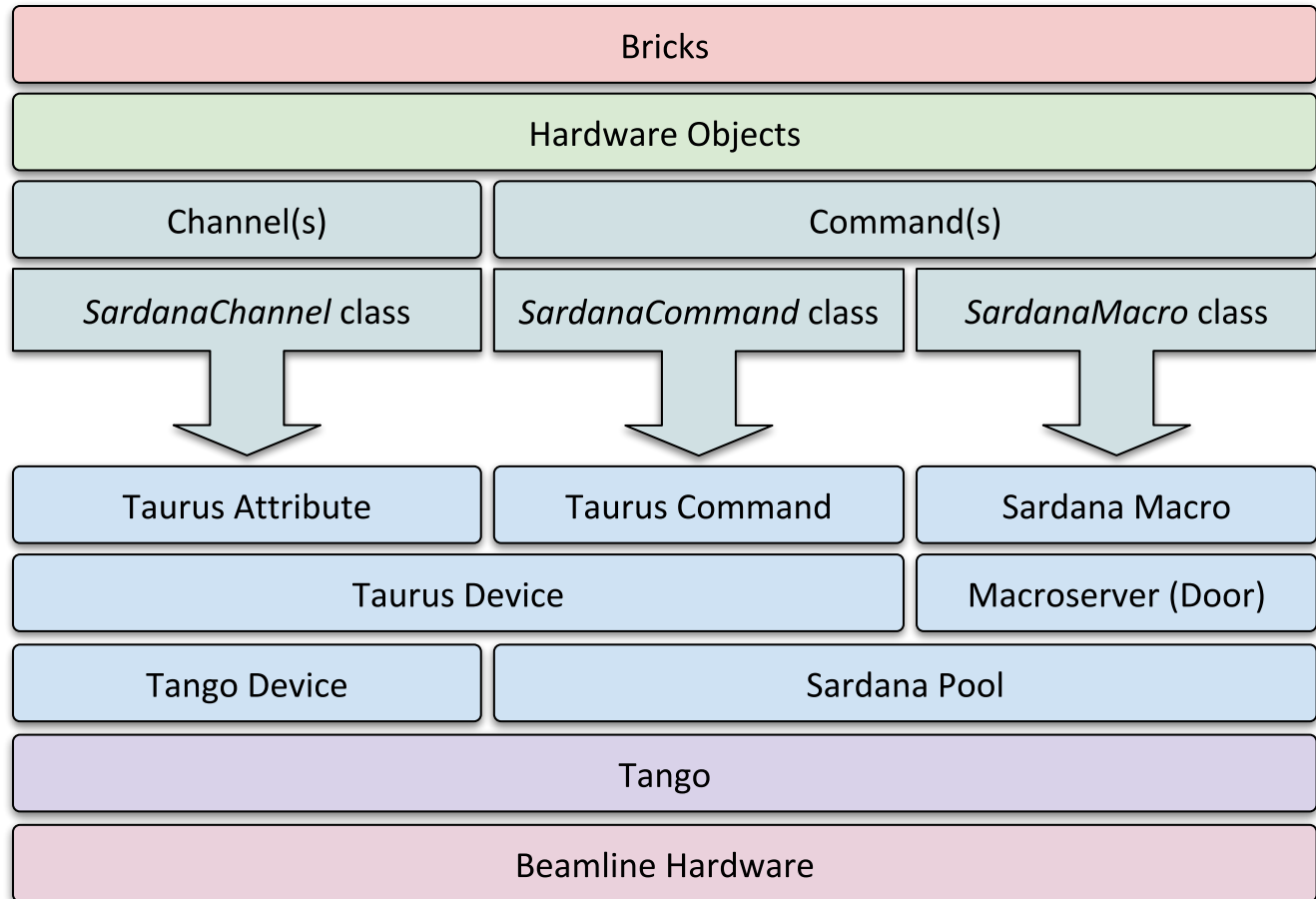FastShutterCollectPosition

Actions
GoBeamViewPhase
GoSampleViewPhase
GoTransferPhase
GoCollectPhase

Integration of MXCuBE 2 @ ALBA

Sardana Support for BlissFramework

BlissFramework
Hardware Repository

Bricks

Hardware Objects

Channel(s)	Command(s)

SardanaChannel class	*SardanaCommand* class	*SardanaMacro* class

ALBA Control System
Sardana & Taurus

Taurus Attribute	Taurus Command	Sardana Macro

Taurus Device	Macroserver (Door)

Tango Device	Sardana Pool

Tango

Beamline Hardware

*Implemented by V. Rey in *CommandContainer.py* and *Sardana.py* files.

ALBA Cluster

Infrastructure

- 11 nodes CPU - 1 node GPU.
- CPUs: Intel(R) Xeon(R) CPU E5-2650 v2 @ 2.60GHz.
- GPU: NVIDIA Tesla P100 16GB.
- 2,4 Tflops of computing capacity.
- 216 CPU cores with 1408 GB RAM.
- 1 Gbps and 10 Gbps Ethernet connections.
- Mpi 3.0.
- 40TB distributed scratch space in 2 nodes.

- Linux as operating system.
- Slurm for High Performance Computing.
- BeeGFS for scratch space.