SYSTEMATICS OF THE GIANT DIPOLE RESONANCE WIDTHS OF NUCLEI WITH THE NUMBER OF NUCLEONS ≥ 40

Kapitonov I.M.
D.V.Skobeltzyn Institute of Nuclear Physics and Faculty of Physics of M.V.Lomonosov Moscow State University, Russia
E-mail: igor-kapitonov@yandex.ru

Analyzed all the available experimental data on photonuclear cross sections in mass numbers $A \geq 40$. Systematics of the Giant Dipole Resonance (GDR) widths of medium and heavy nuclei is created (see figure) based on the 192 total photonucleon and photoabsorption cross sections for the 121 nuclei. Width was considered as the energy interval within which cross section exceeded half its maximum value. The width of the GDR reaches its minimum (4 to 5 MeV) in spherical nuclei with a magic number of protons and/or neutrons. In heavy nuclei ($A > 120$) the main reason of increasing width of the GDR in comparison with magic value (4 to 5 MeV) is the deviation form the nucleus from the spherical (effect of Danos-Okamoto) and this increase is proportional to the modulus of quadrupole deformation of the nucleus in the ground state (see the appropriate I.M. Kapitonov's thesis to this conference).

Further analysis showed that the main factor of increasing the width of the GDR for nuclei with A = 46-115 compared to magic ones is the dipole-quadrupole friction - decay of doorway dipole states to states of more complex nature, arising due to connection of dipole oscillations with quadrupole vibrations of the nuclear surface.