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An approach of relativistic mean field plus exact pairing for open-shell nuclei WEI-CHIA CHEN, JORGE PIEKAREWICZ, ALEXANDER VOLYA, Department of Physics, Florida State University — Pairing plays a crucial role in determining numerous properties of open-shell nuclei. Conventionally, it is included in the mean-field description of atomic nuclei through the approximate BCS or HFB formalism. In this work we propose a new hybrid approach to compute open-shell nuclei. We describe atomic nuclei using relativistic mean field theory. The mean fields are improved by taking pairing into account via the method of exact pairing in which pairing is treated in an exact way, and hence, number of particles is conserved. To verify its applicability, we use it to study the effect of pairing on properties of Sn isotopes (A=100-132), in particular their giant monopole resonances. Our results, such as the odd-even staggering of neutron separation energy and the trend of giant monopole energies along the isotopic chain, are consistent with experimental results. We also find that pairing has very small effect on the giant monopole energies, as what previous studies concluded. All in all, this approach provides another way to compute open-shell nuclei, and its usefulness is justified in the calculations for Sn isotopes. However, the problem of why Sn isotopes are so soft remains open, and to resolve it physics other than pairing seems necessary.

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