Heating Nuclei in the Mass Region of $A \sim$ 40 - 50

A.C. Sunde[1], R. Chankova[1], M. Guttormsen[1], F. Ingebretsen[1], T. Lönnroth[2], S. Messelt[1], J. Rekstad[1], A. Schiller[3], S. Siem[1], N.U.H. Syed[1], A. Voinov[4], S.W. Ødegård[1]

[1] Department of Physics, University of Oslo, P.O.Box 1048 Blindern, N-0316 Oslo, Norway

[2] Department of Physics, Åbo Akademi University, FIN-20500 Åbo, Finland

[3] Lawrence Livermore National Laboratory, L-414, 7000 East Avenue, Livermore, California 94551, USA

[4] Frank Laboratory of Neutron Physics, Joint Institute of Nuclear Research, 141980 Dubna, Moscow region, Russia

[5] Department of Physics and Astronomy, Ohio University, Athens, OH 45701, USA

Phase transitions in small systems are an important research topic. In nuclear physics, two different phase transitions have been discussed in the literature. A first-order phase transition has been reported in the multifragmentation of nuclei [1], thought to be the analogy of a liquid-gas phase transition in a macroscopic system. The other phase transition discussed and anticipated is the transition from a phase with strong pairing correlations to a phase where the nucleon Cooper pairs are broken [2].

The Oslo Cyclotron group has developed the so-called Oslo method, which gives the opportunity of extracting both level density and γ-strength function in one and the same experiment from primary γ spectra. The method relies on the Brink-Axel hypothesis [3,4], which states that the primary γ spectrum is proportional to both the level density and the radiative transmission coefficient. Besides their fundamental importance in nuclear structure, level densities are the starting point to study thermodynamic properties. The nuclear radiative strength function, which can be derived from the γ-transmission coefficient, characterizes the average electromagnetic properties of excited nuclei.

In this talk experimental level densities and radiative strength functions of nuclei in the mass region of $A \sim$ 40 - 50 will be presented. The entropy curves derived from the level densities will be discussed from the point of view of breaking Cooper pairs.

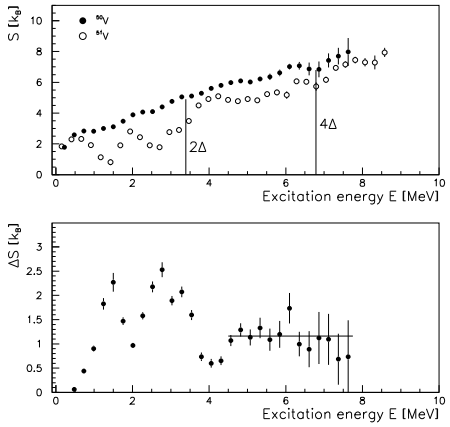

Figure 1: *Experimental entropy curves for the nuclei* ^{50}V *and* ^{51}V.

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