ENLIGHTEN™ 4.1.0 Release Notes

August 22, 2024

Introduction

The last formal customer release of ENLIGHTEN™ for Windows, version 3.2.36, was released to the Wasatch Photonics website Oct 12, 2022. The product then went into an extended internal beta for a major refactor and incorporation of a number of new features and capabilities. As a result, the new version 4.1.0 ended up taking longer to complete than anticipated, and also contains a larger-than-usual set of changes and improvements.

This document is provided as a consolidated listing of key changes between 3.2.36 and 4.1.0.

Future releases are expected to be rolled-out at a more regular interval of months rather than years.

Key Changes

The following are high-level changes categorized by change type. For a chronological list of detailed changes, see Appendices at document end.

GUI / Navigation

- GUI now organized into three (3) "Modes" (Raman, Non-Raman and Expert)
  - **Raman** Mode only exposes controls recommended for typical Raman measurements
  - **Non-Raman** Mode exposes controls appropriate for typical Absorbance, Reflectance and other non-Raman measurements
  - **Expert** Mode exposes all controls, including advanced features
- All three modes are organized into five (5) "Views" (Scope, Settings, Hardware, Log, and Factory)
  - **Scope** mode is centered around the large central graph and is intended for real-time data collection
  - **Settings** allows configuration of various application-wide features
  - **Hardware** provides detailed information about connected spectrometer(s), including EEPROM and firmware data
  - **Log** provides a view onto the "enlighten.log" file written to the user's EnlightenSpectra folder
  - **Factory** provides advanced manufacturing data for unit alignment and calibration, and requires authentication via a password
- Notification Bar
  - Always visible
  - Errors highlighted in red
- Presets
  - Users can save common sets of acquisition parameters (integration time, gain, laser power, scan averaging etc) to named "presets" for quick selection when changing samples

- Keyboard Shortcuts
    - Ctrl-E to Edit last-saved thumbnail label
    - Ctrl-T to change integration Time
    - Ctrl-G to change Gain (on supported devices in Expert mode)
    - Ctrl-N to change the Note (shift/tab to edit Prefix and Suffix)
    - F1 for help website
    - Mouse-over "Help" button in upper-right for table of all shortcuts
- Interactive Help
    - "Did You Know…?" feature tutorials at launch
    - New "What's This?" help mode provides detailed contextual help on key features, including metadata on saved thumbnails
- Themes
    - Easy dark-vs-light mode, plus configurable skins / themes
    - Updated splashscreen provides version and load status

Laser Safety

- On-screen Status Indicators (virtual LEDs) reflect laser interlock and laser warning delay state on compatible devices
- Added second Laser Enable button in GUI masthead for visibility and access across all screens
- Configurable Laser Watchdog Delay on compatible devices
- Optional audio feedback on laser operation
- Ensure laser disabled when exiting Batch Collection
- Selectable laser power unit (% or mW) on ILC models and Expert mode

File Storage

- User is warned when renaming a thumbnail would overwrite existing files
- User is warned before erasing Clipboard
- Spectra can be saved in JCAMP-DX format
- Horizontal ROI
    - Processed data outside configured horizontal ROI saved as "NA" (raw spectra includes full detector area)
- Exports
    - Exports allow "non-collated" option grouped by spectrum type (processed, raw, dark etc)
    - Exports allow user to navigate to any folder when saving data
    - Configured Prefix and Suffix fields automatically applied to export filenames
    - Option to only export displayed traces
- Templating
    - Many additional {macro} types supported including time/date (see Manual)
    - On-screen filename Prefix and Suffix fields, as well as Notes metadata field, support {macro} template expansion

- - ○ User is warned when a "static" template lacking any {macro} fields for per-measurement customization would cause every measurement to be written to the same filename (useful in some streaming / watch-folder applications)
  - Configurable thumbnail limit (default still 500)

Post-Processing

- ASTM-1840 Raman Wavenumber Shift Correction improvements
- Raman Intensity Correction (SRM) moved to Scope button-bar
- Interpolation moved to Scope button-bar

Product Support

- Support for 785XS
- Support for 1064XL
- Improved support for downloading XL "virtual EEPROMs" from cloud

