GDR AND CHARGED PARTICLE DECAY FROM HIGHLY EXCITED NUCLEI

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This contribution reports on an exclusive experiment performed to measure the GDR width of the ^{88}Mo nucleus at high temperatures. High-energy Giant Dipole Resonance gamma-rays were measured following the decay of the hot, rotating compound nucleus of ^{88}Mo, produced at excitation energies of 124 and 261 Me. The fusion-evaporation reaction ^{48}Ti + ^{40}Ca was used and the experimental set-up allowed the detection of the recoiling residual nuclei and the charged particles together with high-energy gamma-rays. The data were analyzed using the statistical model Monte Carlo code GEMINI++. The results presented here are essential to give a more complete picture of the behavior of the GDR width as a function of the nuclear temperature and of GDR damping mechanisms.

The extracted GDR widths, obtained by fitting the high energy gamma-ray spectra, were compared with the available data at lower excitation energy and with theoretical predictions. Model calculations were performed using, on the one hand, the thermal shape fluctuation method based on the Lublin-Strasbourg-Drop (LSD) model and, on the other hand, using the Phonon Damping Model (PDM). The resulting GDR strength functions were convoluted, for the first time, with the population matrices of the evaporation process from the GEMINI++ code. Both modeled effective GDR strength functions predict an increase of the GDR width for ^{88}Mo in the investigated temperature region, whereas the experimental data seem to show a weaker increase, although the error bars do not allow for a firm conclusion. Also a comparison with the results of a phenomenological expression based on the existing systematics, mainly for lower temperature data, is presented and discussed. A possible onset of a saturation of the GDR width was observed around T = 3 MeV.