Quantum black hole and uncertainty principle with minimal length and momentum

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At the early 70-ies Bekenstein and Hawking proposed that black holes reveal some thermodynamical properties. Black holes have been attracted a lot of attention since that time. It was proposed that some thermodynamical functions such as temperature or entropy of a black hole can be obtained with help of Heisenberg uncertainty principle. We investigated a microscopic (quantum) black hole in the case of generalized uncertainty principle leading to a minimal uncertainty in position as well as in momentum. We calculated thermodynamical functions of a Schwarzschild black hole such as temperature, entropy and heat capacity. It is shown that incorporation of a minimal uncertainty in momentum leads to minimal temperature of a black hole similarly as we have for Schwarzschschild-AdS one without minimal uncertainty. Whereas minimal uncertainty in position gives finite mass and temperature at the final point of Hawking radiation. Minimal temperature gives rise to Hawking-Page phase transition i.e. divergency of a heat capacity at this point. We also investigated emission rate relation for the black hole and shown that generalized uncertainty principle makes lifetime of the black hole shorter.