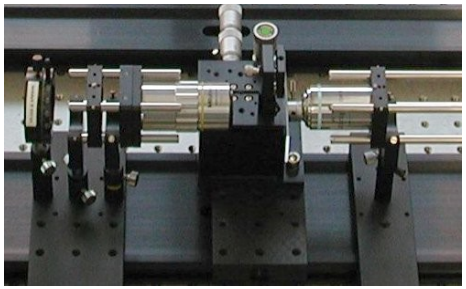
Welcome

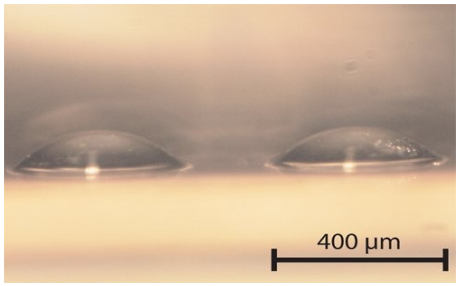
OptSuite (Optical Measurement Suite)

OptSuite related IMTEK projects



Micro-optics characterization using phase-shifting interferometry

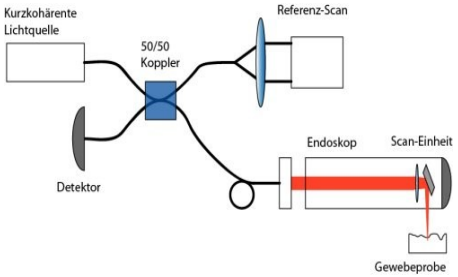
- We have developed a versatile Mach-Zehnder / Twyman-Green hybrid interferometer for micro-lens testing.



Tunable, membrane-based, liquid-filled micro-lenses

Tunable, membrane-based, pneumatic micro-mirrors

Tunable micro-lens actuated by electro-wetting

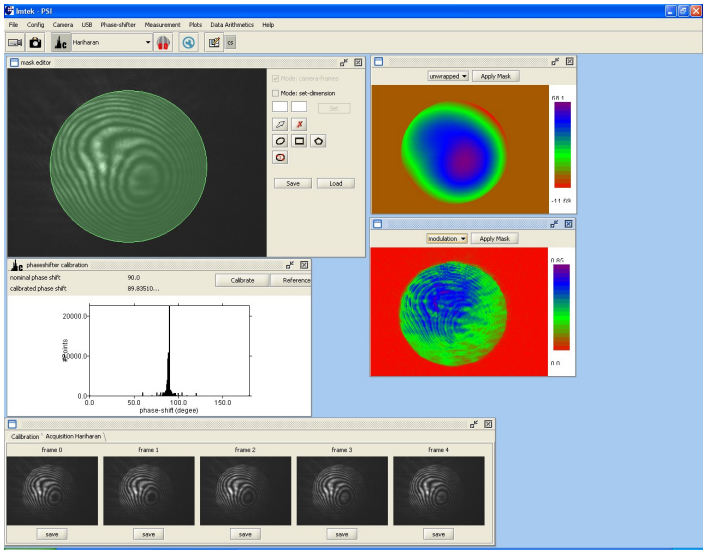


Optical coherence tomography (OCT)

- We are developing OCT-probes for in-vivo imaging of biological tissue.

History

- ImtekPSI
  - started during diploma thesis
  - specialized for PSI and hardly exdendable for non Java-programmers
  - for phase shifting interferometry only
  - Java (Swing) technology



- Improvements needed
  - more extension possibilities
  - simple and faster extensibility

OptSuite Objective and Vision

- Generic software concept
  - from a software for PSI to an general measurement software
  - simple object model that still can handle most needs for measurements in an optical lab
- Simple extension and adaption
  - adaption by graphically combining available parts to perform new tasks
  - extensions using Eclipse functionalities
  - „Macro“ extensions using simpler or more common languages like JavaScript or Matlab
- Benifits of an open platform
  - extensions shared and reusable
  - prevents multiple writing of libraries and tools

