



The Abdus Salam
**International Centre
for Theoretical Physics**



ICTP COLLOQUIUM

16:45, Thursday, 11 July 2013
Main Lecture Hall, Leonardo Building, ICTP

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Superoscillations and weak measurement

Band-limited functions can oscillate arbitrarily faster than their fastest Fourier component over arbitrarily long intervals. Where such ‘superoscillations’ occur, functions are exponentially weak. In typical monochromatic optical fields, substantial fractions of the domain (one-third in two dimensions) are superoscillatory. Superoscillations have implications for signal processing, and raise the possibility of sub-wavelength resolution microscopy without evanescent waves. In quantum mechanics, superoscillations correspond to weak measurements, suggesting ‘weak values’ of observables (e.g photon momenta) far outside the range represented in the quantum state. A weak measurement of neutrino speed could lead to a superluminal result without violating causality, but the effect is too small to explain the speed claimed in a recent experiment.