

# Broadband Integrating Transmittance/Reflectance Spectrometer (BITS)

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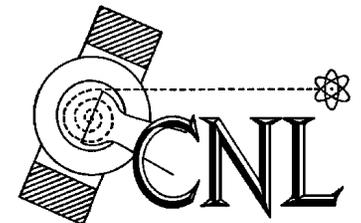
Tony Wexler

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Presented at Cape Romain, SC

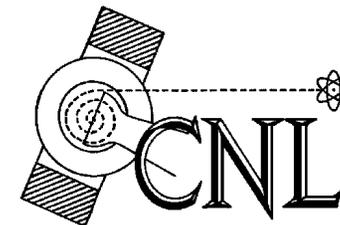
October 15, 2014



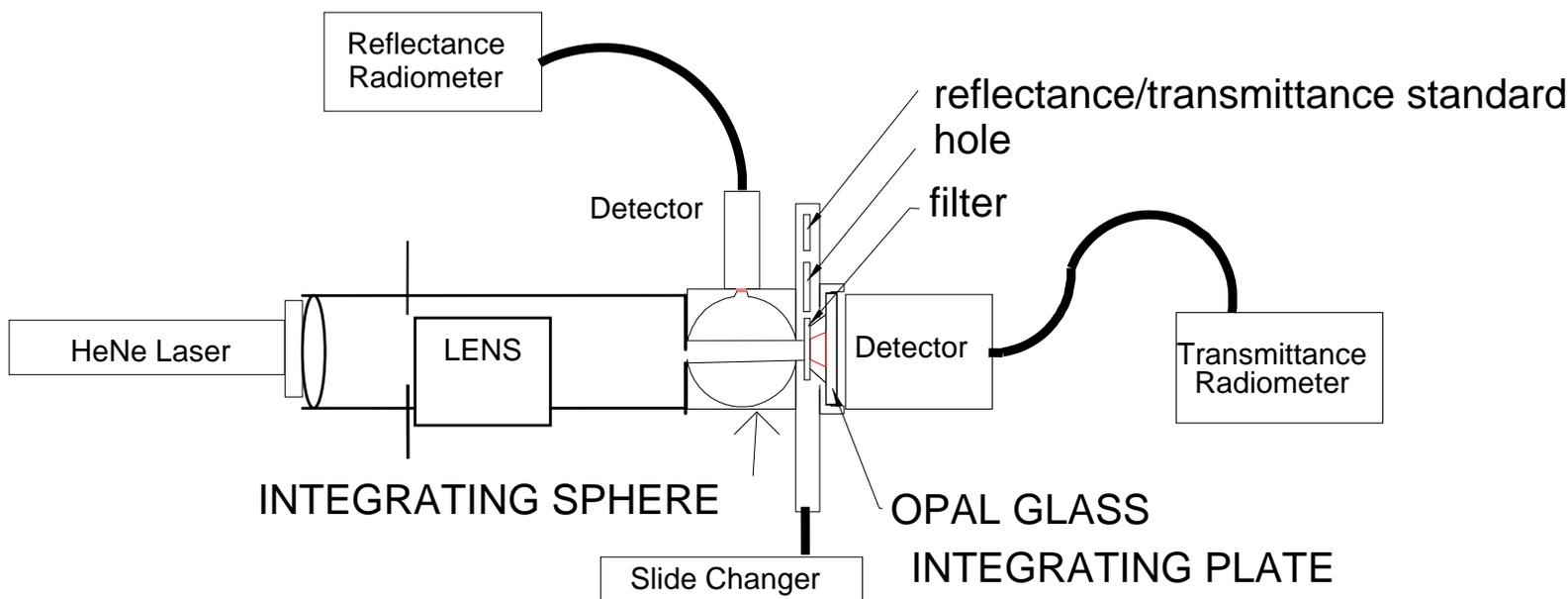
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# Current HIPS System

