The Oslo Method and its Application on the Magic Shell $^{205\text{-}208}$Pb Nuclei

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The Oslo Cyclotron group has developed a method to extract primary γ-ray spectra at various excitation energies [1]. From the set of primary γ-ray spectra nuclear level densities and radiative strength function can be extracted [2].

So far the method has been tested on rare earth and mid shell nuclei. However to check the robustness of the method it has to be applied on the nuclei where statistical properties are less favorable i.e., lighter nuclei and closed shell nuclei. The reported results of lighter ^{27,28}Si nuclei [3] showed that even though the basic assumptions of the method, i.e., the spin and parity distributions should be similar for all excitation energy bins and that the nucleus should thermalize at each step within a given γ cascade, thought to be violated, but the method succeeded to reproduce the results, nuclear level density, in accordance with the known levels.

A similar approach is been used for $^{205\text{-}208}$Pb to put an applicability limit to the method. The comparison of preliminary results to the known data gives a good agreement within experimental resolution.

The experiments were performed at Oslo cyclotron laboratory. The main reactions being studied are;

^{208}Pb(^{3}He, ^{3}He) ^{208}Pb
^{208}Pb(^{3}He, ^{4}He) ^{207}Pb
^{206}Pb(^{3}He, ^{3}He) ^{206}Pb
^{206}Pb(^{3}He, ^{4}He) ^{205}Pb

The experiments and analysis method will also be discussed briefly. Experimental data for ^{205,206,207,208}Pb nuclei will be shown.

References:

[1] Guttormsen M, Ramsøy T, Rekstad J 1987 *Nucl. Instrum. Methods Phys. Res*. A 255, 518
[2] Schiller A, Guttormsen M, Siem S 2000 *Nucl. Instrum. Methods Phys. Res.* A 447, 498
[3] Gutormsen M, Melby E, Rekstad J, Siem S, Schiller A, Lønnroth T and Voinov A 2003 *J. Phys. G: Nucl. Part. Phys.* 29, 263