Concepts – Measurement Tools

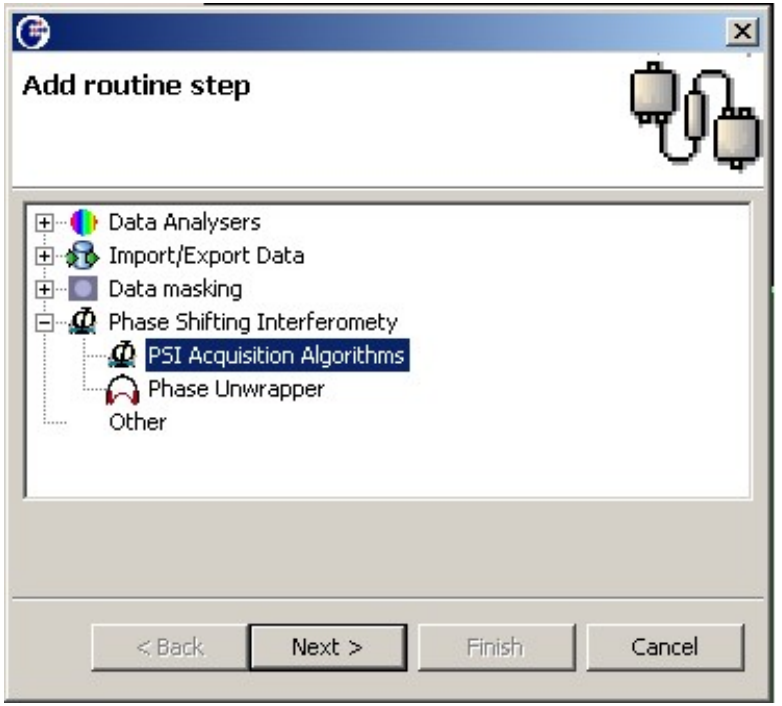
- Measurement Tools
  - A set of extensions reflecting real (hardware) tools
  - Independently configurable for each task (configurations stored)
  - Useable by all actions of OptSuite
  - Examples:
    - IntensityDetector
      - 2D: FireWire: Camera, more to come
      - 1D: soon to come
    - PhaseShifter
    - StageControl
    - GPIB Interface
    - LightSourceControl (Laser, Beamer)

Concepts – Measurement Routines

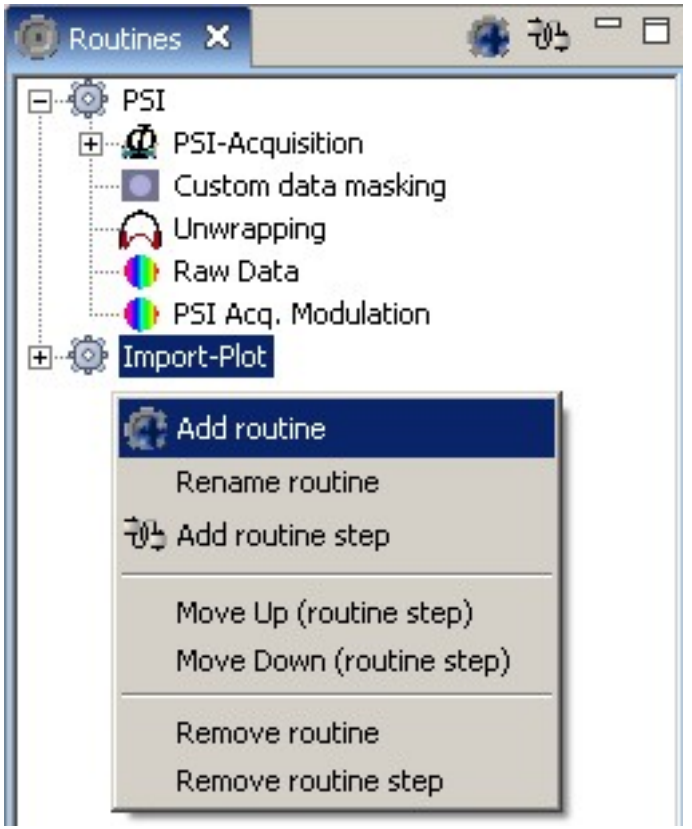
- MeasurementRoutineSteps
  - Finite, small, reusable actions
  - Examples: Data acquisition (PSI, OCT ...), Data masking, Unwrapping, Data analysis (Display, Zernike-Fit, ...)
- MeasurementRoutines:
  - Sequence of arbitrary steps performed one after the other
  - Stored to disk for reuseability
  - Each step has an own configuration within the routine
- MeasurementRoutineSequences
  - Sequence of arbitrary routines
  - After each routine a „routine-transition“ step is performed
  - Possible application: Automated batch measurements with stage translation between measurements