Plugin Support

- Plugins are now accessed from the main scrolling right-hand Tools Palette (previously had been on Settings view)
- Plugin architecture has been streamlined to a more-Pythonic "functional" API using fewer classes and methods. All sample plugins have been updated to the new interface as demonstrations.
- Plugins now have access to all ENLIGHTEN internal state and functionality via a handle to the Controller
- A single Plugin can be auto-loaded at launch via command-line option
- New ComboBox field type
- Plugin fields can be marked for Expert mode
- Plugins can register themselves into Presets
- Plugin selection persisted across sessions
- Tensorflow support
- Sample Plugins
  - Raman.RamanPeaks shows expected peak locations for common compounds
  - Prod.EmissionLines shows expected atomic lines for noble gases

Manufacturing / Hardware Features

- Hardware View
  - EEPROM fields can be filtered via search bar

Cross-Platform

- Improved installation process (.dmg) for MacOS

- New "run from source" installation script for Linux (Ubuntu, Raspberry Pi)

Internal (Developer)

- Business Object constructors have been simplified by giving all objects a handle to the Controller
- Enforce DEBUG logging at launch, during spectrometer connection and 10sec thereafter

Appendix: ENLIGHTEN™ Changelog (3.2.36 - 4.1.0)

The following is extracted from the full ENLIGHTEN™ CHANGELOG.md available on GitHub at:

https://github.com/WasatchPhotonics/ENLIGHTEN/blob/main/CHANGELOG.md

4.0 GUI and Plugin Refactoring

- 2024-08-22 4.1.0
  - public release
- 2024-08-22 4.0.68
  - change StatusBar frame count from ProcessedReading to Reading.session_count
  - clarified BatchCollection "explain this" re: collection timeout
  - [#462] fix system clipboard copy after connecting to plugin
  - [#460] fix issues loading saved spectra
    - fix logging bug in MeasurementFactory
    - fixed missed calls to add_renamable from #452
    - fix bug graphing loaded .json measurements
  - enlighten_ubuntu_launcher.sh
    - fixed curl
    - added python3.7-dev
- 2024-07-19 4.0.67
  - [#452] don't prompt when re-labeling thumbnails
  - [#454] fix issue renaming .spc files
  - [#455] fix basename issue when multiple thumbnails have the same label
  - [#456] laser power unit combobox should disappear when leaving expert mode
  - [#450] indicate when laser in LaserWarningDelay state
- 2024-06-28 4.0.66
  - [#389] add Preset to metadata
  - [#406] handle whitespace in developer path
  - [#408] support --password cmd-line arg and ENLIGHTEN_PASSWORD environment variable
  - [#420] allow user to navigate to target directory when saving exports
  - [#426] support --max-thumbnails cmd-line arg and ENLIGHTEN_MAX_THUMBNAILS environment variable
  - [#428] verify before overwriting files
  - [#429] confirm when user configures "static" filename template
  - [#431] validate interpolation inputs
  - [#432] fixed scan averaging in BatchCollection
  - [#446] update theming docs
  - added hidden scipy imports for superman
- 2026-06-01 4.0.65
  - allow plugins to override Label metadata

- 2024-06-19 4.0.64
  - move pywin32 and spc_spectra to requirements.txt
  - try to remove console on Win11
    - add --noconsole to pyinstaller
    - add FakeOutputHandle to keep Tensorflow happy in absence of sys.stdout
  - struggle with Microsoft Defender Antivirus
    - played with Python 3.12, rolled-back to 3.11
  - accept bizarre 1min+ delay on first Tensorflow initialization post-install/compilation
- 2024-05-30 4.0.63
  - add default FWHM
  - plugins
    - Exporters/SaveAsAngstrom: modernized, simplified
    - Demo/EventResponse: modernized, simplified, renamed Demo/Buttons
    - Demo/LoadHook: modernized, simplified
    - Demo/MakeOddNegative: modernized, simplified
- 2024-05-22 4.0.62
  - XL
    - support horizontal ROI
  - logging
    - enforce DEBUG logging at launch
    - enforce DEBUG logging at spectrometer connection
    - relax to configured logging (typically INFO) 10sec after spectrometer connection
    - do NOT persist verbose logging through enlighten.ini
- 2024-05-14 4.0.61
  - changed laser status messages
- 2024-05-10 4.0.60
  - UI
    - display empirical assessment of laser firing status in Marquee
    - merged in mpylon's awesome EEPROMEditor search bar
  - Measurements
    - prompt user before overwriting existing files on export
    - add vertical ROI metadata
  - BatchCollection
    - always disable laser in BatchCollection.stop
    - added TakeOneFeature copy-ctor (fixed LaserMode.Spectrum)
  - plugins
    - fixed bug in base class
    - moved EmissionLines and RamanLines to combobox
  - XS
    - added microcontroller serial number
- 2024-04-05 4.0.59
  - fixed bug when exporting only displayed traces

