

# Multivariable temporal pulse shaping for the LCLS-I photoinjector laser

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NATIONAL ACCELERATOR LABORATORY



U.S. DEPARTMENT OF ENERGY

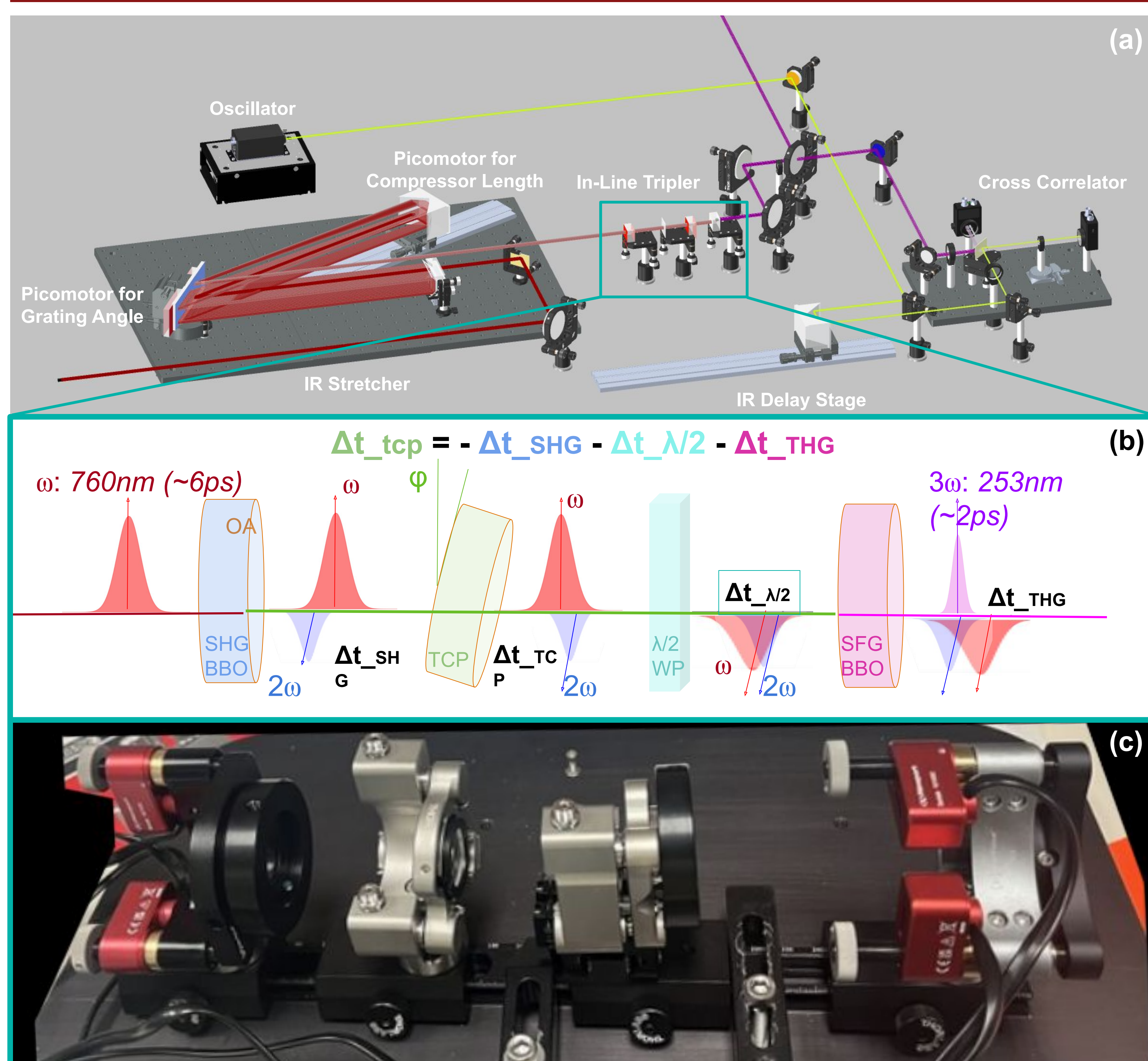


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## Approach

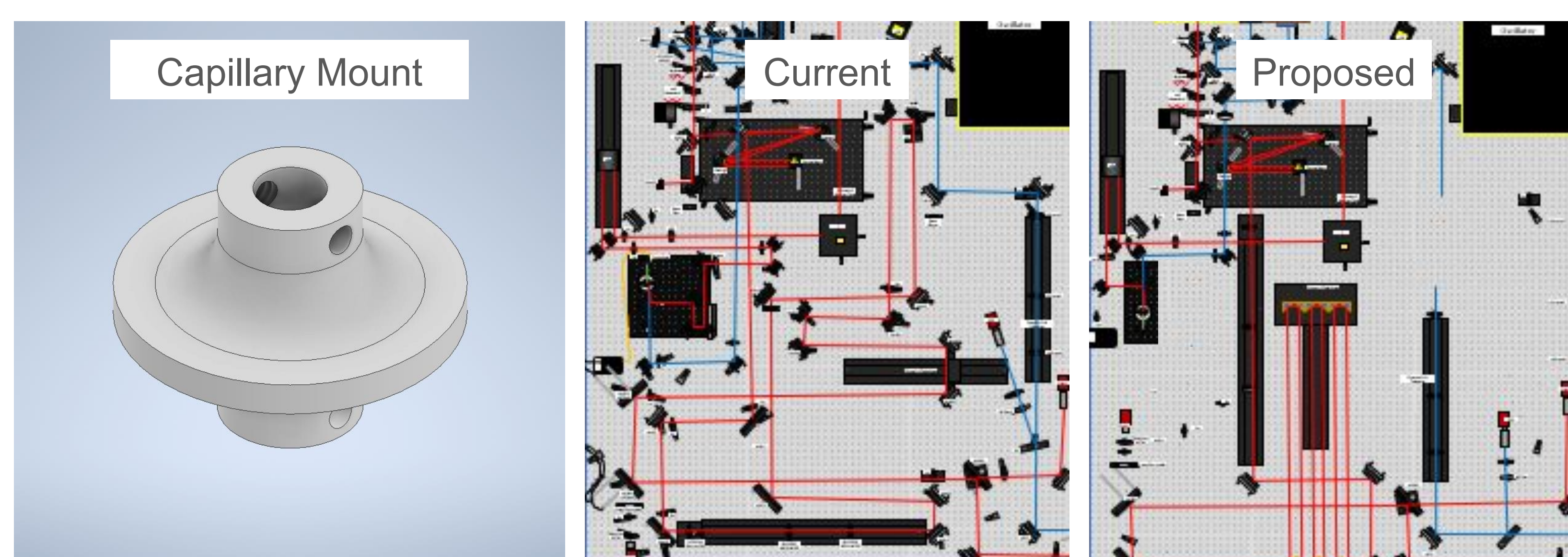
- Temporal pulse length and shape of injector laser important for optimizing XFEL performance
- Optimizing pulse shape requires simultaneous manual adjustment of 5 variables: compressor length and grating angle, SHG and SFG crystal phase-matching angles, and pre-SFG synchronization delay
- Motorized mounts will enable data-based pulse shaping approach for new inline tripler using machine learning

