# Frontiers in Gamma Ray Spectroscopy FIG18

Contribution ID : 73

# Measurement of gamma rays from both hadronic and electromagnetic decay of giant resonance of 12C and 16O

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**Content** :

We have carried out an experiment E398 at RCNP (Osaka) to measure
gamma rays from both hadronic decay and direct electromagnetic decay of
giant resonance of 12C and 16O using 392-MeV proton beam, high-resolution
magnetic spectrometer Grand-Raiden and an array of NaI(Tl) counters.
We first confirmed the consistency of our cross section of the known levels
(12.71MeV, 15.11MeV) with the previous measurements. Then, we measure
the gamma emission probability \Gamma_{\gamma}/\Gamma at each 2 MeV step
for 16<Ex<34MeV. The gamma emission probability for the giant resonance of 12C
increases from 0 at Ex=16MeV to 0.7 at Ex=27 MeV and then begins to decrease.
The measurement is compared to the statistical model calculation.
We also observe the direct electromagnetic decay from the giant resonance of 12C
to be about 0.28+-0.04(stat) % for 22<Ex<26MeV, where GDR resonances are known to be
there,
while we observe no significant direct decays for 16<Ex<22MeV, where there are higher
multipole resonances
(JP=2-, 3-). This is the first systematic measurement of gamma rays from both
hadronic decay and electromagnetic (direct) decay of the giant resoance of 12C (and
16O) over the
excitation energy 16MeV<Ex<34MeV.
We apply our measurement for the estimation of gamma rays induced by
neutrino bursts from supernova explosion.



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