Building Measurement Routines

- Routines – View
  - View to manage routines, steps sequences and their configuration
  - Coupled to routine-detail for coniguration management



The „add routine step“ wizard

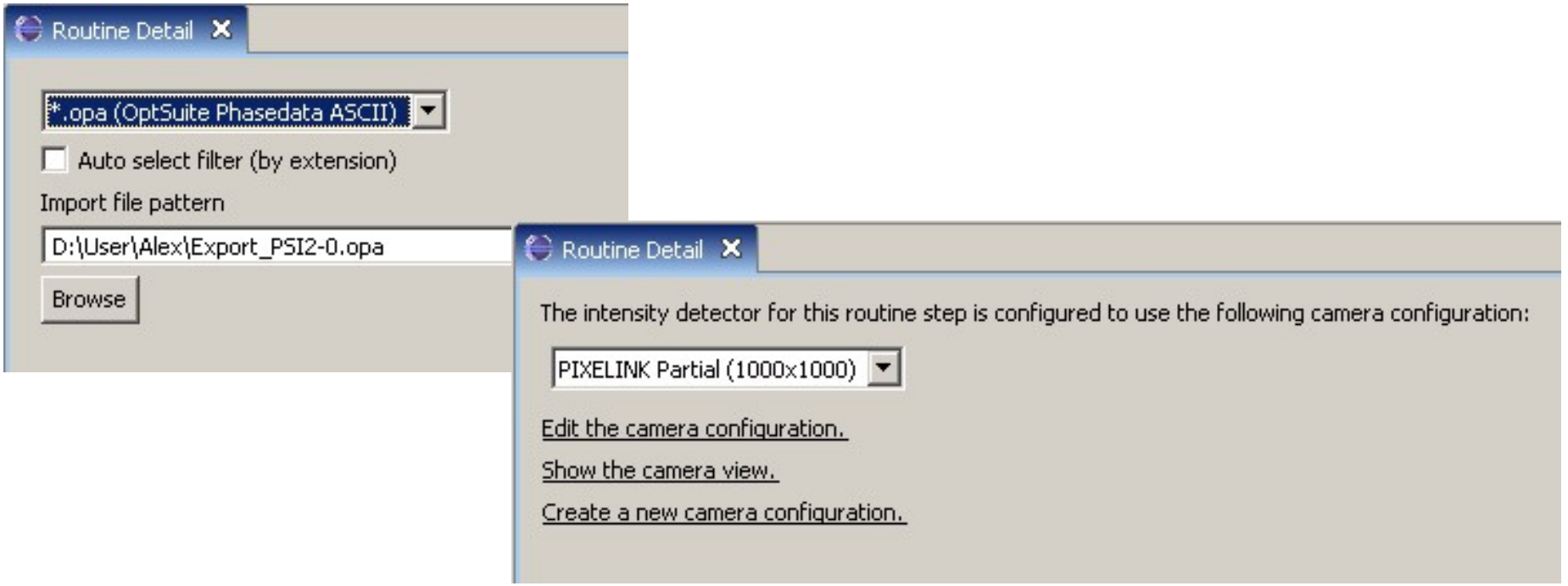


The routine view

  - Several wizards for common tasks like adding routines or steps

Building Measurement Routines

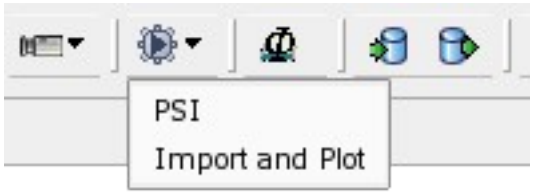
- RoutinesDetail – View
  - Each RoutineStep might contributeto the Detail View to allow the user to configure the step
  - MeasurementTools may also contribute to the detail view