## Instrumentation

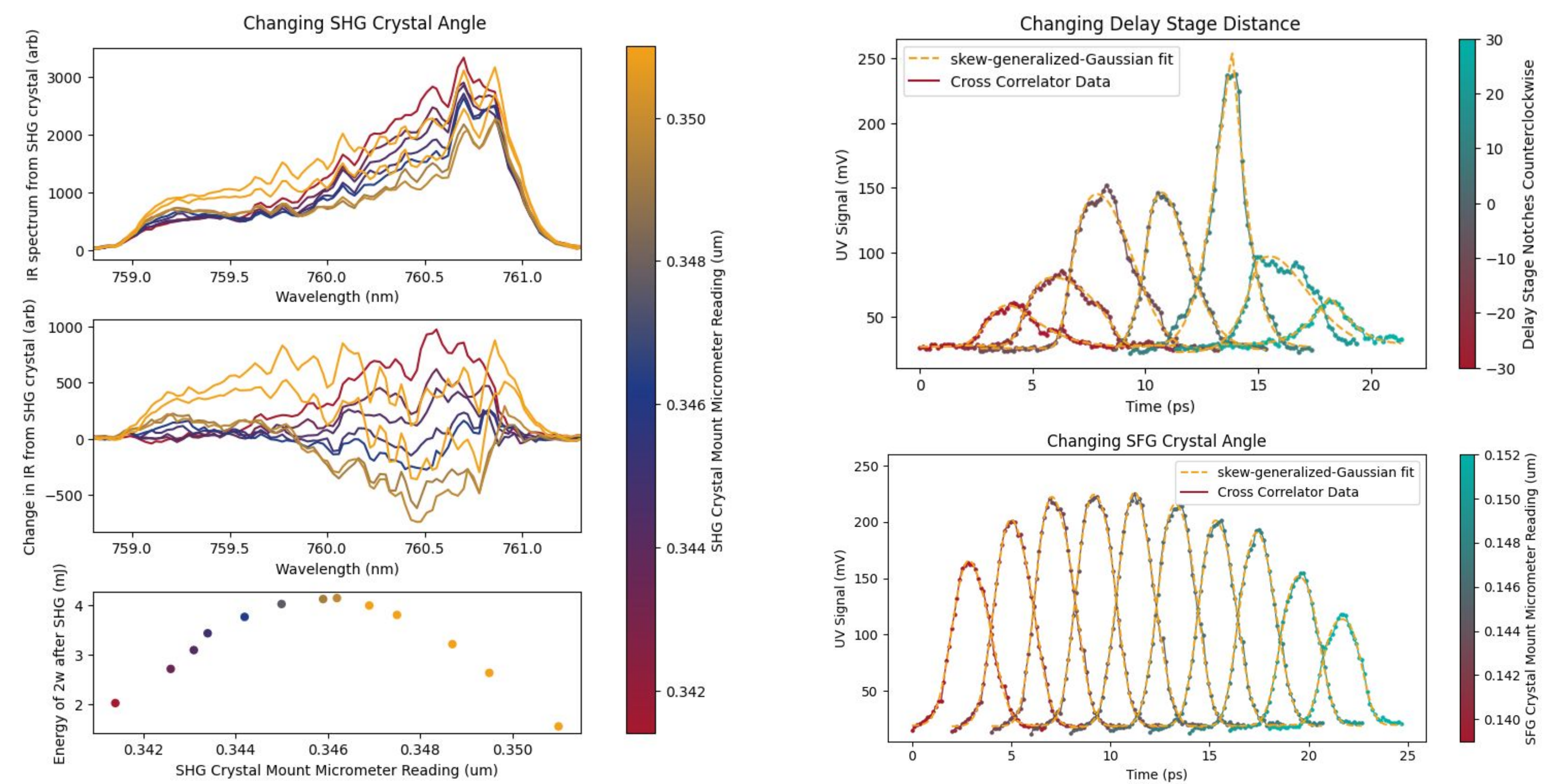


## Other Advancements

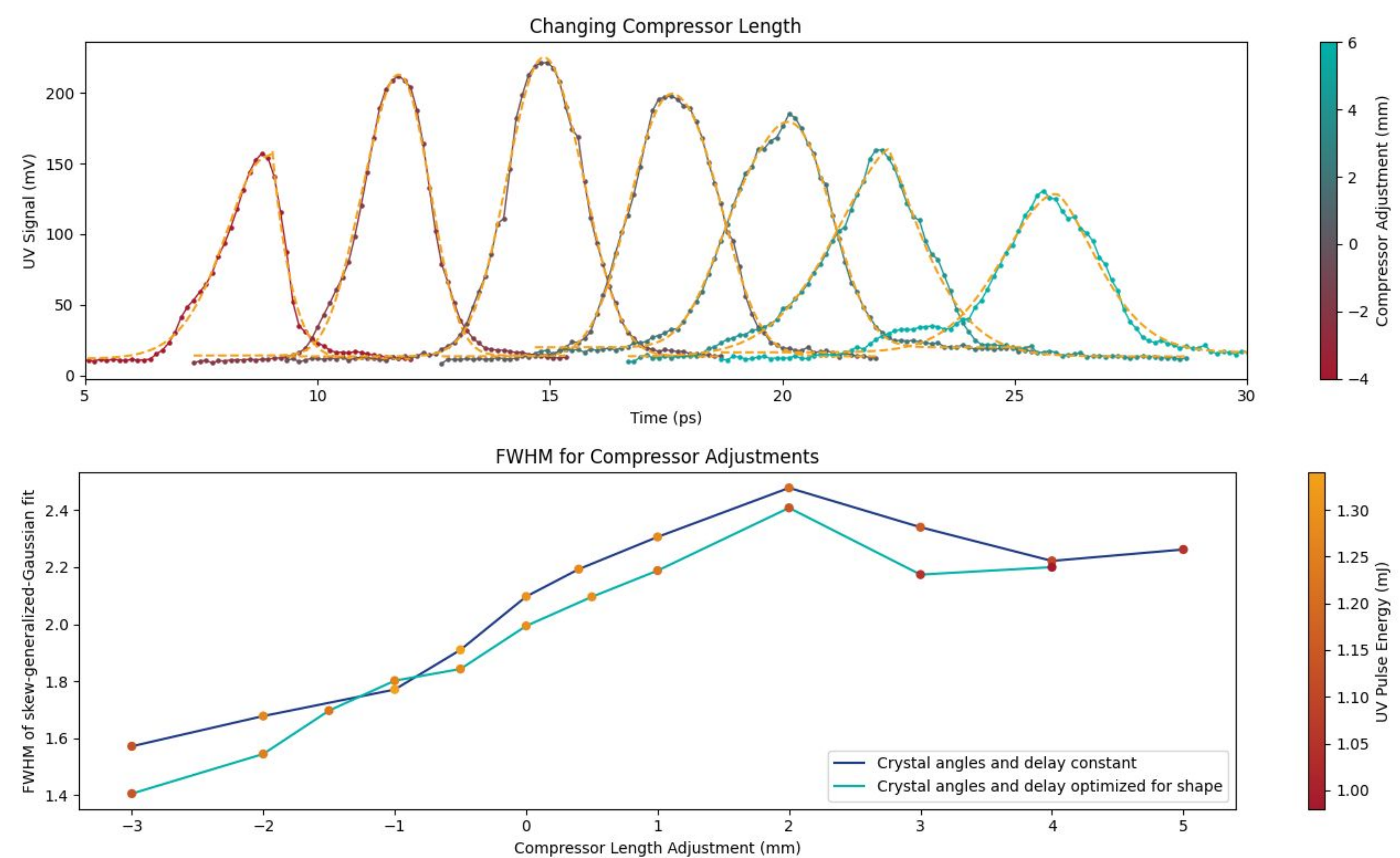
- Proposed a path redesign to simplify cross correlator path, fold IR delay stage, and create space for UV spatial filter
- Designed mount for new UV capillary
- Developed plan for pulse shaping GUI with cross correlator scanning using new delay stage and control of compressor and crystals on new tripler
- Aligned and re-calibrated autocorrelator for IR picosecond operation



