Software

Commercial

Microscopy

SymPhoTime64
A complete software suite for acquisition and analysis of time resolved fluorescence data. SymPhoTime features a powerful scripting language that allows customisation of existing analysis and even implementation of novel analysis techniques.

Phasor Analysis Phasor Analysis is currently included in NovaFLIM. It is not included in SymPhoTime However, you can use Globals developed by the Laboratory for Fluorescence Dynamics to analyse FLIM data via the Phasor approach. Another option would be https://www.phasorpy.org.

Spectroscopy

EasyTau
EasyTau is the systems software of PicoQuants time resolved spectrometer FluoTime 300. EasyTau features a scripting language to automate more complex experiments. Examples of EasyTau scripts can be found on github: https://github.com/PicoQuant/EasyTau-Scripts

FluoFit
Decay curve analysis software

Open Source

Please note that these are external projects for which PicoQuant takes no responsibility and provides no support. In case of problems please contact the respective authors. Also note that such projects may not be maintained continuously. In particular, please check if they use current versions of file formats and/or programming libraries before you invest in larger development work based on such projects.

If you develop improved or new code, please consider contributing your code back to the community.

The compilation below is probably not complete. If you are the maintainer of a software that deals with TCSPC data please edit this page and add your software listing. Alternatively you can also use https://support.picoquant.com to contact PicoQuant support to submit your software project.

Data Analysis

- **snAPI** is a powerful Python wrapper which enables seamless communication and configuration with PicoQuant Time Correlated Single Photon Counting Instruments (TCSPC devices). It harnesses the advantages of C++ for optimal speed and performance and bridges the gap between the high-speed capabilities of your PicoQuant TCSPC device and the ease of use and versatility of Python.

https://github.com/PicoQuant/snAPI

- **PhasorPy** is an open-source Python library for the analysis of fluorescence lifetime and hyperspectral images using the phasor approach. https://www.phasorpy.org
- **FLUTE** is a Python GUI for interactive phasor analysis of Fluorescence Lifetime Microscopy (FLIM) data https://github.com/LaboratoryOpticsBiosciences/FLUTE.
- **FLIMPA** is an open-source software designed for the phasor plot analysis of raw Time-Correlated Single Photon Counting (TCSPC) Fluorescence Lifetime Imaging Microscopy (FLIM) data. Developed in Python, it offers an intuitive graphical user interface (GUI) for the analysis and visualisation of FLIM data. https://github.com/SofiaKapsiani/FLIMPA
- **PAM** is a software package for quantitative analysis of fluorescence microscopy and spectroscopy data, with a focus on experiments using pulsed interleaved excitation.http://pam.readthedocs.io
- Software Package for Multiparameter Fluorescence Spectroscopy and Imaging by research group Seidel, HHU: A collection of independent sotftware packages which enable the user to perfrom the analysis workflow put forward by the group.Please note that a trial version is available.
- **Open Tools for Solution-Based Single-Molecule Fluorescence Spectroscopy**
    - **FRETBursts**: software for burst analysis of freely-diffusing single-molecule FRET (smFRET) measurements including µs-ALEX. FRETBursts Homepage and paper.
    - **PyBroMo** simulator for single molecule FRET experiments of freely diffusing particles.
    - Researchgate group Open Computational Tools for Single-Molecule Spectroscopy

- PyCorrFit is a general-purpose FCS evaluation software that, amongst other formats, supports the established Zeiss ConfoCor3 ~.fcs file format. PyCorrFit comes with several built-in model functions, covering a wide range of applications in standard confocal FCS. In addition, it contains equations dealing with different excitation geometries like total internal reflection (TIR).

- Katherinas correlator is a collection of scripts and correlators that are inspired by the paper Ries…Schwille 2010 Optics Express “Automated suppression of sample-related artifacts in FCS”.

These scripts have different scopes and use the library tttrlib to read and correlate time-tagged time resolved (TTTR) files.

- https://github.com/yusuf-qutbuddin/theatRICS is a Python-based toolkit designed for the analysis of time-resolved fluorescence data. It is particularly well-suited for high-throughput data processing, offering efficient workflows for researchers managing large TCSPC datasets.

- FLIM-FRET analyzer: open source software for automation of lifetime-based FRET analysis. This is a Microsoft Windows application originally developed in C#. The main goal of this application is to provide the FLIM community a user-friendly application.

- Fluortools.Fluorescence Decay and Anisotropy Analysis.

