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Gamma decay of the isovector giant dipole resonance of ^{90}Zr and its finestructure

The giant resonance(GR) is a collective mode of nuclei. Our group has researched giant resonances of many kinds of nuclei such as Ca, Zr, Pb with high energy resolution by using Grand Raiden magnetic spectrometer[1]. These days their excitation mechanism, for example sum rule and electric dipole polarizability, is well researched[2]. But the decay mechanism of GRs still has large ambiguity. Research on gamma decay of GRs can give us its damping information which reflects the nuclear finestructure.

This summer we plan to measure the gamma decay from the IVGDR in ^{90}Zr via $(p, p'\gamma)$ reaction. The experiment will be performed at the Research Center for Nuclear Physics, Osaka University in Japan and make a coincidence between Grand Raiden spectrometer and $LaBr_3$ detectors to catch the gamma ray from thr GDR. 10 nA proton beam which is accelerated to 400 MeV by K400 ring cyclotron will be bombarded to 4 $\mathrm{mg/cm^2}$ thickness ^{90}Zr target. ^{90}Zr is excited by coulomb excitation and we analyze the scattered proton at extreme forward angle including zero degree. The excitation energy acceptance of spectrometer will be 7-33 MeV, which fully covers the bump of the GDR. Since the gamma decay branching ratio to ground state from the GDR is expected to be very small(of the order of 10^{-2}), we need an effective gamma ray detection system. We will use 12 large volume (89 mm ϕ * 203 mm length) $LaBr_3$ detectors which were developed by Milano group[3] and they will cover 30% of 4pi. It will be the first time in the world to measure the gamma decay of the GDR with high excitation energy precision. In this presentation I will give a talk about the experimental result and discuss about the giant resonance decay physics.

References:
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