

Microscopic description of photoabsorption and deexcitation processes

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Electromagnetic processes such as photon absorption or gamma decay play a critical role in the reaction networks involved in nucleosynthesis or radiochemistry. Since direct experimental data is often lacking for many of the nuclei relevant for such applications, developing a predictive theory of these electromagnetic processes is especially important. Microscopic approaches built from fundamental models of nuclear forces and quantum many-body methods offer the advantage to describe in a consistent manner both nuclear ground-state properties, nuclear decays such as gamma or beta decay, and even more complex processes such as fission. In this talk I will give a status report of a LLNL project to perform large-scale calculations of gamma-strength functions, beta-decay rates and level densities within the general framework of nuclear density functional theory with Skyrme forces. This approach is an attempt to generalize recent studies with the Gogny force from the CEA-Bruxelles collaboration, and with the relativistic mean field by the Zagreb group.

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