

NICOS - The Instrument Control solution at the MLZ

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Overview

Challenges:

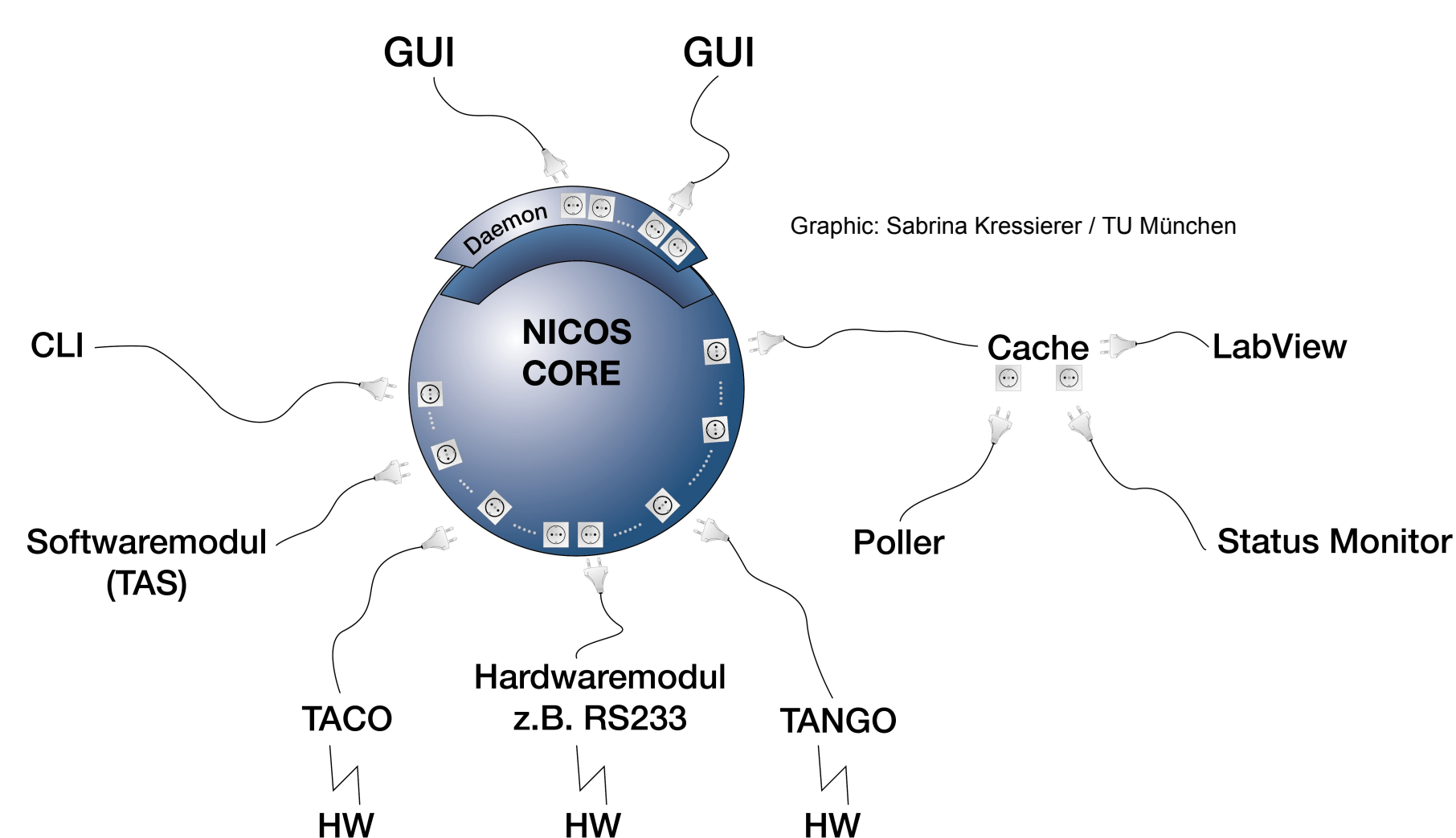
- Instrument control suite should support the experiments & experimenters
- High robustness and reliability
- Adaptation to individual instruments
- High flexibility & modular use of components
- Scripting support

Solution:

- Development driven by instruments needs, co-developed with instruments
- Wide range of applications: tomography, powder diffraction, TAS, TOF,
- Support for single detectors, imaging detectors & cameras (via LIMA)
- Plug'n Play support for sample environment & instrument components
- Enhanced scripting capability, help system & configurable GUI
- Several Control Protocols already included:
TACO / TANGO / MODBUS / RS232...
- Abstract device interfaces hide HW peculiarities

