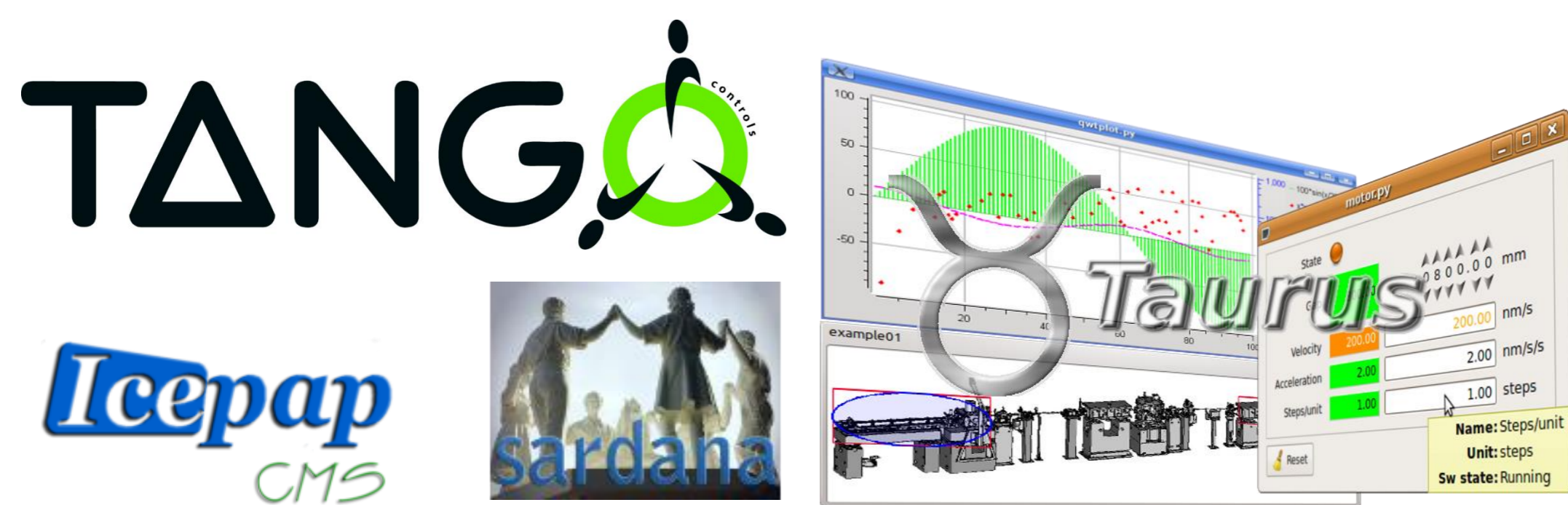


MOTION CONTROL ON THE MAX IV SOFT X-RAY BEAMLINES WITH TANGO AND SARDANA

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SPECIES, a MAX IV Beamline

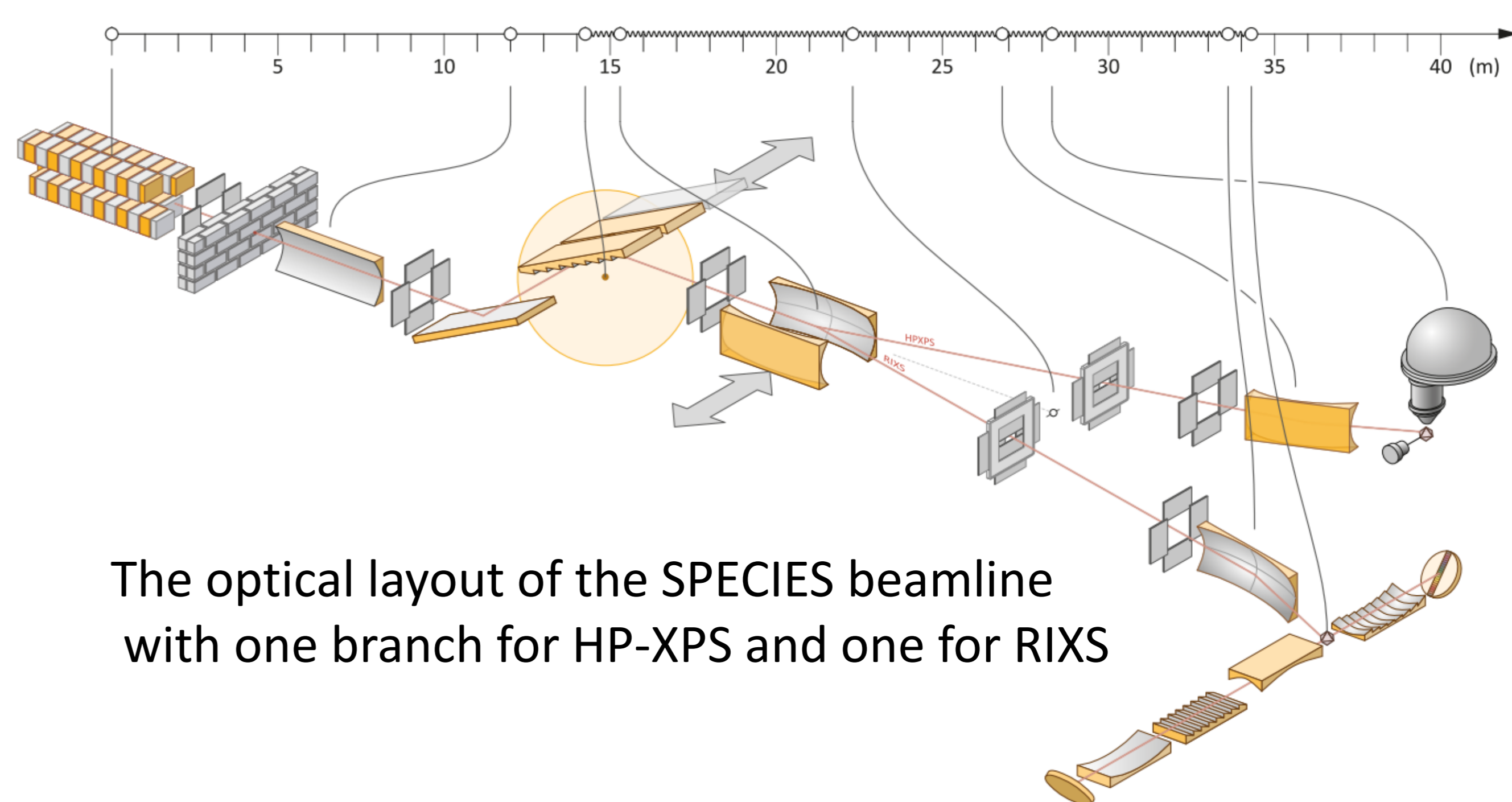
The SPECIES soft x-ray beamline [1] is currently commissioned and taking users at the older facility MAX-lab with the intention to serve as a test bench for the control system that will be used at all the other beamlines at MAX IV.

Powered by standards

The control system for the MAX IV facility applies several standards for both accelerators and beamlines, that have been adopted with the aim to make the deployment and maintenance of the complex machine and the large number of beamlines more efficient and also to grant some familiarity to the user community [2].

