

## MIIPS™ application notes What can you do with MIIPS™?

Automated phase characterization and adaptive pulse compression using MIIPS™ in air

Accurate measurement of the spectral phase in laser pulses is paramount in the field of femtochemistry, control of chemical reactions, and optical communications. In light of these challenges, a Multiphoton Intrapulse Interference Phase Scan (MIIPS) has been developed; a single beam noninterferometric method that accurately measures and compensates spectral phase distortions of a laser pulse. Traditionally, this method requires the effect of localized phase distortions to be measured in the second harmonic spectrum. New advances have expanded this phase measurement technique to third order nonlinear processes, including Third Harmonic Generation (THG) in ambient air. This new method, air-MIIPS, eliminates the complexity of using a nonlinear optical crystal at the measurement point and expands the possible uses of MIIPS within the fields of microscopy, remote sensing (LIDAR), and high energy laser pulse propagation.

Usually a single measurement results in small systematic errors which are easily corrected by iteratively compensating the phase distortions and repeating the measurement. Like in the standard SHG-MIIPS, less than 10 iterations are required, for adaptive pulse compression, depending on how heavily distorted the pulse is at the start. The entire process is completed in less than one minute. The phase is measured by compensation, in analogy to the classical Wheatstone bridge used in electronics, with unprecedented accuracy.

#### References:

B.W. Xu, J.M. Gunn, J.M. Dela Cruz, V.V. Lozovoy, M. Dantus, J Opt Soc Am B Opt phys, 23, 750-9 (2006).  
D. A. Harris, J. C. Shane, V. V. Lozovoy, and M. Dantus, Optics Express, Vol. 15, 1932-1938 (2007).

For more information, contact Dr. Marcos Dantus, Chief Executive Officer, at 517-881-4562 or email to [info@biophotonicsolutions.com](mailto:info@biophotonicsolutions.com)

Copyright 2007 BioPhotonic Solutions, Inc.  
MIIPS™ is protected by U.S. Patent No. 7,105,811; and other patents pending.  
All rights reserved.

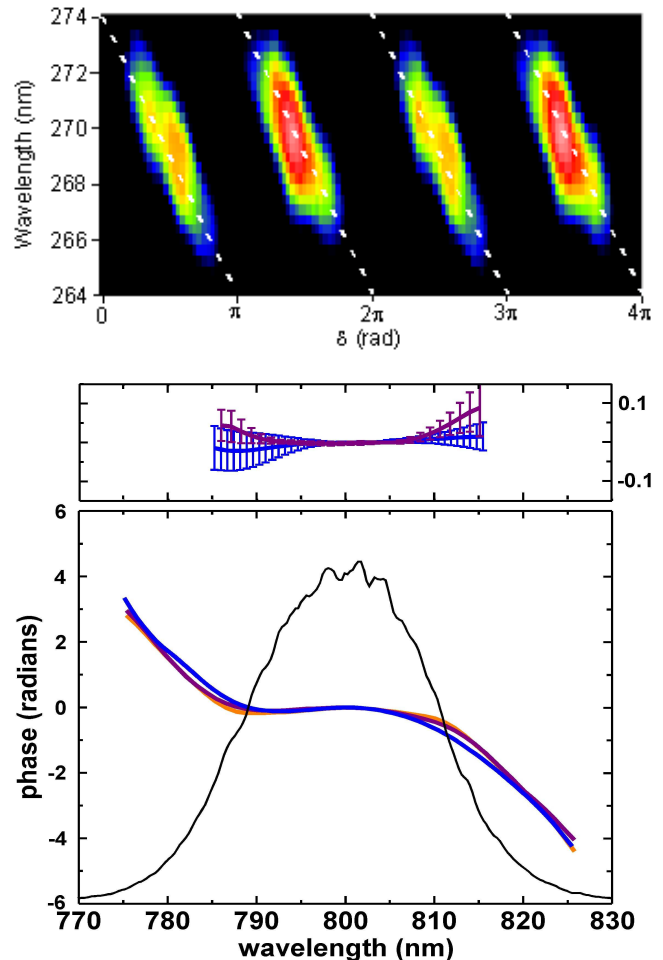


Figure (top) A typical air-MIIPS trace is shown. (bottom) The measured spectral phase for SHG-MIIPS (blue) and air-MIIPS (purple) along with the residue (inset). Figure courtesy of the Dantus Research Group.