History:

- 2003: development started at, with and for TAS instruments
- Nicos1: python 1.x shell with support for TACO remote devices
- Problem: no code review, each instrument had an individual fork
- 2009: approach to merge branches + improve development
- Nicos2: python2.x client + server + gui +
- Code review, git as SCM, all instruments have same code base



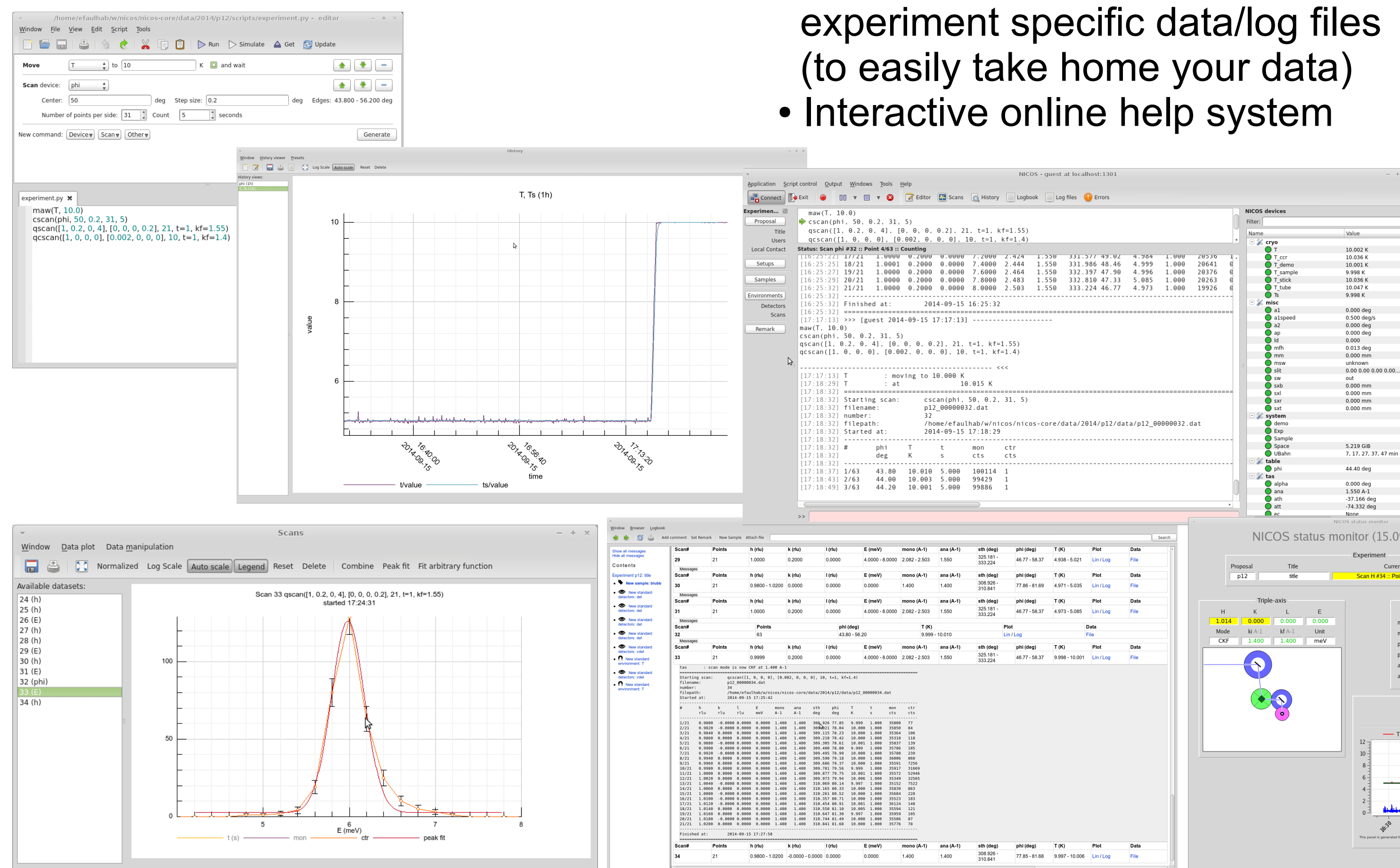
Advantages & Benefits

Instrument Scientists:

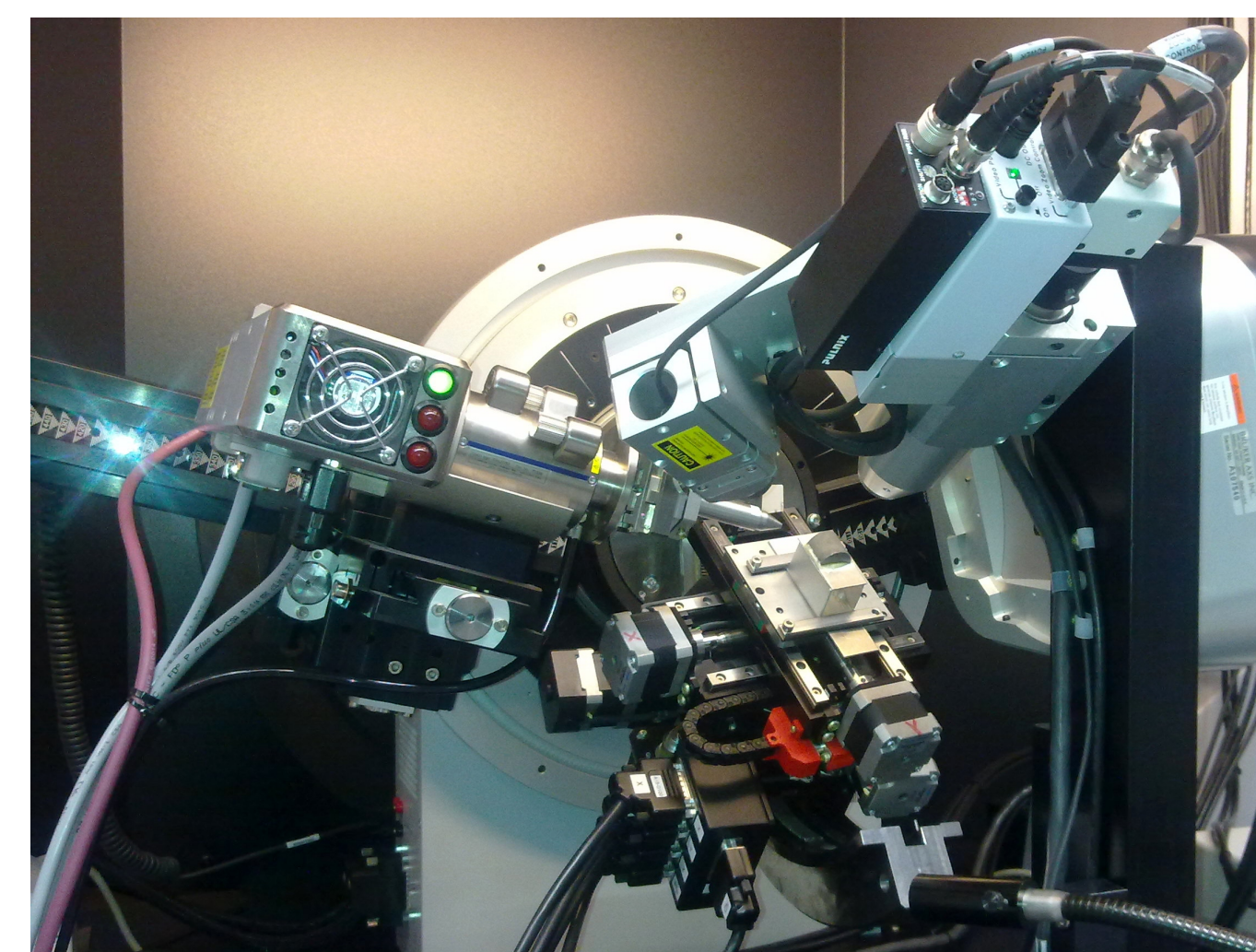
- Configuration files useable across instruments
- Lego-like construction of setups for more complex configurations
- Configuration change 'on-the-fly'
- Flexible configuration system to reflect hardware setup of instrument
- Console or **Graphical User Interface**
- History view of all logged data
- Instrument specific commands
- Client-Server architecture

Experimentalist / User:

- 'Self explaining' commands & argument names
- Few basic commands needed: (move, read, count, scan, run, ...)
- Automatic logging of instrument parameters during the experiment
- Electronic logbook of the activities
- Checking scripts in a 'Dry Run' (incl. limit checks and time estimation)
- Configurable single place for experiment specific data/log files (to easily take home your data)
- Interactive online help system