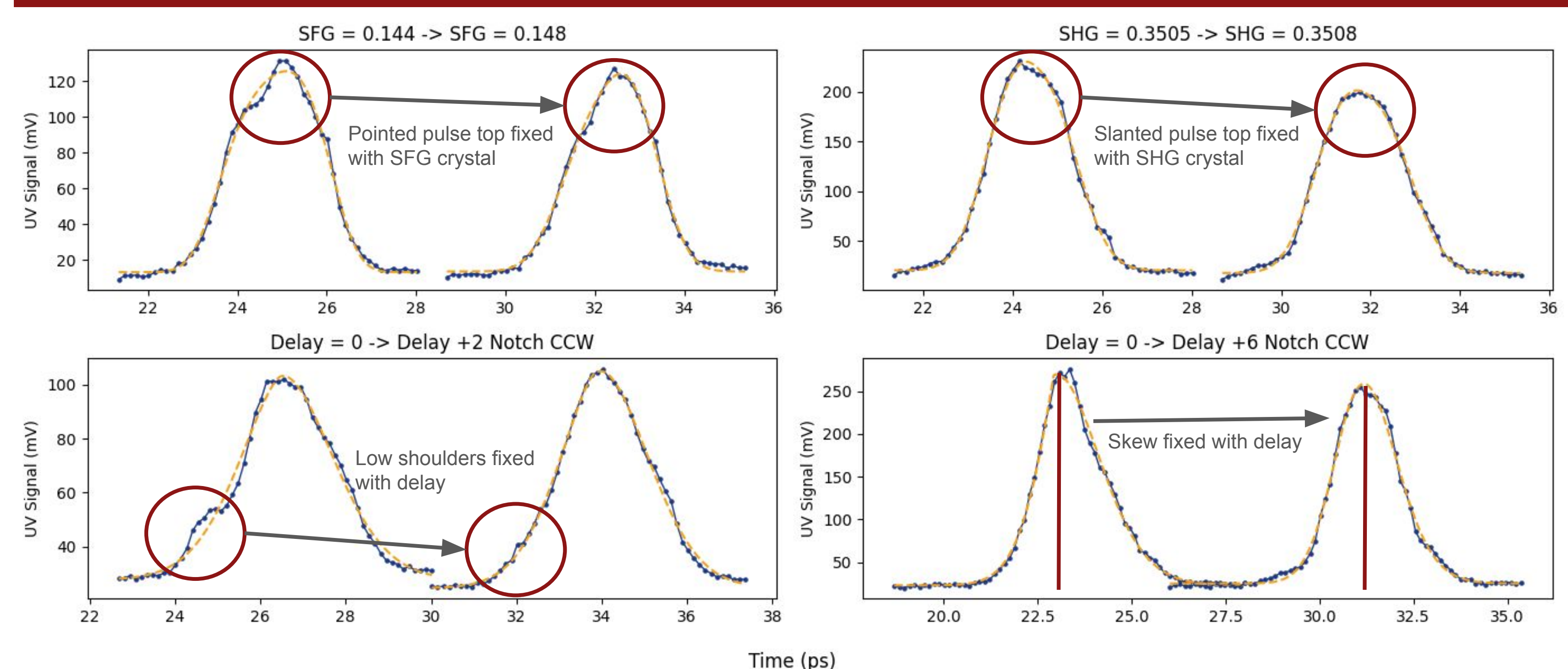
## Crystals and Delay Tuning



## Compressor Adjustments



## Optimizing Pulse Shape



## Acknowledgements

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