Study of $^{155}$Gd by the (p,d$\gamma$) Reaction$^1$ J.M. ALLMOND, C.W. BEAUSANG, T.J. ROSS, B.K. DARAKCHIEVA, Department of Physics, University of Richmond, Virginia 23173, STARS-LIBERACE COLLABORATION — The structure of the $N = 90$ and neighboring nuclei have been of recent interest due to an unusual number of low-lying $0^+$ states and a rapid change from vibrational to rotational character. The single, unpaired neutron in $^{155}$Gd ($N = 91$) acts as a probe to the $^{154}$Gd ($N = 90$) core. To study this, an experiment was conducted at the 88-Inch Cyclotron at LBNL using the STARS and LiBerACE detector arrays. A 25 MeV proton beam incident onto a $^{156}$Gd target was used to populate states in $^{155}$Gd by the (p,d$\gamma$) reaction. The exit channel of the reaction and the residual excitation energy of the nucleus were tagged by detecting scattered charged particles in a Si telescope array (STARS) while coincident gamma rays were detected using 6 Ge clovers and 1 Ge LEPS detector of the LiBerACE array. Particle-$\gamma$ and particle-$\gamma$-$\gamma$ correlations are used to probe the structure of $^{155}$Gd. Preliminary results are presented.

$^1$This work was performed under the auspices of the U.S. Department of Energy under contract numbers DE-FG52-06NA26206 (UR), DE-AC52-07NA27344 (LLNL), and DE-AC02-05CH11231 (LBNL).