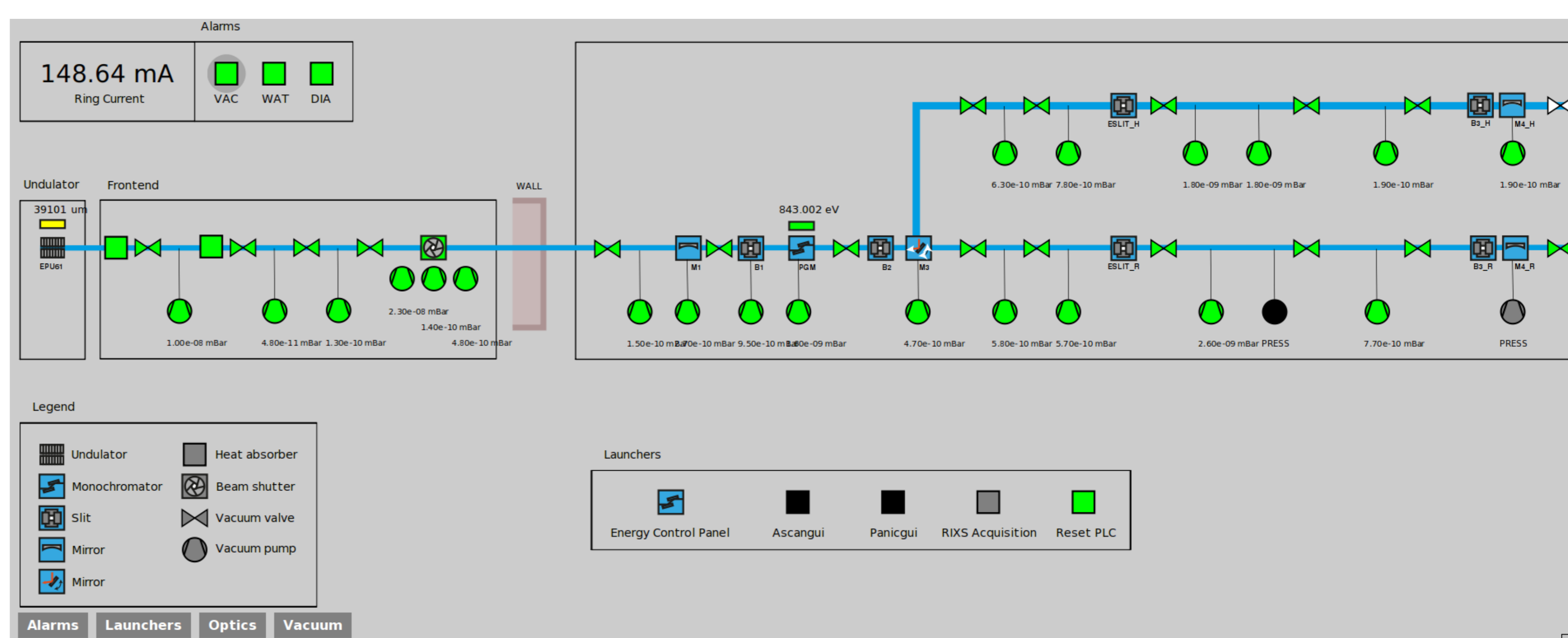
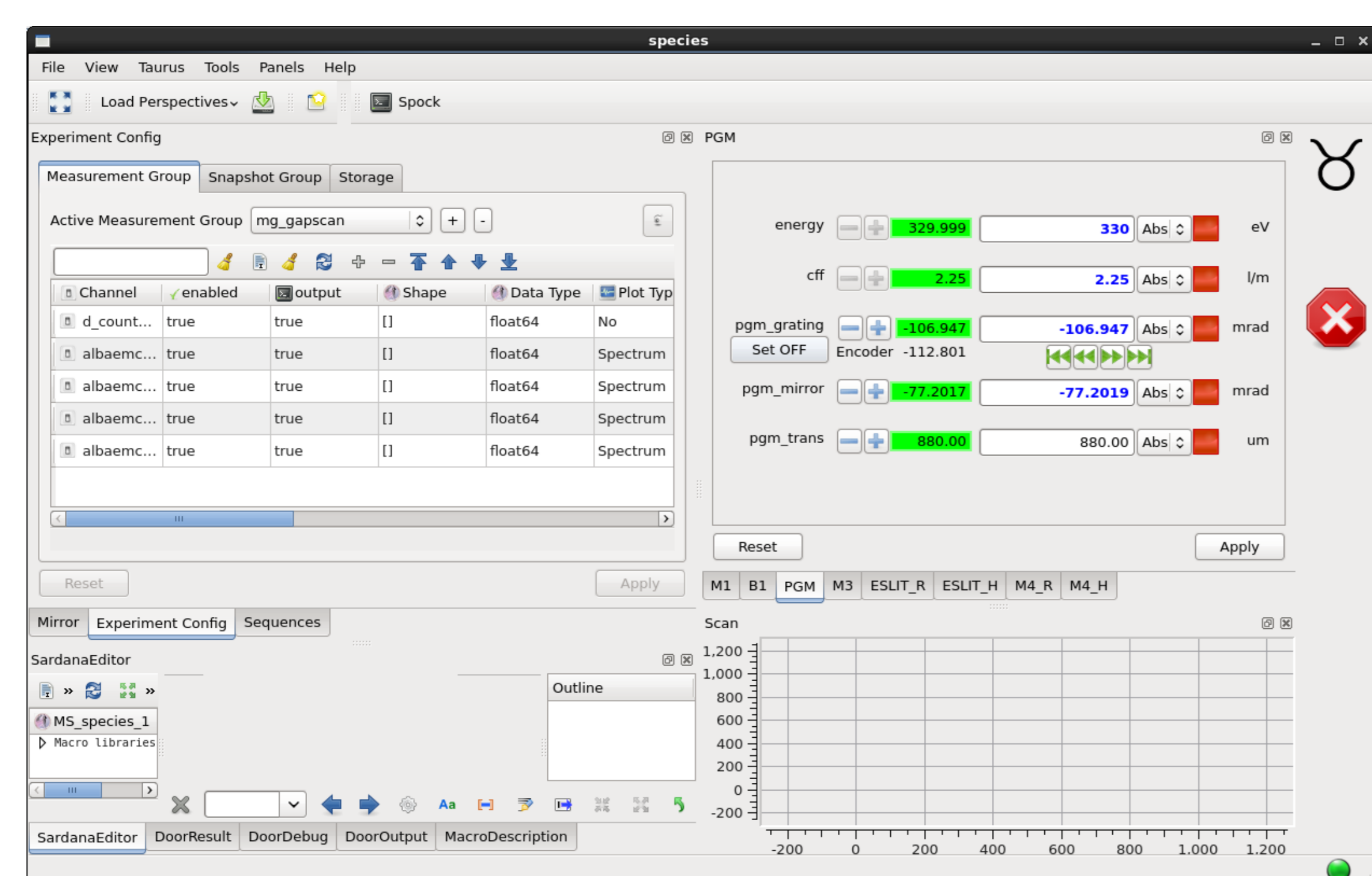
MAX IV is a part of the Tango collaboration, the Sardana collaboration, and the IcePAP collaboration.

