ABSTRACT

THE EFFECT OF DIMPLE POTENTIAL TO THE THERMODYNAMICAL PROPERTIES OF BOSE-EINSTEIN CONDENSATE

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In this thesis; theoretical models of the dimple potential, which are used for obtaining Bose-Einstein condensate in addition to harmonic trap, are considered. In the first part of the thesis, the Dirac δ models which are used for describing the dimple potentials in the literature are introduced. However, one can not incorporate both the dimple depth and width together as different parameters into Dirac δ models. Therefore, in this thesis, it is tried to show that the dimple potentials can be modeled by the truncated parabolic function that includes Dirac δ function as a special limit. Using this model, the thermodynamical quantities like critical temperature, condensate fraction of a Bose-Einstein condensate are calculated. In the appendix, it is proven that the truncated parabolic function is a representation for the Dirac δ function.

Key Words
Bose-Einstein Condensation(BEC), Dimple Potential, Truncated Parabolic Function, Critical Temperature, Condensate Fraction.