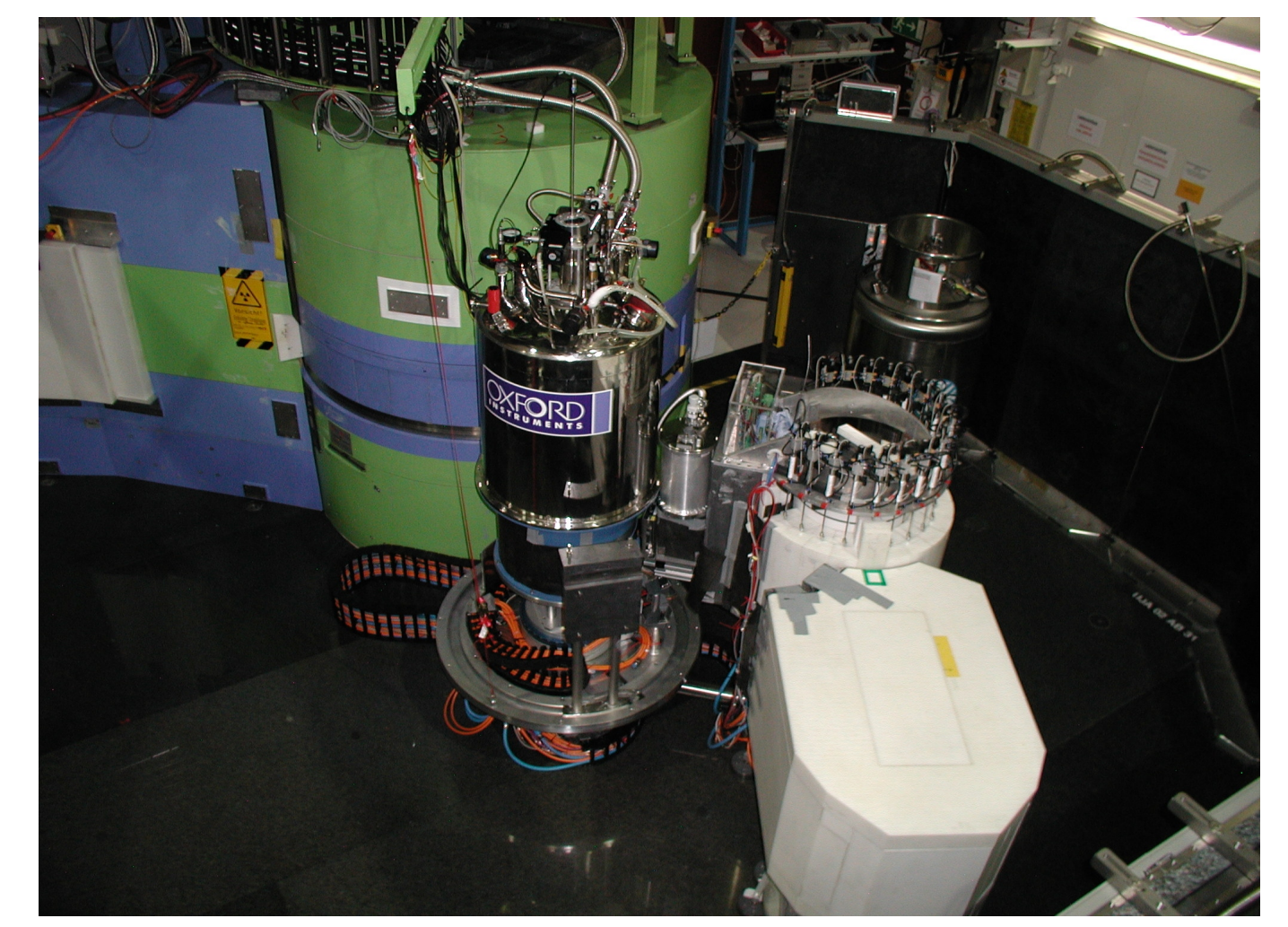
Selected Applications



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X-Ray Diffractometer @TU Wien

