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Electronic Structure of Electron-doped $Sm_{1.85}Ce_{0.15}CuO_4$: Strong `Pseudo-Gap' Effects, Nodeless Gap and Signatures of Short Range Order

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Angle resolved photoemission (ARPES) data from the electron doped cuprate superconductor $Sm_{1.85}Ce_{0.15}CuO_4$ shows a much stronger pseudo-gap or "hot-spot" effect than that observed in other optimally doped n-type cuprates. Importantly, these effects are strong enough to drive the zone-diagonal states below the chemical potential, implying that d-wave superconductivity in this compound would be of a novel ``nodeless" gap variety. The gross features of the Fermi surface topology and low energy electronic structure are found to be well described by a simple spin density wave model. Comparison of the ARPES and optical data from the same sample shows that the pseudo-gap energy observed in optical data is consistent with the inter-band transition energy of the model. However, the high energy electronic structure is found to be inconsistent with such a scenario. We show that a number of these model inconsistencies can be resolved by considering a short range ordering or inhomogeneous state.

Keywords : ARPES, electron-doped, Pseudo-gap