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## Enhanced Phonon Heat Transport at the “Hidden Order” Transition in URu<sub>2</sub>Si<sub>2</sub>

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A dramatic increase in the total thermal conductivity ( $\kappa$ ) is observed in the hidden order (HO) state of single crystal URu<sub>2</sub>Si<sub>2</sub>. Through measurements of the thermal Hall conductivity, we explicitly show that the electronic contribution to  $\kappa$  is extremely small and slightly decreases through the HO transition. Therefore, this large increase in  $\kappa$  is entirely due to phonon conduction. Furthermore, this behavior does not appear to be caused by a simple removal of portions of the Fermi Surface. More subtle electron–phonon scattering mechanisms may be in play, perhaps related to dynamical structural distortions from the quadropolar f-orbital degrees of freedom. It appears that this behavior is unique to URu<sub>2</sub>Si<sub>2</sub> in comparison with other antiferromagnetic heavy fermion systems. The observed enhancement of  $\kappa$  is sharply reduced as HO is destroyed through Rh doping.

*Keywords* : Hidden Order, quadropolar ordering, thermal transport