- PyCorrelate:Pycorrelate computes fast and accurate cross-correlation over arbitrary time lags. Cross-correlations can be calculated on “uniformly-sampled” signals or on “point-processes”, such as photon timestamps. Pycorrelate allows computing cross-correlation at log-spaced lags covering several orders of magnitude. This type of cross-correlation is commonly used in physics or biophysics for techniques such as fluorescence correlation spectroscopy (FCS) or dynamic light scattering (DLS).

- QuickFit 3.0: QuickFit 3 is our open-source data evaluation software for FCS and imagingFCS (imFCS) measurement. Actually QuickFit 3 itself is a project manager and all functionality is added as plugins. A set of tested plugins is supplied together with the software.

- FCS Point Correlator FCS Bulk Correlation Software accepting pt3 and ptu files. for fitting see https://dwaithe.github.io/FCSfitJS/

FCS fit JS

- FLIMFit. FLIMfit is an open source package for rapid analysis of large FLIM datasets.

- https://github.com/zhengkaiyu/FIMAS Fluorescent Imaging Analysis Software

- Extensible Time-tag Analyzer. ETA, the extensible time tag analyzer, is an event driven programming language with graphical user interface for analyzing, plotting, and fitting of time tagged data.More info.
- Pals3D is a graphical application to support the use of a Time-Correlated Single Photon Counting system for application to Positron Annihilation Lifetime Spectroscopy. https://github.com/avancra/Pals3D.
- https://github.com/SarthakJariwala/Python_GUI_apps Graphical User Interface (GUI) Python apps written in python using qt and pyqtgrpah for quick analysis of scientific data. It also includes the ability to convert data to H5 if needed.
- https://lifefit.readthedocs.io/en/latest/ LifeFit is a Python package to analyze time-correlated single-photon counting (TCSPC) data sets, namely fluorescence lifetime and time-resolve anisotropy decays.
- https://github.com/ryoheiyasuda/FLIMage_public FLIMage allows for controlling TCSPC hardware and generate fluorescence lifetime images in real time. The main part of the source code is free for academic and educational uses. It is used and tested in the Yasuda lab (Max Planck Florida Institute for Neuroscience) on Windows 10 and NationalInstruments DAQmx 18.6. The software is updated frequently.

Libraries/scripts/readers

- Demo Code for reading PicoQuants PTU File format
- https://github.com/Brinkslab/ptu_flim_tools/ Tools for reading, converting and analysing ptu flim data.
- https://github.com/ChrisHal/PTU2BIN Tool to convert PicoQuant PTU filesto BIN files or IgorPro binary wave files (IBW)
- Reading PicoQuants PTU File formats to MatLab - 100x faster than the Demo Code
- **libpicoquant:** Tools for reading PicoQuant file formats: https://github.com/tsbischof/libpicoquant
- **Open Microscopy's BioFormat** supports PicoQuant bin files (pre-histogrammed Image Data File) https://www.openmicroscopy.org/site/support/bio-formats5/formats/picoquant-bin.html
- **ImageJ data readers**-
  - Import Filter for pt3 files: http://imagejdocu.tudor.lu/doku.php?id=plugin:inputoutput:picoquant_.pt3_image_reader:start
  - Import of ptu/pt3 image files (+intensity/average lifetime stacks): https://github.com/ekatrukha/PTU_Reader
- https://github.com/QuantumPhotonicsLab/readPTU readPTU: a Python Library to Analyse Time Tagged Time Resolved Data http://qpl.eps.hw.ac.uk/, https://arxiv.org/pdf/1903.07112.pdf
- ptuT3toT2 - a program that converts ptu files from picoquant from T3 mode to T2 mode
- **Photon-Tools** Python utilities for working with photon timestamp data from fluorescence spectroscopy experiments https://github.com/bgamari/photon-tools
- **Photon Correlation** A suite of command-line tools for performing calculations on photon arrival data, as produced by hardware such as the PicoQuant PicoHarp and HydraHarp: https://github.com/tsbischof/photon_correlation
- **dspFRET**: Matlab code for analyzing TTTR data from PicoQuant. Typical application is analysis of single pair FRET measurements with pulsed interleaved excitation (PIE-FRET). https://github.com/RobinsonLab/dspFRET
- exciton diffusion (Matlab)
- **FoCuS-point**: FoCuS-point utilises advanced time-correlated single-photon counting (TCSPC) correlation algorithms along with time-gated filtering and innovative data visualisation. FoCuS Homepage and paper
- TCSPC curve fitting for phd files (Python)