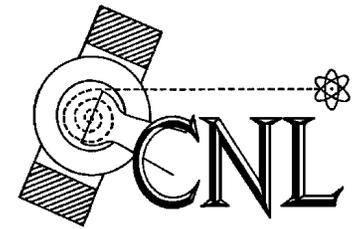


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# 633 nm Red Laser System

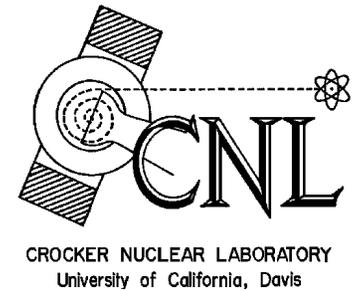


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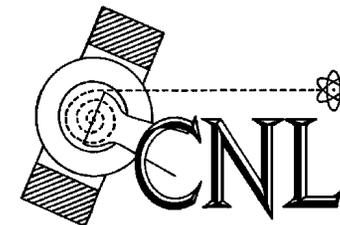
# Components of the BITS System



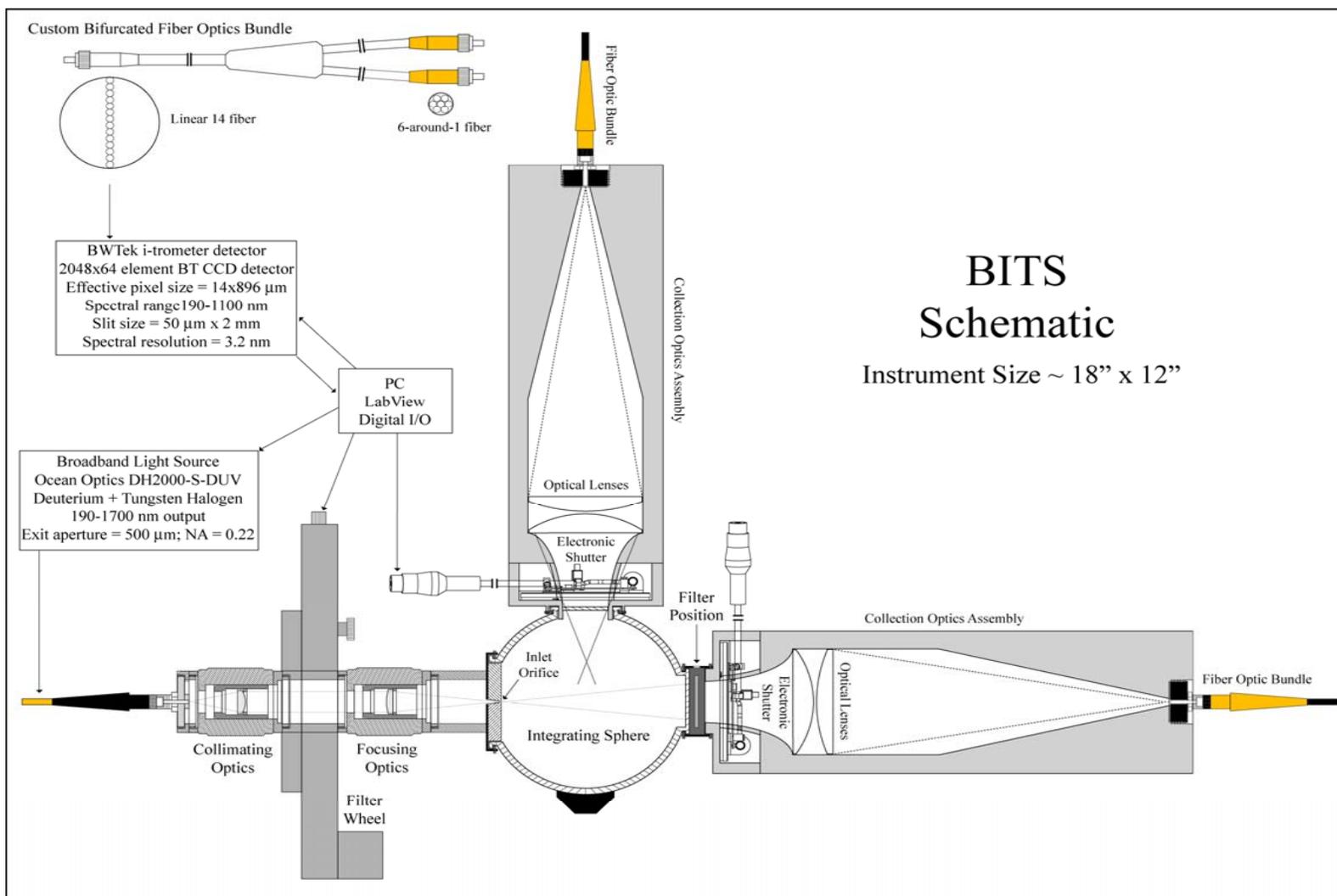
- Broadband light source, 190 to 1700 nm.
- Fiber optic cable; collimating lens assembly.
- Optical filters to select parts of the spectrum.
- Integrating sphere for reflected light.
- Transmittance and reflectance signals are focused into fiber optic bundles.
- Spectrometer, 190-1100 nm range, 3.2 nm resolution.