During the commissioning of the SPECIES beamline, several motorized optical elements needed to be controlled to adjust the alignment of the beamline and its two branches, 40 meter long in total, as seen below. Also, the characteristics of the photon beam must be well known. This is achieved by using a set of macros making calculations from motor positions and current measurements.



Commissioning with Sardana

Choosing to use Sardana [3] from the beginning of the beamline commissioning provided us with several useful tools such as pseudomotors, predefined scans and generic Taurus GUIs [4]. They were of great use when calibrating motor settings, aligning the optical elements and finally characterizing the beam.

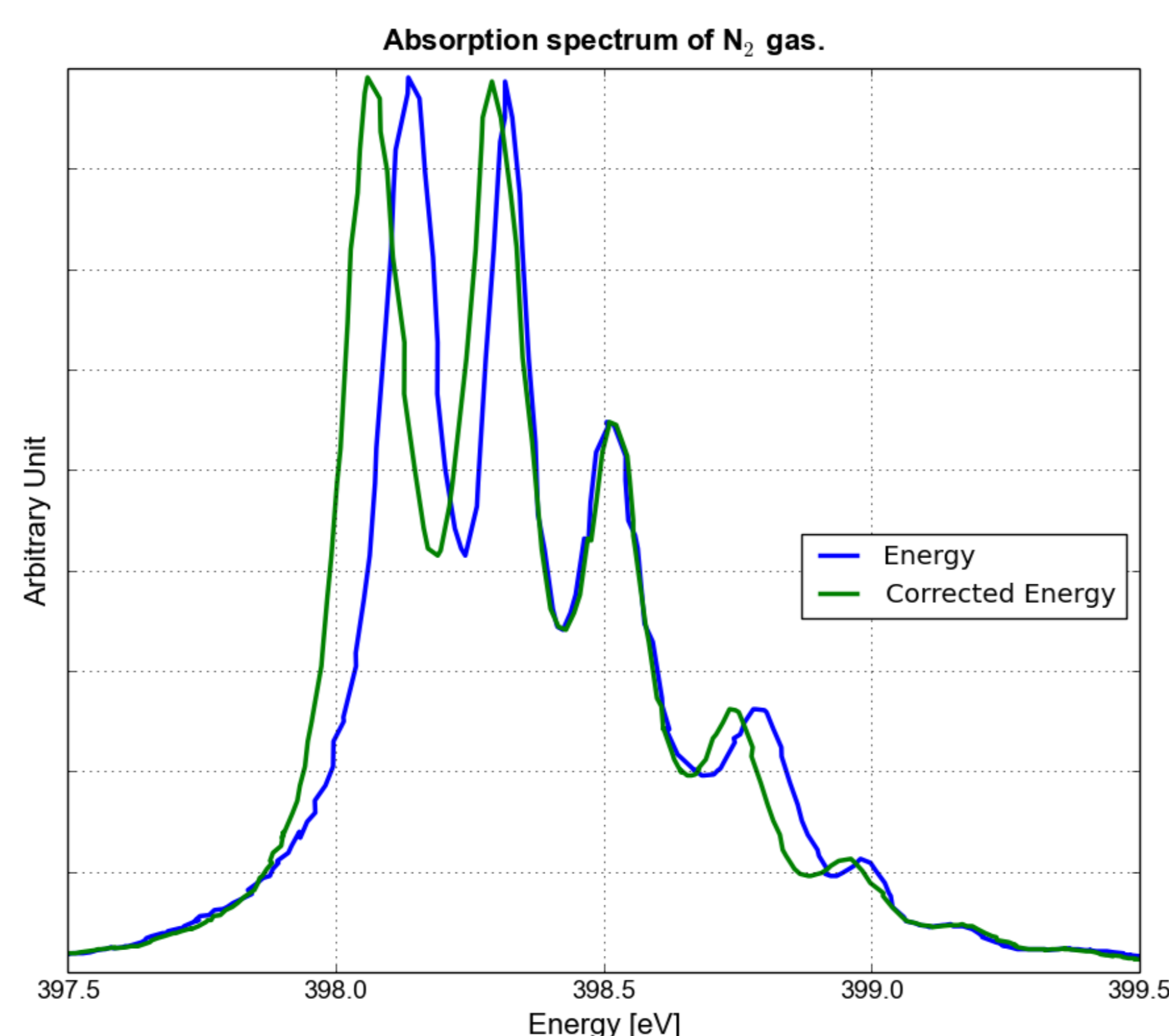


The commissioning GUI is a generic Taurus GUI which allows panels to be added with any combination of equipment and signals available in the control system. In the image above there are panels defined for the motors of each optical element. The GUI is also connected to the experimental control of Sardana.

After the commissioning, the generic GUIs are replaced with an SVG beamline synoptic which provides an overview of the entire beamline. The synoptic gives the possibility to display information about and control each piece of equipment. The view is defined by an SVG-image which is connected through a Python backend to the control system [5].

Achieving good motion control

With the help of Sardana the complexities introduced by the Heidenhain RON905UHV angular encoders of the SPECIES plane grating monochromator were mapped out and then solved through applying corrections to the calculated energy with Sardana pseudomotors.



References

- [1] The MAX IV web page about the SPECIES beamline: <https://www.maxlab.lu.se/node/1505>
- [2] J. Lidón-Simón et al, "Status of the MAX IV Laboratory Control System", Proceedings of ICALEPCS 2013, San Francisco, CA, USA, MOPPC109
- [3] T. Coutinho et al, "SARDANA: The software for building SCADAS in Scientific Environments", ICALEPCS 2011, Grenoble. WEPMSO23. <http://sardanascada.org/>
- [4] The TAURUS official website: <http://www.taurus-scada.org>
- [5] J. Forsberg, V. Hardion, D. Spruce, "A Graphical Tool for Viewing and Interacting with a Control System", ICALEPCS2015, Melbourne, WEM309

The MAX IV Laboratory

The MAX IV Laboratory opened for operation in 1987 (under the name MAX-lab) and is a national laboratory operated jointly by the Swedish Research Council and Lund University. The laboratory supports three distinct research areas: Accelerator Physics, Research based on the use of Synchrotron Radiation, and Nuclear Physics using high energy electrons.

At present three synchrotron storage rings are in operation MAX I-III and each year close to 1000 researchers visit the laboratory to perform experiments. The MAX IV laboratory is also responsible for the build up of the MAX IV facility situated in the Brunshög area just outside of Lund and approximately 2 km from the present facility.