

Search for the Giant Pairing Vibrations

Bogdan Fornal et al.

Institute of Nuclear Physics Polish Academy of Sciences, Kraków

It has long been predicted that in nuclei there should exist a collective mode of excitation based on the coherent superposition of 2-particle (or 2-hole) states in the second major shell above the Fermi surface (it is analogous to the giant resonances of nuclear shapes which involve the coherent superposition of p-h excitations). This mode is called Giant Pairing Vibration (GPV) and should manifest itself as a concentration of strength, with $L=0$ character, in the high-energy region (~ 10 MeV) of the pair-transfer spectrum. Despite efforts using conventional transfer reactions, the GPV has never been identified.

We would like to undertake a search for GPV by using the (p,t) neutron-pair transfer reactions on various targets and at various beam energies. A proton beam would be delivered from the cyclotron at the Centrum Cyklotronowe Bronowice. As the GPV may have a gamma-decay branch, we propose to measure coincidences between the outgoing tritons and gamma rays emitted from the pair-transfer product in the energy range of 4 - 20 MeV. Tritons would be detected in a set of silicon telescopes covering a sizable solid angle. Gamma rays would be measured with the help of an array consisting of BaF_2 and LaBr_3 scintillator detectors.