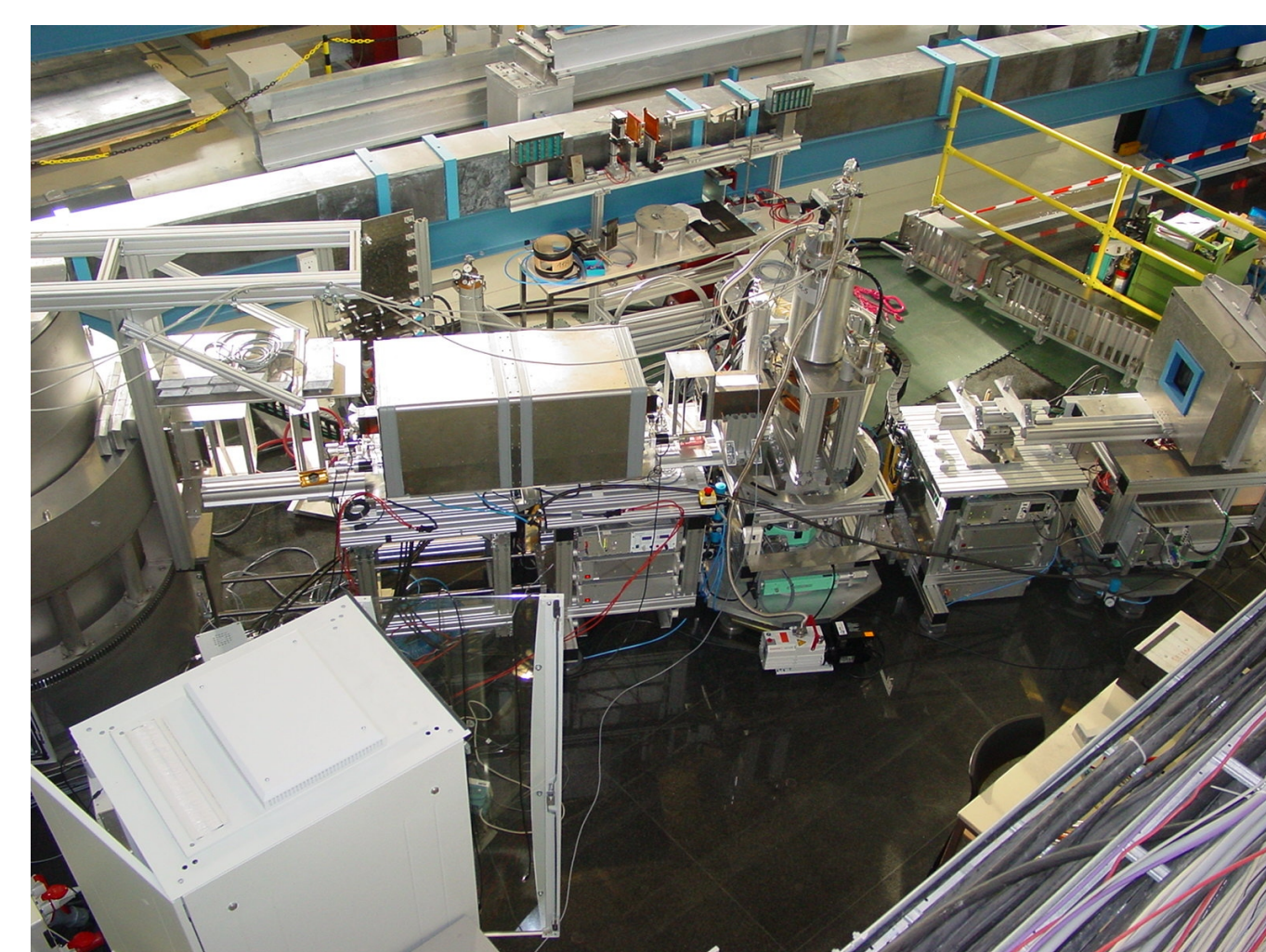
- Typical x-ray setup
- Micropositioning of sample
- Varying demands
- Reliable user operation
- Lab with many machines, not all converted yet



Picture: Astrid Schneidewind JCMS

PANDA@MLZ: Triple Axis Spectrometer (TAS)

- Many Motors, large movements
- Variety of sample environments
- LabView-control of 15T-Magnet
- On-site data treatment needed
- Simple data format



Picture: Wenzel Schürmann / TU München

Mira@MLZ: Multi-purpose Instrument

- SANS / Reflectometer / TAS
- Single / 2D detector
- Polarisation analysis / MIEZE option
- Frequent change of instrument configuration, sample environment
- Flexibility of scripting allows very different measurement schemes



