

Of Bose condensates, squeezed light and black holes

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The interface between statistical and optical physics is rich and full of surprises. The present perspective is based on the analogy between ordinary (photon) lasers [1] and the BEC atom laser [2], on the one hand, and Unruh radiation emitted by accelerating atoms in the vicinity of a black hole, on the other. The dynamics of interacting superfluid Bose condensates is naturally developed in which atom pairs, k and $-k$, are studied [3]. New insights into the Unruh-Hawking radiation problem come from similar pairing correlations between photons above and below the black hole horizon [4]. The quantum optical approach to the problem of Unruh-Hawking radiation gives us new insight into rather subtle aspects of causality and entanglement associated with Unruh acceleration radiation [5].

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