Analog gravity in atomic condensates: a fruitful bidirectional synergy of gravity and quantum optics

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In this talk I will review recent advances in the theoretical and experimental study of ultracold atomic gases as a platform for analog models of gravity, aka the quantum simulation of gravitational and quantum field problems using atomic systems. Beyond analog Hawking emission from black holes and super-radiance from rotating objects, special attention will be paid to back-reaction effects in cosmological particle generation and false vacuum decay phenomena. Avenues for application of these effects to new quantum technologies will be finally outlined.