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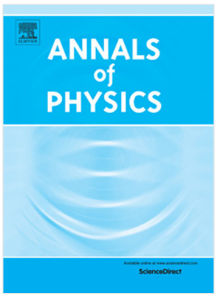


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# Noncommutative effects on holographic superconductors with power Maxwell electrodynamics

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**Abstract**

The matching method is employed to analytically investigate the properties of holographic superconductors in higher dimensions in the framework of power Maxwell electrodynamics taking into account the effects of spacetime noncommutativity. The relationship between the critical temperature and the charge density and the value of the condensation operator is obtained first. The Meissner like effect is then studied. The analysis indicate that larger values of the noncommutative parameter and the parameter $q$ appearing in the power Maxwell theory makes the condensate difficult to form. The critical magnetic field however increases with increase in the noncommutative parameter $\theta$.

## 1 Introduction

It is well known that the BCS theory of superconductivity [1] has proved to be an important theoretical discovery which describes the properties of low temperature superconductors. However, there has been no successful theory yet to understand the superconductivity in a class of materials that exhibit the phenomenon at high temperatures. Examples of such materials are the high $T_c$ cuprates. It is reasonably evident that these are strongly coupled materials and hence lies the difficulty in developing a theory for them.

Recently, there has been an upsurge in the study of holographic superconductors. The importance of these were realized as they reproduced some properties of high $T_c$ superconductors. The theoretical input that goes in the construction of these holographic superconductor models is the gauge/gravity correspondence first discovered in the context of string theory [2]-[4]. The physical mechanism behind this understanding involves

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