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Faculty of Mathematics, Physics and Informatics

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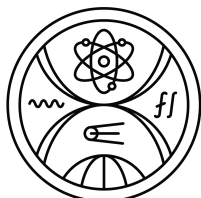
**Meno a priezvisko študenta:** Gulnur Kantay  
**Študijný program:** Nuclear and Subnuclear Physics (Single degree study, Ph.D. III. deg., full time form)  
**Študijný odbor:** 13. Physics  
**Typ záverečnej práce:** Dissertation thesis  
**Jazyk záverečnej práce:** English  
**Sekundárny jazyk:** Slovak

**Title:** Shape coexistence in the vicinity of  $Z = 28$  closed shell: structure of the  $^{58}\text{Ni}$  and  $^{61}\text{Cu}$  isotopes

**Abstrakt:** The dissertation thesis presents the results of the in-beam spectroscopic study of the  $^{58}\text{Ni}$  and  $^{61}\text{Cu}$  isotopes. The experiment was performed at the 6 MV Tandem accelerator in Trnava carried out by the Department of Nuclear Physics, The Slovak Academy of Science in collaboration with the Faculty of Materials Science and the Technology in Trnava, The Slovak University of Technology in Bratislava. The excited states of the  $^{58}\text{Ni}$  isotope were observed via  $(\alpha, \alpha')$  reaction. The new  $\gamma$ -decay is reported as a good candidate for the observation of the new excited  $0^+$  state in the  $^{58}\text{Ni}$  isotope. The excited states of the  $^{61}\text{Cu}$  isotope were observed by the  $(\alpha, p)$  reaction. A total of 12  $\gamma$ -rays, marked as uncertain in the Nuclear Data Sheets, were identified in the Trnava experiment. Five new  $\gamma$ -transitions are reported for the first time. The  $\gamma$ -transition, marked as uncertain in the Nuclear Data Sheets, was observed in  $^{61}\text{Ni}$ . The analysis of other channels of the  $^{58}\text{Ni} + \alpha$  reaction from the Trnava experiment was conducted, and the results are presented.

Dizertacná práca prezentuje výsledky in-beam spektroskopického štúdia izotopov  $^{58}\text{Ni}$  a  $^{61}\text{Cu}$ . Experiment sa uskutočnil na 6 MV Tandemovom urýchľovaci v Trnave, ktorý realizovalo Oddelenie jadrovej fyziky SAV v spolupráci s Materiálovotechnologickou fakultou STU so sídlom v Trnave. Excitované stavy izotopu  $^{58}\text{Ni}$  boli pozorované prostredníctvom reakcie  $(\alpha, \alpha')$ . Nový  $\gamma$ -prechod predstavuje vhodného kandidáta na pozorovanie novonavrhnutého excitovaného stavu  $0^+$  v izotope  $^{58}\text{Ni}$ . Excitované stavy izotopu  $^{61}\text{Cu}$  boli populované reakciou  $(\alpha, p)$ . V experimente z Trnavy bolo identifikovaných celkovo 12  $\gamma$ -prechodov pre izotop  $^{61}\text{Cu}$ , pôvodne označených v literatúre ako neurčitý. Navyše, pozorovali sme päť nových  $\gamma$ -prechodov pre izotop  $^{61}\text{Cu}$ . Jeden  $\gamma$ -prechod, označený ako neurčitý v literatúre, bol pozorovaný v  $^{61}\text{Ni}$ . Bola vykonaná analýza ďalších reakčných kanálov  $^{58}\text{Ni} + \alpha$  experimentu v Trnave a tieto výsledky sú tiež uvedené v práci.

The dissertation thesis presents the results of the in-beam spectroscopic study of the  $^{58}\text{Ni}$  and  $^{61}\text{Cu}$  isotopes. The experiment was performed at the 6 MV Tandem accelerator in Trnava carried out by the Department of Nuclear Physics, The Slovak Academy of Science in collaboration with the Faculty of Materials Science and the Technology in Trnava, The Slovak University of Technology in Bratislava. The excited states of the  $^{58}\text{Ni}$  isotope were observed via  $(\alpha, \alpha')$  reaction. The new  $\gamma$ -decay is reported as a good candidate for the observation of the new excited  $0^+$  state in the  $^{58}\text{Ni}$  isotope. The excited states of the  $^{61}\text{Cu}$  isotope were observed by the  $(\alpha, p)$  reaction. A total of 12  $\gamma$ -rays, marked as uncertain in the Nuclear Data Sheets, were identified in the Trnava experiment.



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**Dátum odovzdania: 31.05.2024**

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Študent