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Properties of Helium-4 In and Near the Self-Organized Critical State[1] S.T.P. BOYD, D.A. SERGATSKOV, R.V. DUNCAN, University of New Mexico — If a downward heat flux is imposed on a sample of ^{4}He near T_λ, the sample can self-organize so that its temperature tracks the variation of T_λ induced by the hydrostatic pressure head. This "Self-Organized-Critical" (SOC) state is the only means by which a uniform reduced temperature very close to T_λ can be achieved on Earth in ^{4}He. We recently reported preliminary analysis of extensive new measurements of the SOC state showing three new results: strong nonlinearity in the upward-going wave under high drive levels, the qualitative form of the breakdown of the SOC state with increasing downward heat flux greater than $\sim 12\mu$W/cm^2, and, most intriguingly, we have corroborated and extended the as-yet unexplained result of Lee *et al.* that the thermal resistivity of helium-II near T_λ is larger under downward heat flux than it is under upward heat flux of equal magnitude (upward resistivity measured previously by Baddar *et al.*). We find that the "downward" resistivity exceeds the "upward" by factors ranging from 18X at 20μW/cm^2 to 12X at 80μW/cm^2. Here we report results of further analysis which help to quantify and flesh out this intriguing picture.

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