Abstract Submitted
for the APR13 Meeting of
The American Physical Society

Low-temperature thermal conductivity measurements of Al_2O_3 ceramic for use in bolometric particle detector[1] ALEXEY DROBIZHEV, UC Berkeley; Lawrence Berkeley National Laboratory, CUORE COLLABORATION[2] — Bolometric particle detectors for rare weak processes operate at temperatures as low as 10mK and are background-dependent, so radiopure structural materials such as alumina ceramic (Al_2O_3) are of interest, and their thermal properties in the very low temperature regime must be understood. Our experiments are conducted in a dilution refrigerator, with heaters being used to create temperature gradients across elongated alumina samples of different cross-sectional geometries mounted in copper clamps, with one end thermalized on the 10mK plate of the cryostat. Temperatures of both ends are measured with RuO_2 resistance thermometers, and thermal conductivity k(T) can be determined using the relationship $\frac{dQ}{dt} = \frac{A}{l}\int k(T)dT$, where $\frac{dQ}{dt}$ is heating power, A is cross-sectional area of the sample, l is its length, and T is temperature. Absolute values and temperature dependence of thermal conductivity of the alumina samples were measured and compared to well-investigated single-crystal sapphire properties. Thermal conductivity of other materials of interest was also investigated; the results will be presented.

[1]DOE, NSF, BPURS
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Date submitted: 11 Jan 2013 Electronic form version 1.4