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Spectroscopic study of decay properties of transfermium isotopes in Dubna

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Important information on the structure of Super Heavy Elements (SHE) can come from the study of lighter deformed transfermium (Z ˜ 100–106) elements. The cross-section for the formation of these nuclei is many orders of magnitude higher than for Z ≥ 110 so that detailed spectroscopy becomes possible.
The opportunity to have high intensity (>1 pμA) accelerated beams with A ≤ 50 together with the use of exotic targets provide the possibility to study many aspects of heavy ion induced reactions exploiting new generation of high efficiency, high resolution experimental setups.
In recent years α-, β- and γ- spectroscopy of heavy nuclei at the focal plane of recoil separators ("decay spectroscopy") has been very intensively developed. The mixing of α decay with γ and β decay spectroscopy allows to investigate single particle states behavior as well as the structure of little known elements in the Z = 100–104 and N = 152–162 region.
Using SHELS recoil separator and GABRIELA (Gamma Alpha Beta Recoil Invetsigations with the ELectromagnetic Analyser) detector set-up the experiments aimed to the gamma and electron spectroscopy of the Fm –Db isotopes, formed at the complete fusion reactions with heavy ions 22Ne, 48Ca, 50Ti and 54Cr were performed at FLNR JINR.
At the years 2017–2019 we performed model experiments using method of high resolution alpha, EC and γ spectroscopy to study decay properties of 254,255,256,257Rf in the reactions 50Ti + 206,207,208Pb ⟶ 256,357,258Rf, *250,252,254No in the reactions 48Ca + 204,206,208Pb ⟶ 252,354,256No* and 256No in the reaction 22Ne + 238U ⟶ 260No*.
Future developments and perspectives of experimental studies in spectroscopy of heavy and superheavy elements are discussed.

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