# New Broadband Design

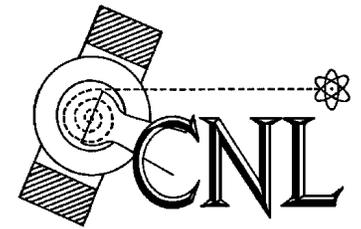


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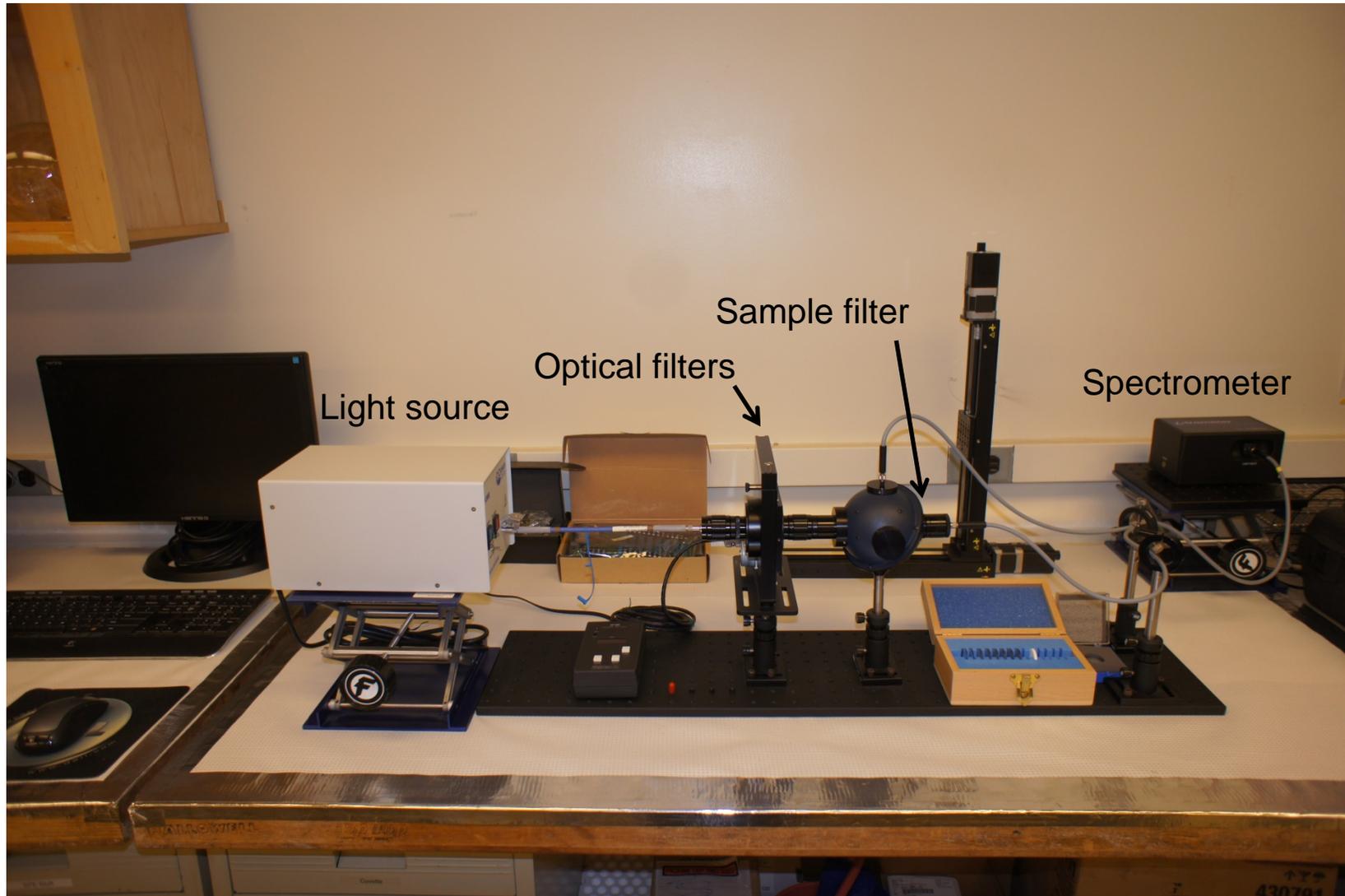




