Abstract Submitted
for the APR12 Meeting of
The American Physical Society

**$^{176}$Lu/$^{175}$Lu thermometry for Oklo natural reactors: a new look at old data**[1] CHRIS GOULD, NC State University, EDUARD SHARAPOV, JINR, Dubna — Lutetium thermometry has been used to analyze Oklo natural nuclear reactor zones but leads to widely varying and puzzling predictions for the temperatures $T_O$, which in turn impacts Oklo bounds on the time variation of the fine structure constant $\alpha$. We revisit results for reactor zone RZ10 in light of new astrophysical measurements of the isomer branching ratio $B^g$ in $^{175}$Lu neutron capture at 5 and 25 keV. We recalculate predictions for $T_O$ as a function of $B^g$ using realistic models of the Oklo neutron flux. We find $T_O = 100 \pm 30$ C using a new value of $B^g$, in contrast to $350 < T_O < 500$ C using the evaluated value at thermal energy. Lutetium thermometry can be applicable to analyses of Oklo reactor data, but a better measurement of $B^g$ with thermal neutrons is needed to confirm the reliability of temperature predictions.

[1]This work was supported by the US Department of Energy, Office of Nuclear Physics, under Grant No. DE-FG02-97ER41041

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Date submitted: 28 Dec 2011 Electronic form version 1.4