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Effects of thermal fluctuations and angular momentum on nuclear pairing properties

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The effects of angular momentum on pairing in nuclei are studied within the so-called FTBCS1 theory, which is an extension of the finite-temperature BCS theory including the thermal fluctuations such as quasiparticle-number fluctuations (QNF). For simplicity, the angular momentum projection M is introduced instead of the total one. The numerical calculations are carried out within a doubly degenerate equidistant model with a constant pairing interaction G. The results obtained show that, at constant values of M, the pairing gaps given by the FTBCS1 theory do not collapse at critical temperature Tc as predicted by the conventional FTBCS one but decrease monotonously with increasing temperature T. At high enough values of M, there appears the so-called thermally assisted pairing correlation or anomalous pairing, in which the pairing gap is zero at T < Tc1 and reappears at T = Tc1 and remains finite at T > Tc1. These features are caused by the QNF within the FTBCS1 theory.

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