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Towards Single-Shot Detection of Bacterial Endospores via Coherent Raman Spectroscopy[1] DMITRY PESTOV, XI WANG, GOMBOJAV ARIUNBOLD, ROBERT MURAWSKI, VLADIMIR SAUTENKOV, ALEXEI SOKOLOV, MARLAN SCULLY, Texas A&M Univ. — Recent advances in coherent anti-Stokes Raman scattering (CARS) spectroscopy hold exciting promise to make the most out of now readily available ultrafast laser sources. Techniques have been devised to mitigate the nonresonant four-wave-mixing in favor of informative Raman-resonant signal. In particular, a hybrid technique for CARS (see *Science* **316**, 265 (2007)) brings together the advantages of coherent broadband pump-Stokes excitation of molecular vibrations and their time-delayed but frequency-resolved probing via a spectrally narrowed and shaped laser pulse. We apply this technique to the problem of real-time detection of warfare bioagents and report single-shot acquisition of a distinct CARS spectrum from a small volume of *B. subtilis* endospores ($\sim 10^4$ spores), a harmless surrogate for *B. anthracis*. We study the dependence of the CARS signal on the energy of the ultrashort preparation pulses and find the limit on the pulse energy fluence (~ 0.2 J/cm^2), imposed by the laser-induced damage of the spores.

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