- - more-robust handling of corrupt EEPROMs
  - master enlighten_ubuntu_launcher.sh within scripts
  - plugins
    - moved PluginController to ctl
    - persist last-selected plugin
    - removed enlighten.Plugins.EnlightenApplicationInfoReal, EnlightenPlugin.EnlightenApplicationInfo
- 2024-03-25 4.0.58
  - restore saturation warning on XS
  - enable Marquee.error with "hazard" CSS
- 2024-03-25 4.0.57
  - fix check_refs in BoxcarFeature
  - support Expert mode in plugin fields
  - add Session Count to Measurement metadata
  - consistently handle plugin metadata
  - added PresetFeature.clear_all
- 2024-03-23 4.0.56
  - updated ColumnFileParser with wasatch.CSVLoader updates
  - changing Preset auto-clears Dark and Reference
  - fixed GUI.msgbox_with_checkbox
  - fixed SpectrometerApplicationState.check_refs
  - moved plugin persistence from "advanced_options" to "plugins"
  - SRM works properly in Presets
- 2024-03-22 4.0.55
  - added msgbox_with_lineedit
  - hopefully didn't break dialog response processing (narrator: it did)
  - R&D
    - skip ambient on ARM 1.0.2.9
    - ignore None responses in WasatchDevice funcs
- 2024-03-22 4.0.54
  - fixed GainDB persistence
  - fixed Reference visibility when Emission/Raman selected
  - flake8 fixes
  - moved GridFeature to ctl
- 2024-03-21 4.0.53
  - moved ReferenceFeature to ctl
  - fixed Dark/Reference on Settings
  - fixed Detector Temperature label bug
  - simplified designer.sh
  - added 'make flake8'
- 2024-03-19 4.0.52
  - started KIA conversion to ctl
  - fixed 2/3-byte FPGA_COMPILATION_OPTIONS
- 2024-03-19 4.0.51

- ○ merged old Temperature Control panel into Detector Control widget (as Detector Temperature)
- ○ added new Laser Temperature panel within Laser Control widget
- ○ added Laser Temperature to StatusBar
- ○ added EDC for IMX385
- ○ LaserTemperatureFeature to ctl
  - ■ added XS Laser TEC Mode
- ○ added AmbientTemperatureFeature
- ○ refactored Factory view a bit
- ○ prompt before erasing Clipboard
- ○ ctrl-5 for Factory view (authenticates if needed)
- ○ only expose XS gain in Expert mode
- 2024-03-13 4.0.50
  - ○ fixed changelog (2024)
  - ○ SRM / Wavenumber button tweaks (also location)
  - ○ ARM fixes regarding FPGAOptions and div-by-zero InGaAs correction
- 2024-03-11 4.0.49
  - ○ DYK (Stats, StatsBuffer, EmissionLines, RamanLines)
  - ○ added RamanIntensityCorrection button
  - ○ added support for orange "tri-state" buttons
  - ○ removed duplicate theme stylesheets
  - ○ ROI editing tweaks
- 2024-03-07 4.0.48
  - ○ temporarily interpolate clipboard measurements during export
  - ○ display "sensor stabilizing" message on SiG
  - ○ display wasatch.StatusMessage via Marquee, not Toast
- 2024-03-07 4.0.47
  - ○ fixed export bug
- 2024-03-01 4.0.46
  - ○ bumping version number for clean installer
- 2024-03-01 4.0.45
  - ○ Multispec fix
  - ○ Tensorflow Win11 fix
  - ○ export ROI fix
  - ○ flipped (corrected) meaning of "collated_export" (still defaults to "original behavior")
  - ○ restore installer COMPRESSION option
- 2024-02-27 4.0.44
  - ○ deprecated Miniconda (python venv FTW)
  - ○ built installer on Win11
  - ○ ASTM tweak
  - ○ DYK tweaks
  - ○ convert timestamps to strings in JSON
  - ○ fix pixel axis with ROI

