List of Software in Nano-Optics Group

The NANO-OPTICS-GROUP sciebo folder contains a folder for software of the group.
This is split up in sub-folders for the different development platforms (e.g. MATLAB).
Any software listed here can be found in a separate folder in one of these sub-folders.
Color Code: LabVIEW purple / MATLAB orange / PYTHON blue / Various green

Software	Description	Last revision	Contact person
3D SCAN	***Automatic confocal scan program.*** Contains applications for direct use in labs C018 and C019. Besides standard 2D scans this program allows scanning of multiple z-planes. Step size, scan range, starting points, motor delay time can be set manually. An automatic focusing procedure is included as well.	27/11/19	Florian Sledz
FLIM	***Automatic fluorescence lifetime imaging program.*** Contains applications for direct use with TimeHarp and PicoHarp modules. Step size, scan range, acquisition time and guessed lifetimes can be set.	27/11/19	Florian Sledz
PicoQuant	***Configuration files and libraries for PicoQuant modules.*** Contains collections of files for TimeHarp and PicoHarp modules.	27/11/19	Florian Sledz
POWERMONITOR	***APD count rate monitoring over time.*** Shows the count rates of connected APDs from the time when it was started. Contains applications for direct use with TimeHarp and PicoHarp modules.	27/11/19	Florian Sledz
Runtime-Engine	***Runtime-Engine for LabVIEW.***	27/11/19	Florian Sledz
AxialScanAnalysis	***Plot and fit of axial confocal intensity scans.*** In this script an intensity scan in axial (z) direction can be analysed. The z-scans can be performed with the APDs and the corresponding	17/01/21	Lukas Hunold

	LabView program. If a measurement of the laser reflection from the surface and the emitter is performed, the corresponding peaks can be fitted with Gaussian or Lorentzian functions to get the implantation depth.		
ConfocalScanAnalysis	***Plot and fit of lateral 2D confocal intensity scans.*** In this script a confocal map is generated from three or four txt files, including the x position (x.txt), y position (y.txt) and the intensity of either one or both APDs (int0.txt and int.txt). The program will plot the data and perform a spatial Gaussian fit of the intensity, if needed. Several parameters for the visualization can be set on demand.	30/01/21	Lukas Hunold
ConfocalScanSim	***Simulation of scanning over a spot of emitters.*** In this script a confocal scan of a spot of emitters is simulated. The emitters are arranged homogeniously in a given sized circle or Gaussian distributed. A focused Gaussian beam by standard objective is assumed and scanned over the spot. Scripts for calculating the peak intensity of the focused Gaussian beam and the PSF of a single emitter are included in the folder “preparation”.	27/01/21	Lukas Hunold
DipoleCollEff	***Calculate dipole collection efficiency in the far field.*** In this script the collection efficiency of a dipole in a material with variable refractive index is calculated (for standard objectives). The dipole is assumed to be either horizontal, vertical or diagonal to the sample surface. Notice that the dipole needs to be located several wavelength below the surface, since otherwise near field effects occur.	17/01/21	Lukas Hunold
EmitterSaturation	***Analysis of saturation measurements on single emitters or ensembles.*** In this script, the saturation behaviour of an emitter ensemble is simulated. The spatial emitter distribution can be homogeneous or Gaussian shaped. Individual saturation curves are overlapped and fitted by different models. In addition two subfolders provide saturation measurement analysis tools. In these scripts a saturation curve can be generated and fitted from	01/02/21	Lukas Hunold

	measured data. As input a txt file with powers and one with the related signal counts is required. Instead the counts can also be measured over time and the power is changed stepwise in equal time intervalls. The script will analyse the result and construct the saturation curve out of it.		
FocusInDielectric	***Simulation of focusing a beam into a dielectric medium.*** In this script the focusing of a laser beam into a dielectric medium is investigated. You might calculate the field strength along the beam axis and in radial direction for all three field components, as well as the corresponding intensity. You can set various incident parameters, like the beam profile, objective parameters, laser wavelength and IOR of the media.	30/01/21	Lukas Hunold
FresnelCalculator	***Compute reflection and transmission from Fresnel coefficients.*** This script calculates the light reflection and transmission at an interface by using Fresnel coefficients for different initial IORs.	02/02/21	Lukas Hunold
g2Analysis	***Analysis of emitter antibunching in continuous and pulsed mode.*** In this script a measurement of the second order correlation function (g2) for SiV color centers is analysed. The routine can also be used for any other single emitter after slight modifications. Two scripts are provided for the excitation laser either in continuous (cw) or pulsed mode. For both the antibunching can be studied and the g2(0) value is reconstructed.	29/01/21	Lukas Hunold
g2Simulation	***Simulation of emitter antibunching in continuous or pulsed mode.*** In this script a measurement of the second order correlation function (g2) for SiV color centers is simulated. The routine can also be used for other single emitter after slight modifications. Two scripts are provided for the excitation laser either in continuous (cw) or pulsed mode. For both the antibunching is visualized and the g2(0) value is investigated.	01/02/21	Lukas Hunold
ImageAnalysis	***Plot and fit camera images given as ASCII files.*** In this script the image of a camera saved as .asc file is plottet and	30/01/21	Lukas Hunold

