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High Precision Gamma Spectroscopy of double Lambda Hypernuclei at the PANDA Experiment

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Hypernuclear research will be one of the main topics addressed by the PANDA experiment at the planned Facility for Antiproton and Ion Research FAIR at Darmstadt (Germany).

Thanks to the use of stored antiproton beams, copious production of double Lambda hypernuclei is expected at the PANDA experiment, which will enable high precision gamma spectroscopy of such nuclei for the first time.

At PANDA excited states of Xi- hypernuclei will be used as a starting point for the formation of double Lambda hypernuclei. In order to predict the yield of particle stable double hypernuclei a microcanonical decay model was developed.

For the detection of these nuclei, a devoted hypernuclear detector setup is planned. This set-up consists, in addition to the general purpose of the PANDA set-up, of a primary nuclear target for the production of Xi- + Xibar pairs, a secondary active target for the hypernuclei formation and the identification of associated decay products and a germanium array detector to perform gamma spectroscopy. Furthermore, the presence of Xibar can be used as an alternative to tag the strangeness in the Xi- + Xibar production channel. Moreover, one of the most challenging issues of this project is the fact that all detector systems need to operate in the presence of a high magnetic field and a large hadronic background.

In the present talk details concerning the identification procedure of double hypernuclei and the suppression of background will be presented. In addition, the current status of the activities related to the detector developments for this challenging programme will be briefly given.

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