

# Instrument control: NICOS

- developed at MLZ since 2009
- steadily rolled out to instruments (replacing various legacy systems)
- operating at 20 instruments



The screenshot shows the NICOS software interface running on a guest at localhost:1301. The interface includes a menu bar (Application, Script control, Output, Windows, Tools, Help) and a toolbar with icons for Connect, Exit, View, Setup, Editor, Scans, History, Logbook, Log files, Errors, and Live data.

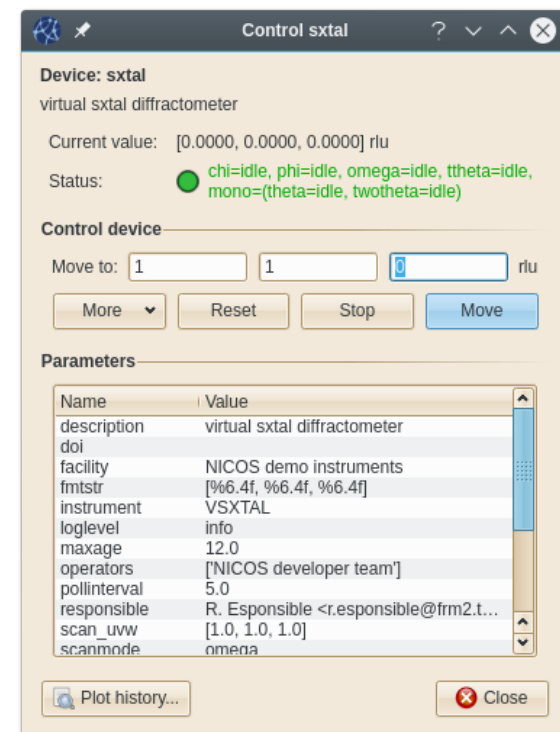
The main window is divided into several sections:

- Experiment Information:** Shows Proposal p1, Title foo, Users, Local Contact local@..., Setups cryo, s..., Samples, Environments, Detectors vdetsxtal, Scans T, Ts, and Remark.
- Command line:** Contains the command `NicosSetup()` and a log of device creation messages. The log shows the creation of various devices such as 'T', 'T\_demo', 'T\_sample', 'Ts', 'UBahn', 'chi', 'conssink', 'demo', 'dmnsink', 'filesink', 'hklfilesink', 'livesink', 'mono', 'mth', 'mtt', 'omega', 'phi', 'scanfilesink', 'serialsink', 'ss', 'ssb', 'ssl', 'ssr', and 'sst'. Two warning messages are visible: `WARNING: mth : value of speed from cache (0.0) differs from` and `WARNING: mtt : value of speed from cache (0.0) differs from`.
- NICOS devices:** A table listing the values for various devices. The table has columns for Name and Value.

Name	Value
cryo	
T	2.079 K
Ts	2.251 K
sxtal	
chi	0.000 deg
mono	2.000 A
mth	-17.341 deg
mtt	-34.683 deg
omega	0.000 deg
phi	6.000 deg
Sample	
Shutter	open
ss	0.00 0.00 0.00 0.00 mm
sxtal	[0.0241, -0.0023, 0.0000] rlu
ttheta	1.000 deg
vdetsxtal	(0, 0, 0)
system	
demo	
Exp	
Space	10.356 GiB
UBahn	12, 22, 32, 42 min

# Basic NICOS features

- client-server system based on Python scripting
- allows execution of predefined commands as well as complex scripts provided by the user
- graphical facilities for user convenience on top of basic „console-like“ interface
- flexible „setup“ system to reconfigure instruments on the fly
- dry-run mode for error checking/timing
- device data logging/archival and retrieval
- low-level device drivers usually provided by another control system: TACO/Tango/Epics/CARESS



# Single-crystal specifics

- development of commands/devices for traditional single-crystal diffractometers at MLZ ongoing
  - POLI: including polarization analysis, cryopad
  - RESI: with area detector
- working with „position lists“ and „reflection lists“
- standard commands like „center peak“, „scan HKL“, „scan list“, „refine matrix“
- goal: make lists available to scripting, to implement complex scripts on-the-fly for the user

Center peak with device: phi custom # steps:  custom step size:  + ↑ ↓ −

default # steps (per side):  default step size:   continuous

max. rounds:  center function: center\_of\_mass count time:  s

New command: Device Scan Other Orientation Generate

Sample information

SXTAL sample

Sample name:

Lattice constants:

Lattice angles:

UB matrix:

	1	2	3
1	-0	0.361	-0
2	0.361	0.11	-0
3	0.045	0	0.361

Additional parameters:

Bravais lattice: I

Laue group: 4/mmm

# POWTEX

- new RWTH/FZJ instrument POWTEX:
  - TOF powder instrument with large detector coverage
  - built in the new eastern guide hall at MLZ
- current development phase:
  - implementation of device drivers
  - preparation for possible in-situ detector tests at SNS
- full requirements for NICOS not yet clearly defined
- important areas:
  - data handling and data format (event stream as primary format not used otherwise at MLZ)
  - direct export to Mantid for online data visualization