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Weak coupling SDW ground state with strong Fermi surface gapping in Na_xCoO_2 , x $\approx$ 0.8 M. BRUEHWILER, B. BATLOGG, S.M. KAZAKOV, J. KARPINSKI, Laboratory for Solid State Physics, ETH Zurich, D. SHEPTYAKOV, Paul Scherrer Institute, Villigen, Switzerland — In Na_xCoO_2 the electrons move on a triangular lattice and in the Na-rich composition range (x $\geq$ 0.75) form a SDW ground state below $T_c \approx 22.5$ K with a small ordered moment. We have studied this Fermi surface instability with heat capacity, magnetic and transport measurements on a series of samples with various nominal Na content. The SDW phase is characterized by a jump ΔC at T_c and an associated reduction of the electronic density of states. This removal of DOS has been deduced from the high-temperature value of the Sommerfeld γ and the extrapolation from below 1K to T $\rightarrow$ 0. Interestingly, the ratio $\Delta C/(\delta\gamma.T_c) \approx 1.5$ is close to the BCS weak coupling value. Even more surprising is the observation that up to $\approx$ 80% of the DOS is removed in this Fermi surface instability. In addition to the gapped electronic excitation spectrum a broad hump in the specific heat is measured above $\approx$5K, consistent with excitations of the gapped spin wave spectrum in the SDW ordered state. Crystal structure analysis reveals for the SDW an orthorhombic symmetry and thus a slight distortion of the triangular lattice. Similarities and differences to the CDW-like state, which forms at x=0.5 also in a distorted triangular lattice, will be discussed.

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