1078-35-376 **Brian Wissman*** (wissman@hawaii.edu), Brian Wissman, University of Hawai'i at Hilo, Natural Sciences Division, Hilo, HI 96720. *Global solutions to the ultra-relativistic Euler equations.*

We show that when entropy variations are included and special relativity is imposed, the thermodynamics of a perfect fluid leads to two distinct families of equations of state whose relativistic compressible Euler equations are of Nishida type. (In the non-relativistic case there is only one.) The first corresponds to the Stefan-Boltzmann radiation law, and the other, emerges most naturally in the ultra-relativistic limit of a γ-law gas, the limit in which the temperature is very high or the rest mass very small. We clarify how these two relativistic equations of state emerge physically, and provide a unified analysis of entropy variations to prove global existence in one space dimension for the two distinct 3×3 relativistic Nishida-type systems. (Received December 13, 2011)