

Photonics with Atomic Bose-Einstein Condensates

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Materialization of Bose-Einstein condensation in trapped ultracold alkali atom clouds has led to experimental demonstrations of various coherent atomic phenomena which resembles coherent optical effects. Present experimental techniques allow for unprecedented ability of control over mutual interaction of coherent matter and optical waves. Novel observations such as matter wave amplification, atomic four-wave mixing, ultraslow light propagation and coherent optical information storage, as well as intriguing proposals such as photonic band gaps, and multimode waveguiding have already been reported. Integrated atom-optical systems at smaller scales, in particular atom-chips or atomtronics are already under development to bring such exciting effects closer to practical applications. In this talk we shall review some of the key developments related to photonics applications with atomic Bose-Einstein condensates. We shall also discuss how some of these developments can assist quantum information science and technology.
