Collective Rotational Structures in Light Nuclei

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In recent years, we have witnessed a renaissance of spectroscopic studies of light nuclei. In the high-spin domain, this research has been fueled by the coupling of large γ-ray spectrometers with powerful auxiliary detection systems capable of cleaning identifying events from weakly populated reaction channels. With the development of new analysis techniques to fully exploit the capabilities of these large arrays, orders of magnitude increase in sensitivity has been achieved in the study of high-angular momentum states in light nuclei. The result has been the observation of a wide variety of nuclear structure phenomena, from the onset of highly-collective rotational motion to its demise in high-spin band terminations, from the occurrence of superdeformation in light nuclei to detailed studies of the transition back to spherical states through both electromagnetic and particle decay. In addition to the rich, and rapidly changing, patterns of behavior that can be studied in these nuclei, the comparatively modest valence spaces involved provide many exciting opportunities to compare and relate a range of theoretical models, from the cranked deformed mean-field description of the nuclear intrinsic state to the microscopic laboratory-frame description of nuclear structure achieved in large-scale spherical shell-model calculations. In this presentation, I will review recent highlights from the study of collective rotational structures in light nuclei, with focus on the $N \approx Z$ nuclei in the $A \sim 30$ and $A \sim 60$ regions, and will discuss new research opportunities in this field with accelerated radioactive ion beams.