Novel and powerful enhancement of measurement systems' resolution (Technion)

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This invention is a novel and powerful method which enables the enhancement of measurement equipment resolution beyond its physical limits in cases where the signal being measured is sparse in a known basis. Most measure objects (natural and artificial) are sparse, i.e., they contain many coefficients close or equal to zero when represented in some basis. This is the first time this approach has been employed to tackle this problem. The method has been demonstrated to enhance the resolution of an optical microscope by a factor of ~10 beyond the fundamental diffraction limit. Similar resolution enhancement capabilities have been shown, where a laser pulse consisting of three 150 ps subpulses has been successfully and accurately reconstructed following acquisition by a “slow” photodiode with a 1000 ps rise time. This technique is very general, and can be utilized in any sensing/ detection/ data acquisition scheme.

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