- ○ disable KIA tips
- ● 2024-02-20 4.0.43
  - ○ fixed XL temperature
  - ○ fixed Peak Sharpening
- ● 2024-02-19 4.0.42
  - ○ GUI tweaks
    - ■ added DidYouKnowFeature
    - ■ added session close button for KIA
    - ■ fleshed-out WhatsThis docs
    - ■ theme fixes
    - ■ moved sounds checkbox to Settings view
    - ■ added laser_steady.wav
    - ■ tightened checks around StatusIndicators
- ● 2024-02-14 4.0.41 ❤️
  - ○ RamanShiftCorrection: better support for ROI, tweaked peak windows
  - ○ updated to Tensorflow 2.13.1
- ● 2024-02-09 4.0.40
  - ○ Configuration cleanup
  - ○ persist scans to average in enlighten.ini by serial number
  - ○ move PluginController.autoload to PluginController QTimer
- ● 2024-02-07 4.0.39
  - ○ fixed ROI bug in Measurement.save_excel_file
  - ○ properly apply ROI for loaded export and columnar csv files
- ● 2024-02-06 4.0.38
  - ○ fixed load from export
  - ○ fixed graph traces on loaded exports
  - ○ fixed common.msgbox bug
  - ○ moved to ctl
    - ■ ColumnFileParser
    - ■ DashFileParser
    - ■ ExportFileParser
    - ■ SPCFileParser
    - ■ TextFileParser
- ● 2024-02-05 4.0.37
  - ○ pylint
  - ○ docs
  - ○ fixed LaserControlFeature restriction bug
  - ○ fixed Measurements export ROI bug
- ● 2024-01-30 4.0.36
  - ○ Raman
    - ■ ensured all Raman features available in Expert mode
    - ■ renamed RamanModeFeature to AutoRaman
    - ■ moving Raman Intensity Correction to its own widget visible in Raman view

- - - extracted LaserWatchdogFeature
      - don't force Laser Watchdog unless XS SML w/o TEC (but support for any XS)
    - GUI
      - Guide tweaks
      - common.msgbox tweaks
    - cleanup
      - moved Filters and Authentication to ui
      - moved SpectrometerApplicationState, AccessoryControlFeature, DetectorTemperatureFeature, ExternalTriggerFeature, GainDBFeature, HighGainModeFeature, IntegrationTimeFeature, LaserControlFeature, LaserTemperatureFeature, MultiPos, RegionControlFeature and Spectrometer to device
      - renamed spectra_processes to post_processing
      - moved DarkFeature, ReferenceFeature, RamanMode to post_processing
      - renamed pluginExamples to plugins
      - renamed sfu to cfu
    - moved to ctl
      - HighGainModeFeature
      - ManufacturingFeature
      - CloudManager
      - RichardsonLucy
      - Sounds
- 2024-01-26 4.0.35
  - RamanModeFeature
    - prompt for confirmation
    - release restriction on LaserControlFeature when invisible
    - better handling of case where laser already firing when Raman Mode engaged
  - BatchCollection
    - bugfix (typo)
    - disable Guide during BatchCollection
    - enforce 2sec gap between subsequent Batches to allow manual "Stop" and stabilization
    - reset TakeOneFeature before calling TakeOne.complete observers
    - added --start-batch cmd-line
  - Plugins
    - simplified --plugin cmd-line arg
    - made RamanLines auto-enable
  - HelpFeature: added shortcuts to tooltip
  - LoggingFeature: utf-8 bugfix
- 2024-01-24 4.0.34
  - Refactored RamanModeFeature, VCRControls and TakeOneFeature around TakeOneRequest

- - - moved to ctl
      - BatchCollection
      - RamanModeFeature
      - TakeOneFeature
      - VCRControls
- 2024-01-15 4.0.33
  - fix load bug
  - simplify common.msgbox api
  - simplify thumbnail removal prompt
  - correctly associate thumbnails with generating plugin
  - give Graphs names for tracking
  - make utf8 settings more explicit
  - default logfile to truncate
- 2024-01-12 4.0.32
  - GUI
    - StatusBar only shows battery when appropriate
    - added common.msgbox(..., detail)
    - added GUI.msgbox_with_textedit
  - plugins
    - renamed logfile to plugin.log
    - truncate plugin logfile on load
  - updated peaks in RamanLines and ASTM-1840 configuration
- 2024-01-11 4.0.31
  - axis corner-cases
    - replaced InterpolatedProcessedReading with ProcessedReading.cropped and .interpolated
    - prevent export from trying to mix different x-axes from the same serial number
  - GUI
    - allow visualizing SRM calibration
    - styled common.msgbox
    - expand ScrollStealFilter to include focused widgets
    - fixed bug graphing pixel axis
  - moved to ctl
    - Authentication
    - EEPROMWriter
    - MeasurementFactory
  - scripts
    - retain more metadata in split-spectra
- 2023-12-14 4.0.30
  - GUI
    - added battery to StatusBar
    - generalized PluginController.display_plugin_warning into GUI.msgbox_with_checkbox

