Direct Calculation of Mutual Information of Distant Regions

Thursday, 5 December 2019 14:00 (15 minutes)

We consider the (Renyi) mutual information, I^(n) (A,B)=S^(n)A +S^(n)_B -S^(n) A \cup B , of distant compact spatial regions A and B in the vacuum state of a free scalar field. The distance r between A and B is much greater than their sizes R A,B . It is known that I^(n)_(A,B)~C^(n)_AB $\langle 0|\phi(r)\phi(0)|0\rangle^2$. We obtain the direct expression of C^(n)_AB for arbitrary regions A and B. We perform the analytical continuation of n and obtain the mutual information. The direct expression is useful for the numerical computation. By using the direct expression, we can compute directly I(A,B) without computing S_A,S_B and S_A ∪B respectively, so it reduces significantly the amount of computation.

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