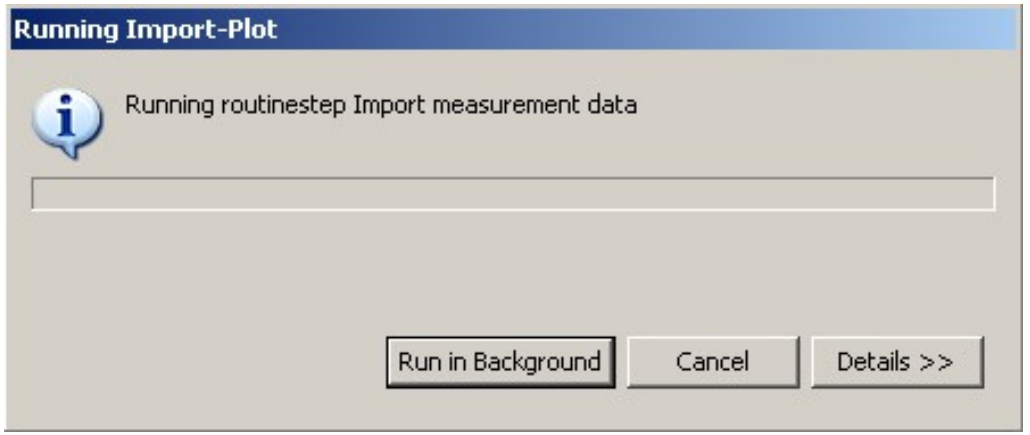
Examples for the contribution to the „Routine Detail“ View

Running Routines

- Routines are started with the „Run Routine“ Dropdown action



- Routines are executed as Eclipse Job, so they cam be send to background allowing the user to continue work while it is running.



OptSuite Plugin Architecture

- Base plugins are:
  - **imtek.optsuite.base** (application)
  - **imtek.optsuite.acquisition**
    - Interfaces for data model and I/O
    - Extension-points for hardware interfaces (measurement tools)
    - Extension-points for acquisition (algorigthms)
    - Model and extensioin points for data masking
  - **imtek.optsuite.analysis**
    - Analyser framework (compute new data based on measured)
    - Interfaces and base for plotting
    - Basics for data statistics and reporting

