Recoil Distance Method lifetime measurement of the $2^+_1$ state in $^{94}$Sr and implications for the structure of neutron rich Sr isotopes

AARON CHESTER, KRZYSZTOF STAROSTA, Department of Chemistry, Simon Fraser University, S1467 EXPERIMENT COLLABORATION — A high precision lifetime measurement of the $2^+_1$ state in $^{94}$Sr was performed at TRIUMF’s ISAC-II facility by coupling the Recoil Distance Method implemented via the TIGRESS Integrated Plunger with unsafe Coulomb excitation in inverse kinematics. Due to limited statistics imposed by the use of a radioactive $^{94}$Sr beam, a likelihood ratio $\chi^2$ method was derived and used to compare experimental data to Geant4-simulated lineshapes. The $B(E2; 2^+_1 \rightarrow 0^+_1)$ value extracted from the lifetime measurement of $7.80^{+0.50}_{-0.40}$ (stat.)$^{+0.07}_{-0.07}$ (sys.) ps is approximately 25% larger than previously reported while the relative uncertainty has been reduced by a factor of approximately 8. A baseline deformation has been established for Sr isotopes with $N \leq 58$ which is a necessary condition for the Quantum Phase Transition interpretation of the onset of deformation in this region. A summary of the experiment, description of the data analysis methods, and a comparison to existing theoretical models will be presented.

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