

论文

柱黑洞的熵

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摘要:

采用由广义测不准关系得到的新的态密度方程,研究了具有柱对称时空背景下黑柱的熵.利用新的态密度方程后,不通过截断可以消除brick-wall 模型中无法克服的发散项,并且同样可得到黑柱的熵与视界面积成正比的结论.计算结果表明,黑柱熵是视界面上量子态的熵,是一种量子效应,是黑洞的内禀性质.在计算中我们直接应用量子统计的方法,求柱黑洞背景下玻色场与费米场的配分函数,避开了求解各种粒子波动方程的困难,为研究各种时空黑洞熵提供了一条简捷的新途径.

关键词: 广义测不准关系 量子统计 黑柱统计熵

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Entropy of Cylindrical Black Hole

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Abstract:

Using the new equation of state density motivated by the generalized uncertainty relation, the authors derive the entropy of the black cylinder on the background of the cylindrically symmetric spacetime. When the new equation of state density is utilized to obtain that the entropy of the black cylinder is proportional to the horizon area, the divergence appearing in the brick wall model is removed, without any cutoff. It is shown that black cylinder's entropy is the entropy of quantum state on the surface of horizon. The black cylinder's entropy is a kind of quantum effect. It is the intrinsic property of the black cylinder. Via the method of quantum statistics, the authors directly derive the partition functions of Bosonic and Fermi field in black cylinder. The authors also avoid the difficult to solve the wave equation of various particles. The authors offer a new simple and direct way of calculating the entropy of black cylinders of different complicated spacetime.

Keywords: Quantum statistics Generalized uncertainty relation Statistical entropy of black cylinder

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