OptSuite Plugin Architecture

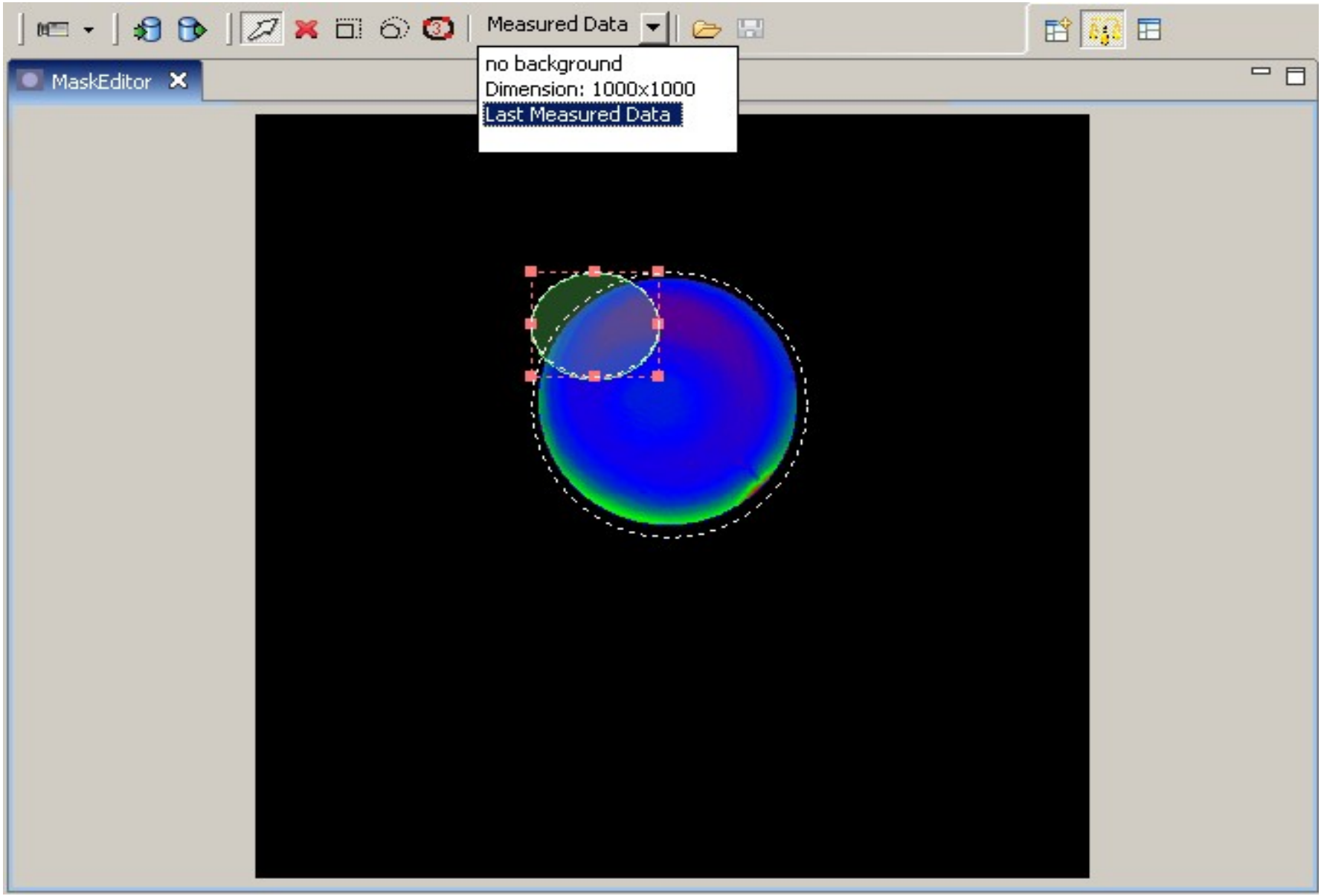
- Sattelite plugins (providing measurement-tools):
  - **imtek.optsuite.jlibdc1394**
    - Framework for controlling firewire cameras
  - **imtek.optsuite.stagecontrol**
    - Framework for controlling linear stages
  - **imtek.optsuite.gpib**
    - Providing a GPIB interface for OptSuite
  - **imtek.optsuite.psi**
    - Algorithms and tools for phase shifting interferometry
  - **imtek.optsuite.oct**
    - Algorithms and tools for optical coherence tomography
  - **imtek.optsuite.jmathlib**
    - Integration of Open Source project JMathLib into Eclipse

Masking

- Mask Editor
  - Extension-point driven mask items and editor tools
  - Pluggable background providers
    - Last measured data
    - Live camera view
  - Ready to use implementations for
    - rectangular
    - elliptical / circular