	eventually parts of it are fitted.		
ImageSpectral	***Guide for program on spatial-spectral-resolved imaging.*** Includes pdf with explained MATLAB code and corresponding readme.	26/11/19	Assegid Flatae
ImagingEMCCD	***Program for plotting data of tif, spe, png or similar image files.*** Loads image files, reads data in matrix and plots corresponding map. Includes file for directly loading of .spe files generated by Princeton EMCCD.	04/03/20	Florian Sledz
LifetimeImage	***Program for fluorescence lifetime imaging (FLIM) analysis.*** Code can be used to import data of FLIM scan and fit/plot it. Deconvolution of IRF can be performed by means of a Wiener Filter.	26/11/19	Florian Sledz
LifetimeSiV	***Lifetime plot and fitting for SiV color centers or other emitters.*** This program can be used to plot and fit a lifetime measurement. You have to provide a dat file including a list with the histogram counts. The program can also do a background correction if you provide a similar background file and a deconvolution with the IRF, if you provide a similar file for the IRF measurement. A multiexponential fit is also possible.	30/01/21	Lukas Hunold
PinholeImplantSim	***Simulation of ion implantation through a pinhole.*** In this script the implantation through a pinhole is investigated. SRIM simulations for the stopping of the ions in the pinhole material and the transmission through different thicknesses are provided in the data folder. The program loads the data and performs analysis to create the corresponding distribution of emitters on the sample after the pinhole. Various parameters (ion energy, pinhole shape, …) can be adjusted.	26/01/21	Lukas Hunold
SiVAbsorption	***Analysis of SiV absorption cross section and emission.*** In this script the absorption of SiV centers is investigated with respect to the influence on effective emission count rates. The script can be reused for other emitters after slight modifications.	30/01/21	Lukas Hunold

SpectralScan	***Separation of background and signal in a spectral scan.*** In this script several spectra of SiV centers are analysed. The background is estimated and in the spectral window of Raman and SiV peak the integrated background and integrated signal is calculated.	01/02/21	Lukas Hunold
SpectrumSiV	***Spectral fit program for SiV color centers or other emitters.*** In this script a spectrum with SiV emission can be plotted and fitted. Fitting range and method (Gauss, Lorentz, Voigt) can be adjusted. A background correction is possible, if a background spectrum file is in the folder. The program needs an asc file with two columns containing wavelength and corresponding number of counts.	17/01/21	Lukas Hunold
AutoSRIM	***Tool for automatic execution of SRIM simulations.*** The script defines parameters for the SRIM simulation and executes it. You set the location of your SRIM application and adjust the params. Two scripts are provided, which do slightly different jobs. They both run simulations for an array of inputs (ion energy, target thickness, …), you do not have to restart it manually. One can also find optimal changing steps.	22/11/20	Lukas Hunold
Beam-Focusing	***Tool for simulation of focusing a beam into a dielectric medium.*** GUI tool for easy simulation of focusing a beam into a dielectric medium. Does the same job as the corresponding MATLAB script described above.	13/01/20	Lukas Hunold
ThesisHelp	***Tool for creation of folder and file system for a thesis or similar project.*** In this folder you find a py file called ThesisHelp, which can be executed to open a starting window. You are guided through the installation of a folder and file system, which is helpful for a thesis or similar project. A document is created, in which you can insert you chapters and sections. The script can automatically create a folder for each section with a .tex file, which you can use to write the thesis. Configuration files for a thesis class and bib file are also provided. A tex file for a complete overview will be given	25/04/20	Lukas Hunold

	as well as a main file, that loads and compiles all parts together. Finally a reset py file is added, which you can run to reset the project, such that you can open a new one. To save you data, an archiving option is included.		
FCS	***Application for quick analysis of FCS measurements.***	11/07/19	Assegid Flatae
SNR	***Spreadsheet for quick calculation of SNR for imaging.*** In this excel sheet you can provide several parameters of your excitation, the optical system, the collection, the camera and the emitter, in order to calculate the expected signal to noise ratio of the imaging process.	26/11/19	Lukas Hunold
SRIM	***Stopping and range of ions in matter application.*** Tool for analysing the stopping process of ions in various materials. Incident ion parameters and target properties can be chosen manually. The tool can be found online and is free of charge, here all required files are collected.	09/12/19	Lukas Hunold
VEST	***Tool for visualizing 3D crystal structures.*** The program allows flexible design of crystal structures to be visualized for theses or publications.	26/11/19	Philipp Reuschel
Imina_Robots	***Documentary and Application for using the Imina Robots***	08/05/20	Florian Sledz