# New BITS System in Testing Configuration

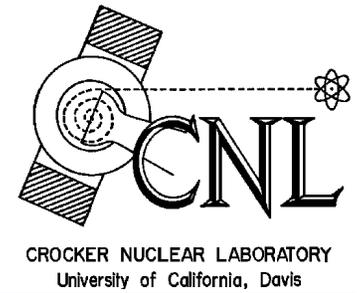


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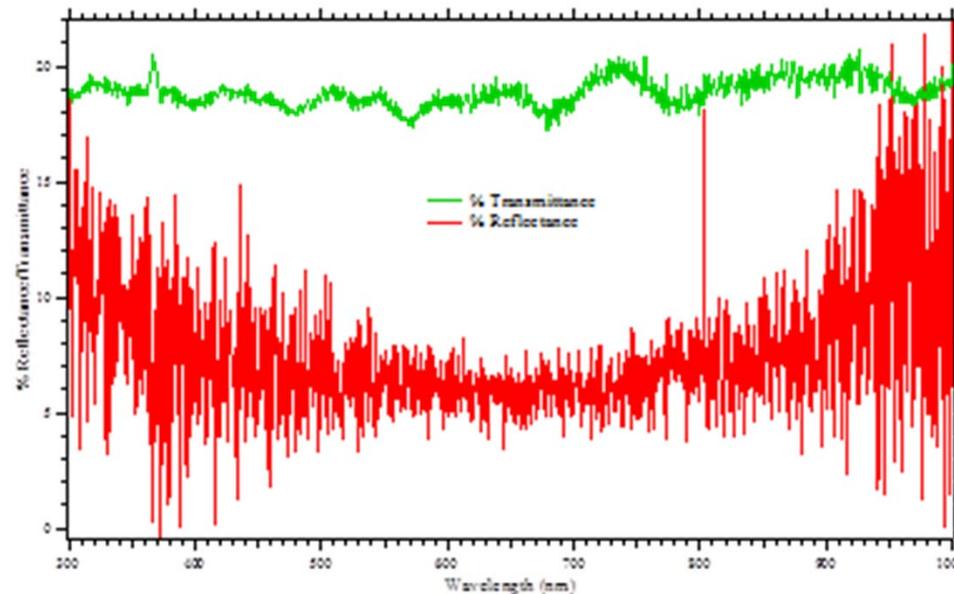




# Testing of Calibration and Light Characteristics

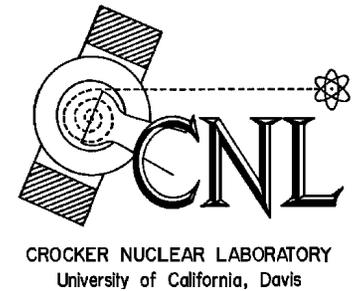


- Successful calibration achieved using neutral density filters with collimated light
- But application of the calibration to blank PTFE filters gave noisy results (below)





