Supervisor's report on PhD thesis of Ingrid Knapová
"Study of gamma decay in ^{168}Er from neutron capture“

Our group at the Charles University has long been studying the properties of (i) the γ decay of atomic nuclei above excitation energy of one or two MeV – in the region where the information on levels is incomplete and the decay is typically described within the statistical model using concepts of photon strength functions (PSFs) and nuclear level density (NLD) – and (ii) the statistical properties of neutron resonances. To this aim we process and interpret γ-ray data from radiative capture of slow neutrons. One of the sources of valuable experimental data usable for both these topics is the DANCE highly-segmented BaF_2 detector at the Los Alamos National Laboratory. The main topic of the PhD thesis of Ingrid Knapová has been analysis and interpretation of data from the resonance neutron capture on ^{167}Er measured with this detector.

The acquired data from γ decay of ^{168}Er can be used for several different purposes – (i) to determine spins of formed s-wave neutron resonances, (ii) to study PSFs and NLD in this nucleus using so-called multistep-cascade spectra, and (iii) to check the prediction of a population of the K-isomeric state, occurring in the nucleus, within the statistical model. In particular the last issue is very interesting as the statistical model has great difficulty reproducing the observed population of K-isomeric states. Determination of resonance spins for several tens of the lowest neutron resonances then allowed to check the consistency of their positions against the predictions of the Random Matrix Theory (RMT).

Ingrid Knapová participated in all phases of data processing during her PhD studies – from being present on the measurement, through the complete data analysis and interpretation to writing publications for a peer-reviewed journal. She was active and independent at all these stages. The analysis of isomeric state population data from DANCE detector has been performed in our group for the first time. Therefore, a complete methodology had to be developed. Her PhD study should result in two papers in Physical Review C, where she is the first author. At the moment one of the papers – related to the determination of spin of resonances and comparison of their statistical properties with the RMT predictions – is accepted for the publication. Another one that deals with PSFs and NLD tests and population of the isomer is in the review process. In the course of her work, she had to gain a deep understanding of the description of γ decay in the framework of the statistical model, as well as of various statistical properties of neutron resonances. In addition to analysis of data from the resonance neutron capture on ^{167}Er she also partly participated in the analysis of multistep cascades data following neutron capture on ^{195}Pt – the results were also published in Physical Review C.

In my opinion Ingrid Knapová, has demonstrated her ability to perform independent and creative scientific work. Therefore, I fully recommend that she be award with the PhD degree.

Prague, September 1, 2022

doc. Milan Krtička, PhD.