

Abstract Submitted
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Van Hove singularity crossing in overdoped superconducting cuprates - effect on superconducting and normal-state properties JEFFERY L. TALLON, MacDiarmid Institute, JAMES STOREY, Victoria University, TOBIAS FELLMETH, GRANT WILLIAMS, MacDiarmid Institute — We show from modelling the entropy, superfluid density and thermoelectric power using a rigid ARPES-derived dispersion that the crossing of the van Hove singularity (vHs) occurs in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ in the heavily overdoped region at a hole concentration of $p=0.22$ holes per Cu. This concurs with recent results from ARPES measurements. The impact of the vHs crossing on the thermodynamic properties, the Knight shift and susceptibility, transport, optical and superconducting properties is described and shown to account for much of the overall doping dependence of these properties. The only exotic feature that needs to be introduced is the pseudogap showing that much of the physics of HTS materials is conventional. These insights help us to see that the “lost entropy” of $1k_B$ per doped hole, previously associated with the pseudogap, is just associated with the DOS asymmetry arising from the proximity of the vHs. Remarkable is the insensitivity of the doping dependence of T_c to the singularity in the DOS.

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