Abstract:
- The high-throughput protein crystallization center at UZH (PCC) has the capacity to screen up to 20,000 crystallization conditions per day.
- Crystalization experiments are set up at 20°C with the Phoenix liquid handler (ARI).
- Crystalization experiments using temperature sensitive protein samples are routinely setup at 4°C using the Gryphon-LCP (ARI).
- The researcher can select any drop volumes between 50 nl and 800 nl for the vapor diffusion crystallization experiments.
- In addition to VD crystallization experiments, PCC offers LCP-, seeding-, counter diffusion- and under-oil crystallization techniques.
- Two new Rock Imager (Formulatrix) incubation and imaging systems will replace the two CrystalFarms (Brooks) at 4°C and 20°C.
- The researcher can monitor and analyze the crystallization experiments through the web.
- OptiMatrixMaker (Protein BioSolutions) does allow the researcher to rapidly design an optimization screen for crystal refinement.
- The UV/fluorescence microscope (JAN Scientific) allows the recognition of small protein crystals and distinguishes easily from inorganic crystals.
- The PX Scanner (Agilent) allows protein crystal testing for in situ diffraction.

Organizational Architecture of the High-Throughput Crystallization Center

Screen preparation
- Aquarius + Lissy - Liquid Handler
  - Reformattion of commercial screens into a 96-well format
  - Prepares gradients for grid screens
  - Setup up crystallization plates
  - Volume range: 20-1000µl

Crystal screens
- Hampton Research
- Molecular Dimensions
- Fluka
- Giagen

Optimization Screen
- “Opti Matrix Maker” custom screen for crystal refinement

Plate setup
- Phoenix + Gryphon-LCP (ARI)
  - 96-3/4 channel dispenser
  - 4°C or 20°C, sitting drop VD; LCP; Matrix seeding.
  - Drop volumes: 50 - 800nl
  - 70 plates/day

Crystallization plates
- MRC 2 Lims plate (UVP and PSI)
- 3x48 VD-experiments
- 5 µl round well
- LCP-Plate
- 96 LCP-experiments
- 100 µl or 400µl ML
- CrystalHarp-Plate
- 48 CD-experiments
- 10 µl round well

Protein crystal verification
- UV-Fluorescence microscope (JAN Scientific)
- Salt
- Protein

Conclusion:
- The high-throughput protein crystallization center at UZH (PCC) has the capacity for setting over 70,000 crystallization experiments per week.
- For standard drop volume ratios (100:100:200:200:100:100) 4 µl protein solution is needed for one crystallization plate with 288 VD-experiments.
- Routine setup include vapor diffusion, lipidic cubic phase, bicine, matrix seeding, free interface diffusion and “under-oil” crystallization techniques.
- Plates are routinely setup at 20°C or 4°C, independent of the incubation temperature of 20°C or 4°C.
- Setup-up experiments are successful and reproducible.
- The crystallization service is open to all academic research groups in- and outside UZH.
- The facility also extends its service to research groups in private industry.