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BCS-BEC transition in finite systems NGUYEN DINH DANG[1], NGUYEN QUANG HUNG[2], Heavy-Ion Nuclear Physics Laboratory, RIKEN Nishina Center for Accelerator-Based Science, PETER SCHUCK, Groupe de Physique Theorique, IPN Orsay — The BCS-BEC (Bose-Einstein condensation) transition is studied in finite systems by using an exactly solvable multilevel pairing model as well as a realistic single-particle spectrum for ^{20}O nucleus. The predictions obtained within the selfconsistent quasiparticle RPA that includes the effects due to quantal and thermal fluctuations are discussed along with those given by the BCS theory and exact solutions. They show a smooth BCS-BEC transition in the qualitative behavior of the chemical potential as a function of the pairing interaction parameter G. The BEC is achieved at $G = G_c$*(BEC)*, where the chemical potential reaches the bottom of the single-particle spectrum, and continues to decrease as Gbecomes larger than G_c*(BEC)*. The critical temperature T_c*(BEC)* of the BCS-BEC transition in the strong coupling regime is deducted, at which the entropy of the system reaches the limit of the free bose gas. The effect due to the angular momentum on the BCS-BEC transition is also discussed.

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