- simplified font sizes
- added X series png's
- fixed Hardware tab device image
- optionally Export only displayed traces
    - moved to ctl
        - AbsorbanceFeature
        - Clipboard
        - Configuration
        - DetectorTemperatureFeature
        - EEPROMEditor
        - ExternalTriggerFeature
        - FileManager
        - FocusListener
        - GuideFeature
        - HardwareFileOutputManager
        - LoggingFeature
        - Marquee
        - ModelInfo
        - Multispec
        - ResourceMonitorFeature
        - SaveOptions
        - StatusBarFeature
        - ThumbnailWidget
        - TransmissionFeature
    - scripts
        - refreshed scripts/split-spectra
- 2023-12-13 4.0.29
    - stopped clearing dark/refs when changing interpolation
    - RamanShiftCorrection tweaks (fixed width unit, obey ROI, show nm hint)
    - refactoring
        - moved DarkFeature to ctl
- 2023-12-11 4.0.28
    - platforms
        - updating Raspberry Pi build docs
        - support both PySide6 and PySide2
    - GUI
        - laser button tooltip fix
        - fixed markers
        - added convenience laser button where permanently visible
        - added interpolation button above graph
        - restored original ordering of (lock, fullwidth) buttons
        - fixed multiple Factory items on multiple logins
- 2023-12-08 4.0.27
    - locked to Python 3.11 for Tensorflow

- - default to maximized
  - restore previous integration time up to 5sec (was 1sec)
  - plugins
    - all field types support callbacks
  - docs
    - updated Windows docs for 10/11
    - updated MacOS docs for ARM
- 2023-11-10 4.0.26
  - auto-resize pandas table columns
  - fix ctl issues in Measurement*
  - move jcamp from pip to PYTHONPATH until feature branch released
- 2023-11-06 4.0.25
  - added PresetFeature
  - plugins
    - hide plugin field frame if no fields
    - deprecate dependencies
    - support events in functional plugins
    - increase default plugin Marquee period
    - provide self.marquee_message for functional plugins
    - add combobox datatype for plugin fields
    - allow plugin fields to have stylesheets
    - auto-resize pandas table columns
  - file_io
    - persist custom spectra save location
    - save as JCAMP-DX
    - support loading columnar CSV files which don't happen to include 'Integration Time'
  - refactoring
    - moved RamanIntensityCorrection, ScanAveragingFeature, BaselineCorrection, BoxcarFeature, IntegrationTimeFeature to ctl
    - docs and cleanup around ScrollStealFilter and MouseWheelFilter
    - simplified Configuration.save
- 2023-10-09 4.0.24
  - Prod.BurnIn temperature fix
  - added run_from_root
  - restored hide_from_console (hide-early doesn't work on W11, hide-late doesn't on W10)
- 2023-10-06 4.0.23
  - temporarily changed PluginController autoload from "ctor + 1sec" to "first
- spectrometer connection" (later rolled-back, as broke ID plugin)
- 2023-10-06 4.0.22
  - bundle libusb0.dll to Windows install folder :-(
- 2023-10-06 4.0.21
  - automatically retain previous 2MB of existing enlighten.log to aid in fault analysis

- 2023-09-30 4.0.20
  - updated dependency versions to resolve tensorflow import issue
    - Python 3.10 -> 3.11
    - PySide 2 -> 6
    - pyinstaller 4 -> 5
    - numpy -> 1.26 (1.24.3?)
    - tensorflow <- 2.13
  - let bootstrap pass compression to InnoSetup (default lzma/max)
  - change pyinstaller --noconsole to --hide-console to fix pexpect issue
- 2023-09-29 4.0.19
  - applog tweak
- 2023-09-29 4.0.18
  - fixed plugin outputs/table bug
  - added ScanAveragingFeature.set_locked
  - changed --headless to --window-state
  - BurnIn tweak
- 2023-09-20 4.0.17
  - support --log-append
  - moved run-burning.bat to plugins/Prod
  - improved Prod.BurnIn logging
- 2023-09-20 4.0.16
  - bugfixes
    - RamanIntensityCorrection works in Expert Mode
    - use EEPROM FWHM for RamanShiftCorrection
  - UI
    - splash tweak
    - msgbox for improved error reporting (e.g. 0 max integration time)
  - portability
    - fixed rebuild_resources.sh for MacOS
    - updated Mac .dmg installer process
  - production
    - added BurnIn plugin
- 2023-09-01 4.0.15
  - enforce eeprom.max_integration_time_ms on XS
  - fixed DetectorTemperatureFeature on ambient detectors
  - plugins
    - added --plugin command-line option
    - added Demo.LockSettings
  - XS-Series
    - enforce eeprom.max_integration_time_ms
    - StatusIndicators show laser unavailable when battery low
  - refactoring
    - moved BatteryFeature, StatusIndicators to ctl
- 2023-07-19 4.0.14

