Adding new Techniques

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Considerations…

- Why should you add new techniques?

  Performance improvement, higher automation, higher data yield, new capabilities

- Does it affect the signal path (optically and/or electronically)?

  If it changes the optical signal path, is that captured by the calibration?

  If it changes the electrical signal path it can have significant effect on signal levels (impedance), threshold settings!

  Replacement items may have considerable effect (higher bandwidth, different voltage levels)

Considerations…

- Error sources are everywhere and extremely subtle

  Example: changing from a dye laser to an active modelocked laser caused a range bias because of a shift of the pulse in the range gate

- Is the upgraded system compatible with calibration history?

  The calibration history is a good local indicator.

  Keeping a system change-log is good practise! (correlation of modifications to changing biases)

  If the modifications don't work out - always keep a clean path to go back to a working system (avoid points of no return, if possible)

Exploit new technologies

- Light Curves: Add-On application, using single-photon detectors (best sensitivity, 100 Hz resolution, etc.)

  => Determine Attitude Motion of Debris targets / defunct satellites;

  => Can run also completely parallel to SLR operation

  => Relatively cheap

  => Adds scientific output (e.g. determining solar radiation pressure consequences)

  => Adds additional info for POD, helps for orbit determination when approaching re-entry etc.

- Visualisation of larger SLR targets in daylight - if predictions are not accurate enough for SLRLight Curves: Add-On application, using single-photon detectors (best sensitivity, 100 Hz resolution, etc.)

  Use a dichroic mirror and a low-cost CCD

  Allows to 'see' targets in daylight: Envisat, Adeos-2, Ajisai, CrypSat2, Hy2A, Jason-3, Kompsat5, Saral, Tandem-X, TerrasarX, Topex .....

Exploit new technologies

- Schedule List for Observers

  => Targets / Priorities etc. are changing every week (campaigns, new targets, experiments....)

  => Graz has 4 student observers, and at least 2 staff observers => Adds additional info for POD, helps for orbit determination when approaching re-entry

  => The list is a good communication tool, to inform about campaigns, desired output, ...

- Aligning small SPAD units: Towards a perfect single-photon sensitivity - **OR**: Are you sure that ALL echo photons hit your 200 µm (or smaller) detector?Use a dichroic mirror and a low-cost CCD

  => Install a 50% pellicle in front of the detector; use it to watch the SPAD surface with a CCD

  => Tracking e.g. Polar Star, you will see its image - and can focus / align / correct ....