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**Fluctuations, mean-field  $T_c$  and energy gaps in cuprate superconductors** JEFFERY TALLON, Industrial Research Ltd, JAMES STOREY, Victoria University of Wellington, JOHN LORAM, Cambridge University — We have carried out an analysis of Gaussian fluctuations about  $T_c$  in the specific heat of  $(Y,Ca)Ba_2Cu_3O_{7-x}$  and  $Bi_2Sr_2CaCu_2O_{8+\delta}$ . The analysis employs a full ARPES derived dispersion, including the pseudogap. This enables us to calculate the doping dependence of the mean-field transition temperatures,  $T_c^{mf}$ , in the absence of fluctuations. The values lie well above  $T_c$  especially for lower doping where  $T_c^{mf}$  is trending towards 180K. As a result, while the observed  $T_c$  follows the well-known parabolic doping dependence, the values of  $T_c^{mf}$  decrease monotonically with doping along with the superconducting gap parameter,  $\Delta_0$ , such that  $2\Delta_0/k_B T_c = 5$ . Using this result we offer explanations for a number of anomalous observations. The line  $T_c^{mf}(p)$  should not however be confused with the  $T^*(p)$  line which is associated with the pseudogap and falls abruptly to zero at critical doping ( $p_{crit}=0.19$  holes/Cu).

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