- extend boxcar to left and right edges of spectra
- clear scan average count upon reset
- 2023-07-07 4.0.13
  - spectrometer control
    - support selectable mW/PWM for ILC and Expert Mode
  - data management
    - added "use filename as label" checkbox
    - template improvements
      - added filename template
      - macros now work in export filename components
      - support Reading attributes
      - user-configurable floating-point precision
      - added date/time components ({YYYY}, {hh} etc)
      - added file_timestamp, integration_time_sec macros
  - persistence
    - enlighten.ini allows %
    - persist gain_db by serial number
  - GUI updates
    - added WhatsThis button next to Help
    - changed Measurement ToolTip to WhatsThis
    - added min/avg/max to thumbnail WhatsThis
    - thumbnail label improvements (smaller font, easier editing)
    - keyboard shortcuts
      - added ctrl-G/N/T per https://www.goodreads.com/quotes/9934315-it-is-a-curious-fact-and-one-to-which-no
      - added F1 for help
    - splash screen messages
  - plugin improvements
    - updated Savitzky-Golay
    - updated StatsBuffer
    - updated Stats
    - updated docs
    - fixed plugin_name in metadata
  - refactoring
    - renamed VignetteROIFeature to HorizROIFeature
    - updated LaserControlFeature to ctl
    - technique-vs-view fixes
    - vignette-vs-crop fixes
    - static analysis support
  - devtools
    - pyusb-virtSpec support
- 2023-06-14 4.0.12
  - persistence

- ■ fixed Configuration defaults
- ■ updated Write EEPROM tooltip
- ○ file_io
  - ■ warn when saving but no formats selected
  - ■ fixed load-then-export use-case
  - ■ always save all rows of column-ordered CSV spectra regardless of ROI
  - ■ output "NA" rather than 0 for values omitted due to ROI or spectral range
  - ■ use prefix and suffix in export filenames
  - ■ stop forcing loaded data to lowercase
  - ■ improved data consistency in loaded CSVs
- ○ plugins
  - ■ moved from Settings View to Control Palette
  - ■ moved RamanLines to Raman
  - ■ simplified Prod.EmissionLines
- ● 2023-05-15 4.0.11
  - ○ added collated export
  - ○ invert x-axis for 1064XL
- ● 2023-05-10 4.0.10
  - ○ "fixed" Marquee
  - ○ added scripts/transpose.py
  - ○ fixed save on non-Raman
  - ○ allow LocalBaseline plugin to save metadata
  - ○ persist cloud permission
  - ○ fixed Raman Intensity Correction in 1064XL
- ● 2023-05-03 4.0.9
  - ○ fixed Save and Export
- ● 2023-05-02 4.0.8
  - ○ added LocalBaseline plugin
  - ○ refactored Business Objects package structure
  - ○ pyinstaller tweak (excluded _bootlocale)
- ● 2023-03-27 4.0.7
  - ○ persist PluginController marquee while satisfying prerequisites
  - ○ clamped Python to 3.10 to resolve build issues
  - ○ removed matplotlib dependency from non-Mac platforms
  - ○ added cyclohexane peaks
  - ○ fixed PYTHONPATH issue affecting installer
- ● 2023-03-17 4.0.6
  - ○ Added Plugin Quick Start documentation
  - ○ Added Worek AChE Timeseries Plugin
  - ○ Ctrl-E to rename
  - ○ Fix bugs causing CSV files to fail to load
  - ○ Added Hello Graph Demo Plugin
- ● 2023-02-08 4.0.5
  - ○ watchdog toggle via checkbox