- readPTU_FLIM Library for reading PTU files (works for MultiHarp, HydraHarp, PicoHarp, TimeHarp acquisition) as well as converting raw TTTR data to FLIM image data stack.
- https://github.com/RobertMolenaar-UT/PicoQuant-multi_channel_screen The main purpose of the MultiChannel script is one can proccess multiple PTU files or a folder with PTU files and get a series Fluorescent multicolor images with minimal user input. Usefull for screening results during imaging and to be used in presentations.
- https://github.com/RobertMolenaar-UT/Lifetime_fit With this script you can fit TCSPC lifetime histograms to single, double or triple order exponential fit with reconvolution method Minimalization method are NLLS / MLE-Nelder-Mead minimalisation methods.
- tttrlib tttrlib is a low level, high performance API to read and process time-tagged-time resolved (TTTR) data
- Trattoria Trattoria delivers you the fastest streaming algorithms to analyze your TTTR data
- picoquantio is a Python library for reading file formats generated by PicoQuant hardware.
- https://github.com/cgohlke/ptufile Ptufile is a Python library to read image and metadata from PicoQuant PTU and related files: PHU, PCK, PCO, PFS, PUS, and PQRES. PTU files contain time correlated single photon counting (TCSPC) measurement data and instrumentation parameters.

Data Acquisition

- **snAPI** is a powerful Python wrapper which enables seamless communication and configuration with PicoQuant Time Correlated Single Photon Counting Instruments (TCSPC devices). It harnesses the advantages of C++ for optimal speed and performance and bridges the gap between the high-speed capabilities of your PicoQuant TCSPC device and the ease of use and versatility of Python. https://github.com/PicoQuant/snAPI
- **qudi**: A modular laboratory experiment management suite which supports PicoHarp300. https://github.com/Ulm-IQO/qudi
- **pyPL**: wxpython integration of software and hardware for micro-photoluminescence measurements: WinSpec, PicoHarp, and Thorlabs/APT piezos and stepper motors. https://github.com/kaseyrussell/pyPL
- PicoHarp Multiscan with Prior Stage: https://bitbucket.org/ywsong2/uky_ptu_convert
- **Python** interface to communicate with TimeHarp 260: https://github.com/impact27/th260
- LabView based **Fluorescence lifetime activated droplet sorting** softwarehttps://github.com/SadatHasan/EasyFlux
- https://github.com/scopefoundry/ A Python platform for controlling custom laboratory experiments and visualizing scientific data
- https://github.com/CEMES-CNRS/pymodaq_plugins_picoquant PyMoDAQ plugin for Picoquant instruments (TimeHarp260, …)

Demos about Controlling PicoQuant Devices

Sepia II and Solea

- SepiaWrapper is an experimental Python Wrapper to control PicoQuants Sepia PDL828
- https://github.com/PicoQuant/PQLaserDrv
- PicoQuant Sepia2 API Bundle

TimeHarp 260

- https://github.com/PicoQuant/TH260-Demos

PicoHarp 300

- PicoHarp 300 TCSPC system hardware plug-in for ScopeFoundry (Python)
- Python binding, Tango device server and Taurus gui to access the PicoHarp300 photon counter
- https://github.com/PicoQuant/PH300-v2.x-Demos
- https://github.com/PicoQuant/PH300-v3.x-Demos

HydraHarp 400

- Control HydraHarp400 (python)
- https://github.com/PicoQuant/HH400-v1.x-Demos
- https://github.com/PicoQuant/HH400-v3.x-Demos

MultiHarp 150

- https://github.com/PicoQuant/MH150-Demos

Other

- PicoHarp Library in Python
  https://github.com/srgblnch/PicoHarp300

GitHub repositories mentioning PicoQuant and supporting the PicoQuant t3r data file format:
https://github.com/search?&q=picoquant+OR+picoharp+OR+hydraharp+OR+TimeHarp

Copyright of this document belongs to PicoQuant GmbH. No parts of it may be reproduced, translated or transferred to third parties without written permission of PicoQuant GmbH. All information given here is reliable to our best knowledge. However, no responsibility is assumed for possible inaccuraciesor omissions. Specifi cations and external appearances are subject to change without notice.

PicoQuant GmbH
Rudower Chaussee 29 (IGZ)
12489 Berlin
Germany

P +49-(0)30-1208820-89
F +49-(0)30-1208820-90
info@picoquant.com
www.picoquant.com