Observation of mutually enhanced collectivity in self-conjugate ^{76}Sr

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The shape of the atomic nucleus is determined by the interplay of macroscopic and microscopic effects within this finite quantum many-body system. Self-conjugate nuclei give an opportunity to study the role of neutron proton correlations in deformation and have attracted a great interest due to drastic shape evolution along the $N = Z$ line. In these nuclei, proton and neutron shell effects can act coherently, promoting an extreme sensitivity of nuclear properties to small changes of nucleon numbers. Strong ground-state deformation is expected to occur for $N = Z$ nuclei above $Z = 36$ from the 2^+ energy systematic as well as from theoretical predictions and reduced transition strengths B(E2) can guide our understanding of the onset of collectivity along the $N = Z$ line.

In this talk, we will report on the first determination of B(E2; $2^+ \rightarrow 0^+$) for the $N = Z = 38$ nucleus ^{76}Sr obtained from the measurement of the 2^+ state lifetime using γ-rays line shape technique [1]. ^{76}Sr nuclei were produced at the NSCL in charge exchange reaction from fast secondary ^{76}Rb beam. γ-rays emitted at the reaction target position were measured with the SeGA HPGe array in coincidence with reaction residues detected in the S800 spectrometer. Results will be discussed in the light of available data and theoretical predictions to provide insight into the evolution of shell structure and collectivity in this region.

References

[1] A. Lemasson *et al.*, Phys. Rev. C, **85**, (2012), 041303(R).