- ○ minimum watchdog of 3 sec
- 2023-01-31 4.0.4
  - ○ fixed logo in light mode
  - ○ fixed installer bug?
- 2023-01-13 4.0.3
  - ○ added dark-mode button
  - ○ hopefully improved laser watchdog handling on older (unsupported) models
- 2023-01-03 4.0.2
  - ○ persist initial spectrometer color assignment across disconnects within a session
  - ○ added thumbnail tooltip
- 2022-12-19 4.0.1
  - ○ improved plugin exception-handling
  - ○ improved plugin dependency messaging
  - ○ improved Marquee 'immediate' display
- 2022-12-09 4.0.0
  - ○ better widget scaling at lower resolutions
  - ○ refactored Techniques, Modes and Views
  - ○ refactored GridFeature and VignetteROIFeature
  - ○ refactored LoggingFeature
  - ○ reflect laserWatchdog state in GUI
  - ○ fixed bug when multiple thumbnails have same label

3.2 Open-Source

- 2022-12-08 3.2.42
  - ○ expose save options to plugins
  - ○ plugins can programmatically change input fields
  - ○ plugins can save in same date dir as regular save
  - ○ fix graphing issues for plugins
  - ○ add measurement metadata so plugin thumbnail overlays show on other graph
- 2022-12-06 3.2.41
  - ○ adding widget for laser watchdog
- 2022-11-29 3.2.40
  - ○ dark-correct reference spectrum after-the-fact if collected in that order
  - ○ don't apply boxcar to dark or reference when in reference technique
- 2022-11-28 3.2.39
  - ○ i18n
  - ○ add fix for international computers for plugins creation on install
- 2022-11-15 3.2.38
  - ○ add battery data to hardware strip charts
  - ○ add string formatting to note, prefix, and suffix
- 2022-10-17 3.2.37
  - ○ updates to regression tests

- 2022-10-12 3.2.36
  - merged pluginWarning / ROI fixes

Appendix: Wasatch.PY Changelog (2.1.21 - 2.2.0)

The following is extracted from the full Wasatch.PY CHANGELOG.md available on GitHub at:

- 2024-08-22 2.2.0
  - ENLIGHTEN 4.1.0 release
- 2024-06-27 2.1.73
  - update demo.py to support multiple spectrometers
  - add optional `callback` parameter to WrapperWorker for Inversion of Control (IoC)
- 2024-06-27 2.1.72
  - temporarily disable GET_LASER_ENABLED on XS
- 2024-06-19 2.1.71
  - disable applog to stdout if stdout missing
- 2024-06-12 2.1.70
  - force laser to disable on perc/PWM zero
- 2024-05-30 2.1.69
  - added avg_resolution to edittable EEPROM fields
- 2024-05-24 2.1.68
  - added horizontal ROI to XL virtual EEPROM
  - Raspberry Pi testing (no change)
- 2024-05-22 2.1.67
  - relax thread logging 10sec after successful connection
  - display connected spectrometer properties in demo.py
- 2024-05-07 2.1.66
  - gave TakeOneRequest a copy-ctor
- 2024-05-02 2.1.65
  - updated README links to work on pypi servers
- 2024-05-02 2.1.64
  - added wasatch.FirmwareRequirements
  - added wasatch.PollStatus
  - added FID.get_poll_status() and .is_sensor_stable()
  - added util.vercmp()
  - added microcontroller serial number
- 2024-03-23 2.1.63
  - CSVLoader
    - store x-axes in ProcessedReading rather than metadata
    - support "intensity" header
    - simplified
- 2024-03-22 2.1.62
  - ignore 3 consecutive USB errors when reading spectra (R&D)
  - ignore None responses in WasatchDevice func/attr calls
  - skip ambient temperature readout on ARM 1.0.2.9
- 2024-03-19 2.1.61

