Exotic nuclei far from the $\beta$-stability line provide us with new interesting features. One of them can be the evolution of shell structure, including change of magic number, due to characteristic properties of the nuclear force [1], as being increasingly observed in recent experimental data [2, 3]. Although there are many bound nuclei between $\beta$-stability and drip lines presenting a variety of structure changes including the shell evolution [4], one eventually approaches the drip line, by adding more neutrons (or protons). Low-lying states are then in the continuum even if the ground state is still bound. Thus, the physics of drip line and that of shell evolution should meet. It is of much importance to clarify how the coupling to the continuum affects various structures generated by the nuclear force.

As an example, low-lying continuum states of exotic oxygen isotopes are studied, by introducing the Continuum-Coupled Shell Model (CCSM) characterized by an infinite wall placed very far and an interaction for continuum coupling constructed in a close relation to realistic shell-model interaction. Neutron emission spectra from exotic oxygen isotopes are calculated. The results shown in Fig. 1 agree with experiment remarkably well, as an evidence that the continuum effects are stronger than ~1 MeV [5].

We also calculate the same observable by Gamow shell model [6], starting from the same interaction that is used in CCSM. We compare the results with those of CCSM [5] and confirm the consistency. The description of the many-body theory including continuum degree of freedom provides us with new and precise understandings about exotic nuclei.

Fig. 1. Peak energies of one- neutron or two-neutron emission compared with experiment (Exp.). Calculations are made by bound states for SDPF-M, our model Hamiltonian fitted to SDPF-M without continuum (Bound approx) and with continuum effects (CCSM). The results of USDB are also shown.