

Giant Proximity Effect in Superfluid ^4He

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Abstract

Recently it was shown that two confined regions of liquid ^4He exhibit proximity effects over distances much larger than the correlation length ξ [1]. Here we report measurements of the superfluid fraction ρ_s/ρ and specific heat C_p for a 33.6 ± 0.93 nm film of ^4He . We compare these new data to those of a 31.7 ± 0.1 nm film linking an array of 34×10^6 $(2\mu\text{m})^3$ boxes of ^4He . This comparison allows us to show quantitatively, the enhancement in ρ_s/ρ due to the presence of the boxes in the temperature region where the film orders. The enhancement is observed at distances *over 600 times the bulk correlation length*. This anomalously large length scale is analogous to a giant proximity effect observed in High- T_c superconductors (HTSC)[2]. A mechanism has been proposed[3] involving flow fields of vortex pairs to explain the effect in the HTSC. This explanation may also be applicable to the ^4He system.

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