- o handle either 3-byte or 2-byte FPGA_COMPILATION_OPTIONS response
- 2024-03-18 2.1.60
  - o added get_ambient_temperature_degC_arm
- 2024-03-15 2.1.59
  - o changed XS get_detector_gain to big-endian
  - o added clarity around XS laser_tec_mode -vs- enabled
- 2024-03-15 2.1.58
  - o added set/get_laser_tec_mode
  - o sanity-check XS laser TEC setpoint to 700-900 range
- 2024-03-14 2.1.57
  - o added laser temperature calibration for XS
  - o added EDC for XS
  - o clarified FPGAOptions as 24-bit (but ignore for XS)
- 2024-03-13 2.1.56
  - o double-check to prevent div-by-zero in InGaAs gain correction
  - o decline to parse FPGAOptions for ARM (leave at initialized values)
- 2024-03-13 2.1.55
  - o don't use FPGAOptions on ARM
  - o return "Sensor Stabilizing" message on ARM when intTime/gain changes
- 2024-03-07 2.1.54
  - o return "sensor stabilizing" message
- 2024-02-28 2.1.53
  - o enriched ProcessedReading.dump
- 2024-02-28 2.1.52
  - o fixed ProcessedReading bug
- 2024-02-27 2.1.51
  - o added ProcessedReading.get_pixel_axis
- 2024-02-20 2.1.50
  - o fixed AndorDevice temperature
- 2024-02-19 2.1.49
  - o return state.laser_enabled from FID.get_laser_enabled on SiG until FW fixed
- 2024-02-14 2.1.48
  - o ProcessedReading: force to np.array on load_from_dict, clear .interpolated on set_processed
- 2024-02-07 2.1.47
  - o ProcessedReading always takes wavelengths/wavenumbers from settings if empty and available
- 2024-02-06 2.1.46
  - o removed enlighten.SaveOptions(?) from wasatch.CSVLoader(?!?)
  - o made ProcessedReading smarter about loading wavelengths/wavenumbers from SpectrometerSettings
- 2024-02-05 2.1.45
  - o clarified scan averaging a bit
  - o added TakeOneRequest.scans_to_average
- 2024-01-30 2.1.44

- o Auto-Raman fix: store laser-related attributes in Reading before auto-disabling laser
  - o notation updates
- 2024-01-26 2.1.43
  - o utils bugfix
- 2024-01-25 2.1.42
  - o TakeOneRequest.take_dark + .enable_laser_before now implies laser disable + 1sec delay
- 2024-01-23 2.1.41
  - o moved to TakeOneRequest
  - o deprecated acquisition_laser_trigger_enable, self.acquisition_take_dark_enable and acquisition_laser_trigger_delay_ms
- 2024-01-15 2.1.40
  - o better UTF-8 support
  - o support cropped/interpolated ProcessedReading in dict conversions
- 2024-01-11 2.1.39
  - o refactored ProcessedReading with new .cropped and .interpolated nodes
  - o fixed small PWM bug
- 2023-12-18 2.1.38
  - o fixed iterable bug in ProcessedReading dict ctor
- 2023-12-14 2.1.37
  - o ProcessedReading tweak
- 2023-12-07 2.1.36
  - o add throwaways around IMX sensor commands
  - o treat flat IMX spectra as keepalives
- 2023-11-01 2.1.35
  - o auto-generate raman_intensity_calibration_order in AndorDevice virtual EEPROM if missing
  - o added ProcessedReading.to_dict()
- 2023-09-20 2.1.34
  - o added applog(append)
- 2023-09-20 2.1.33
  - o enforce FPGA version number length
  - o log USB results in hex
  - o check for "bad data" in EEPROM
  - o XS-Series
    - ▪ added set_laser_power_attenuator
    - ▪ added support for startup laser TEC setpoint
    - ▪ read battery @ 0.2Hz
- 2023-07-10 2.1.32
  - o offset gettors now return SpectrometerResponse
  - o fixed display of gettors returning SpectrometerResponse in WasatchShell
- 2023-07-04 2.1.31
  - o clarify methods returning bool vs SpectrometerResponse
  - o remove return type annotations
  - o s/vignette/crop/

- 2023-06-13 2.1.30
  - invert x-axis for 1064XL
  - don't enable TEC with default / invalid TEC calibration
  - restore ability for CSVLoader.parse_metadata to support single-measurement CSVs where metadata fields are expected to be scalars rather than lists
- 2023-05-10 2.1.29
  - support for 1064XL
- 2023-05-03 2.1.28
  - better handling of rare null-buffer EEPROM readout
- 2023-01-13 2.1.27
  - is_andor fix
  - laser watchdog fix (disable on older EEPROMs)
- 2022-12-14 2.1.26
  - default InGaAs detectors to high-gain mode
  - forget disconnected USB devices
- 2022-12-13 2.1.25
  - disable laserEnable verification loop for Series-XS
- 2022-12-07 2.1.24
  - update EEPROM to Rev15
  - default laser power calibration to high-resolution
- 2022-10-26 2.1.23
  - fix connect bug
  - added scripts/dark-vs-integ.py
- 2022-10-17 2.1.22
  - updates to MockUSBDevice to support ENLIGHTEN regression tests
- 2022-10-12 2.1.21
  - add is_sml and is_mml functions
  - fix floating-point array index lookup