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Spectroscopy of Transfermium Nuclei

The study of the heaviest elements remains a compelling scientific endeavor. By investigation of nuclei in the trans-fermium region, we can learn about the quasi-particle structure, pairing correlations, and excitation modes in these nuclei. Berkeley Lab scientists have led several recent experiments to study the excited level structure of nuclei in this region through prompt and delayed gamma-ray spectroscopy including, notably, the odd-Z nuclei $^{249,251}\text{Md}$ ($Z=101$). The latest results and findings from these spectroscopic studies will be discussed, including observation and characterization of new rotational bands in both of these nuclei.

While such studies of the quasi-particle structure are vital to understanding the stability of the heaviest elements, the question remains as to how far we can push investigations of the heaviest nuclei. Experiments have been carried out at the 88-Inch Cyclotron using the Berkeley Gas-filled Separator (BGS) to investigate this issue. The latest progress of studies aimed at creation of superheavy elements ($Z>103$) using 50Ti-induced fusion-evaporation reactions will be highlighted.

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