  mask items

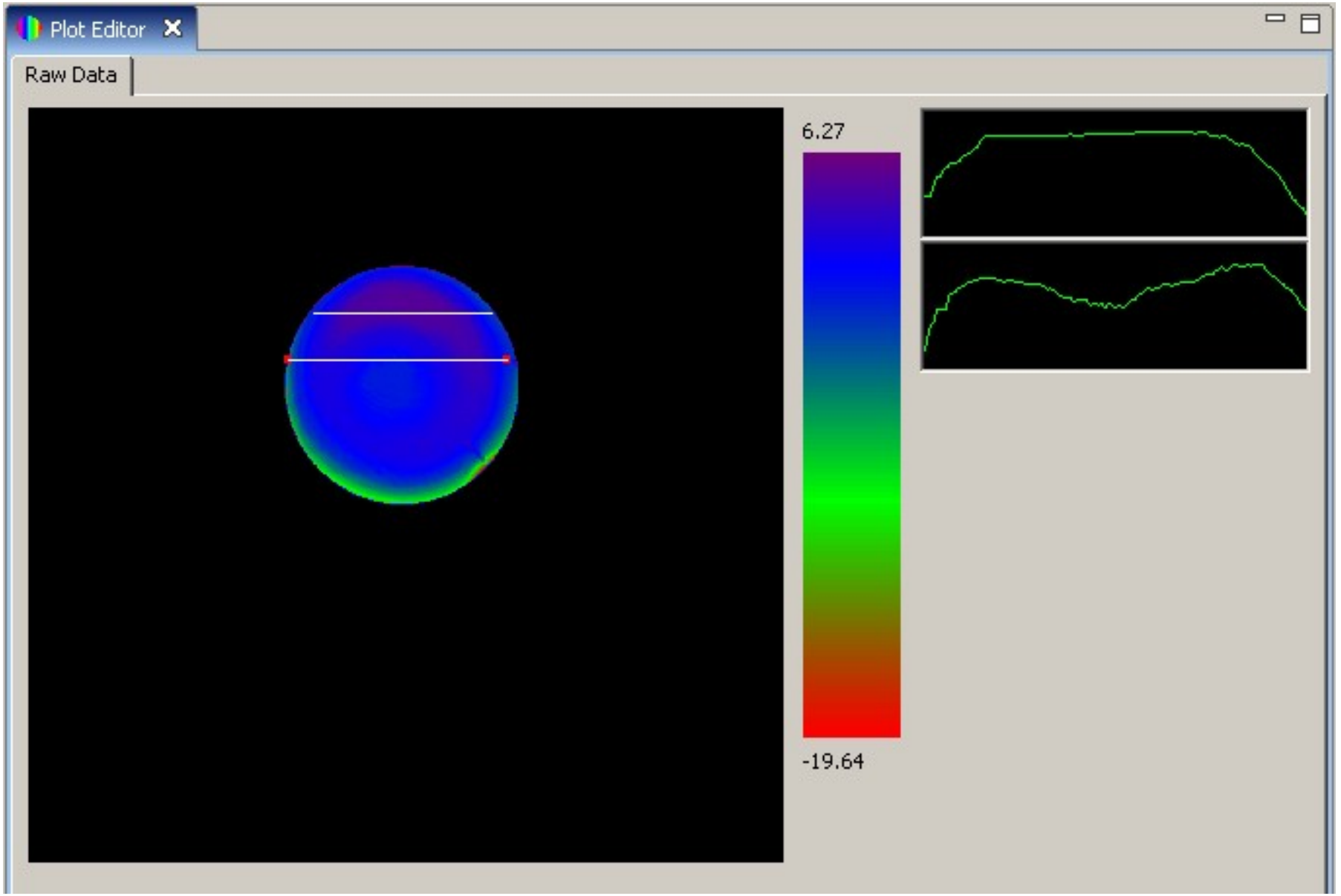
Defining Masks



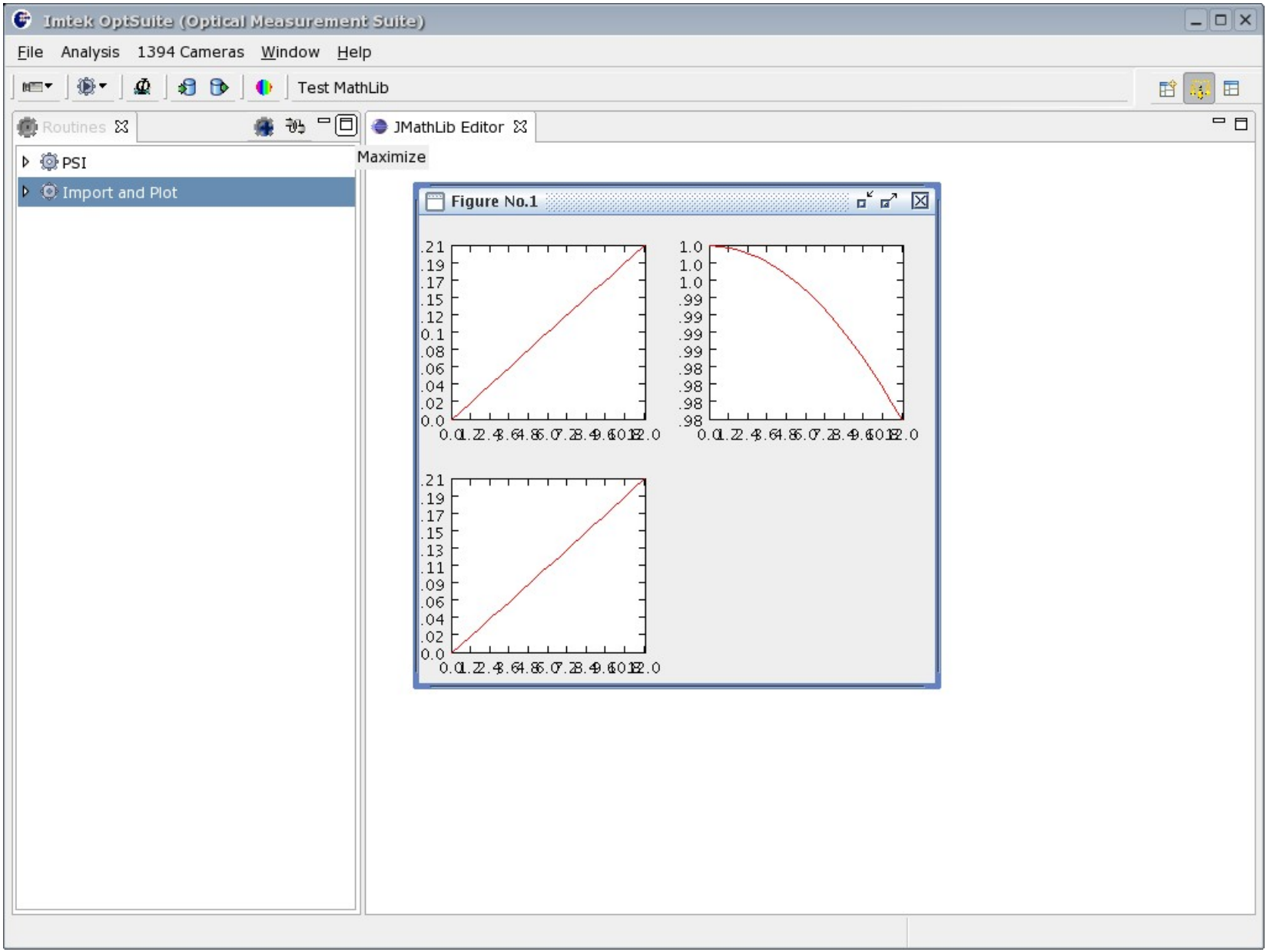
Plotting

- Analysis & Display
  - Data analysers take acquired data and might manipulate it
  - Many applications
    - Averaging
    - Fitting
    - Unwrapping
    - ...
  - Plots take analysed data and display
    - Plots are routinesteps – edited through normal gui
    - Plot 1D and 2D components available (still in development)

Plotting



Matlab (JMathLib) Integration



End

- Thanks for your attention

- More information can be found here:
  - http://www.imtek.de/micro-optics/optsuite
  - http://sourceforge.net/projects/optsuite
  -

- Ackknowledgements
  - Prof. Hans Zappe, Dr. Stephan Reichelt, Bernd Aatz and many more at IMTEK

Quick insertions

- CSS
  - Nightly build system
    - NighLabs created Eclipse integrated NightLabsly build
      - Define Products (Like Features in Eclipse system)
      - Dependencies resolved automatically
      - Build and packaging of products automatically
  - Managment Interface
    - Also NightLabs is developing workstation based updates
  - See http://jfire.org

- **Collaboration**