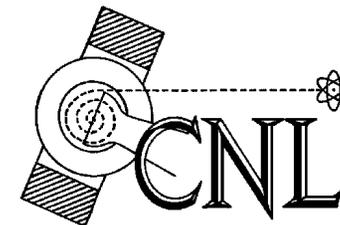
# Collimated Versus Diffuse Radiation



- Neutral density filters have little effect on light characteristics, so collimated light retains its form throughout the calibration process
- PTFE filters are diffusers, so light is diffused as it passes through the filter
- Experiments have focused on making the light sufficiently diffuse to achieve a consistent calibration with diffuse light

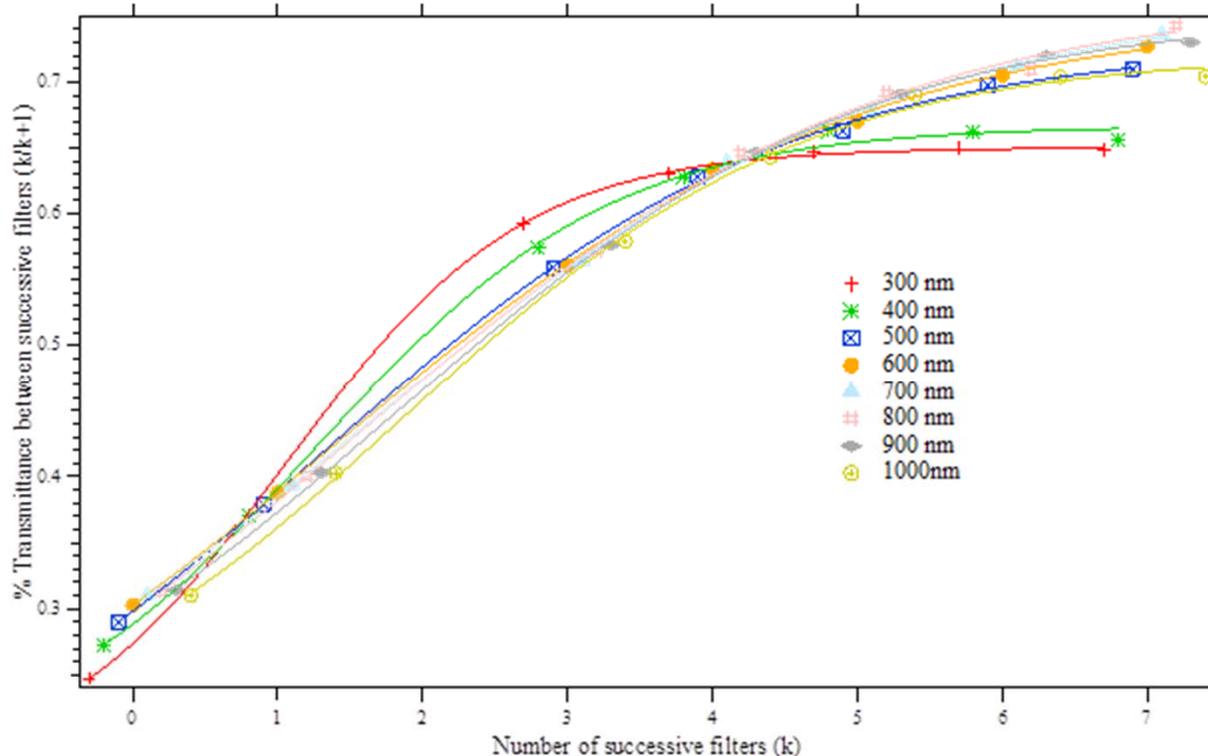


# Stacking PTFE Filters



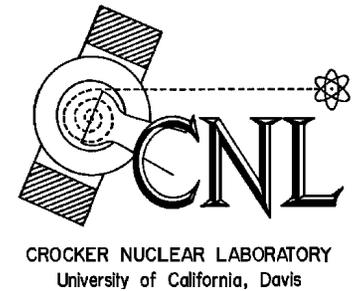
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- Experiments used successive stacks of PTFE filters as diffusers
- Limiting value achieved at 5 to 6 filters.





# Upcoming Work



- Complete the development and confirmation of the calibration approach
- Assemble complete system, with apparatus for IMPROVE sample handling
- Test system with archived IMPROVE samples for comparison with HIPS
- Routine sample analysis