

# Collective Multipole Excitations of Deformed Halos

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Weakly bound nuclei have exotic collective excitations associated with halo structures and continuum effects. For example, the diffused surfaces with a small incompressibility can have soft monopole modes. The dipole modes related to the photo reaction cross sections can be a good probe for deformations of halos. The low energy quadrupole modes can be a good probe for deformation difference between protons and neutrons near driplines. We studied these collective excitation modes based on deformed coordinate-space Hartree-Fock-Bogoliubov approach and the finite-amplitude QRPA method, which is a suitable tool for descriptions of deformed weakly bound nuclei with continuum. The study was a great challenge with the standard matrix QRPA and become very efficient with the FAM-QRPA. The calculations are implemented in the Tianhe supercomputer with the multi-core hybrid parallel scheme.

## References:

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