Picture: Wenzel Schürmann / TU München

TOFTOF@MLZ: Time-Of-Flight Spectrometer

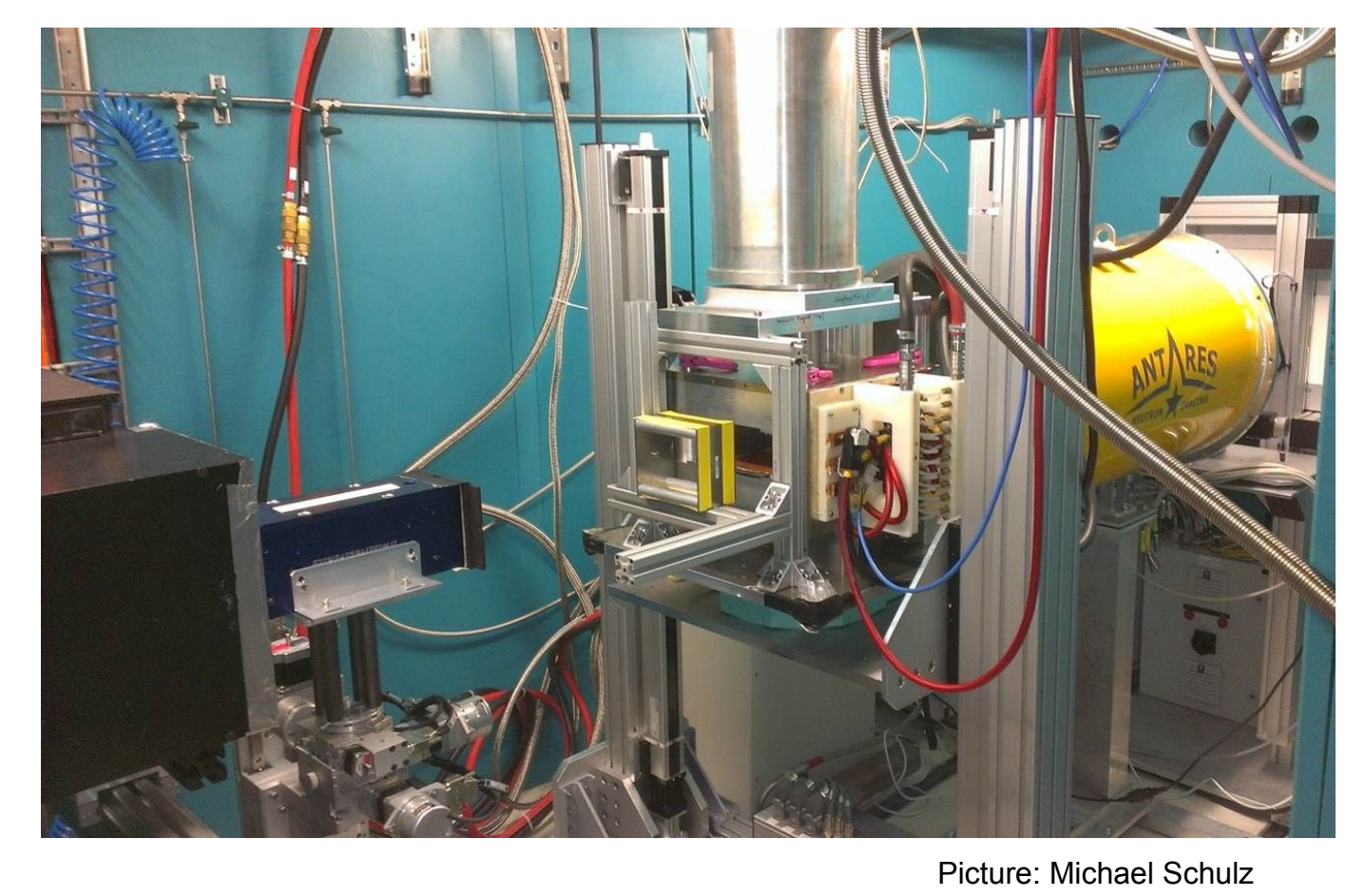
- Flexible to high energy resolution
- Few moving parts
- complex chopper system
- Multiple detectors (~1000)
- Small set of sample environments
- Custom sample environments



Picture: Andreas Wilhelm FRM2

SANS1@MLZ: Small angle neutron scattering

- Flexible collimation
- Movable 2D detector
- Interlocks prevent HW damage
- Frequent setup change
- Custom magnet



Picture: Michael Schulz TU München

Antares@MLZ: Tomography Beamline

- Tomography / Radiography
- Several 2D detectors / cameras
- Polarisation analysis
- Velocity Selector / Double Monochromator
- Precise positioning, heavy samples