Contribution ID: **216** Type: **Oral Presentation**

Study of superheavy nuclei with S3

The study of superheavy nuclei has progressed in the last decade with new techniques. In addition to the findings of decay spectroscopy studies [1], the measurement of masses [2] and charge radii [3] have become possible in the fermium-nobelium region, providing new information necessary for the comprehension of the heaviest nuclei. In parallel, a strong international competition is ongoing to produce elements 119 and 120.

However, spectroscopy in the region of high masses is still very close to the limits of the existing detection systems. The isotopes investigated are still the same since the beginning of the investigation of 254No. In order to extend the study to higher Z and A, increasing the production and detection rates of transfermium isotopes, the efficiency of the separator and detection instrumentation must be improved.

This is the goal of the Super Separator Spectrometer S3 [4]. It is currently under completion at the LINAC of SPIRAL2. The LINAC will provide very high intensity stable beams with its upcoming injector NEWGAIN [4], and S3 is designed to efficiently use these beams. Its mass resolving power associated with a high transmission make it a unique tool for identification and decay spectroscopy of superheavy nuclei. The increased sensitivity will allow to study single particle excited states in heavier nuclei, closer to the limits in mass.

This contribution will develop the physics program envisaged for the study of superheavy nuclei at S3 its various instruments, coming online in the next years. An update on the actual status of S3 and its detection instrumentation will be given.

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[4] F. Dechery et al., Nucl. Inst. Meth. B 376 (2016) 125.
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Session Classification: Parallel session

Track Classification: Accelerators and Instrumentation