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Future fission experiments at the Oslo Cyclotron laboratory

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Abstract. Fission is one of the five Research Themes in the newly established Norwegian Nuclear Research Centre [1]. The new improved experimental set-up for fission experiments at OCL will be presented and plans for new experiments. A new target chamber dedicated for fission experiments with actinide targets has been designed and is now being built. Also a new array of solid-state detectors for fission fragments, designed and built by collaborators in Hungary [2], will be replacing the previous gas-filled detectors (PPACs) and are planned to be tested as soon as the new target chamber is ready. One of the planned experiments is to compare different initial spin of the fissioning system by comparing proton and alpha induced fission data. Previously we have measured prompt fission gammas (PFG), as a function of excitation energy, at OCL using the CACTUS array (NaI detectors) and PPAC fission detectors [3,4]. With CACTUS it was not possible to separate out the contribution from neutrons from the prompt fission gamma rays experimentally, so assumptions had to be made regarding the contribution from neutrons in the PFG spectra. With the new detector array OSCAR, consisting of 30 large volume LaBr₃ detectors, with excellent timing, we can now distinguish neutrons and gamma rays using time of flight. By repeating one of the experiments run with CACTUS, we can measure the neutron contribution using OSCAR and the new fission set-up and use this to make a “recipe” to correct the CACTUS data. In the past we have performed many experiments on actinide targets with the gamma detector array CACTUS, mainly to measure nuclear level densities and photon strength functions and using the PPAC fission detector only as a veto. These data can with this “recipe” be re-analysed to get the PFGs. We would also like to take the opportunity to discuss possible new experiments at OCL with the fission experts at this conference.

[1] Norwegian Nuclear Research Centre: <http://www.nnrc.uio.no>

[2] L. Csige and M. Hunyadi et al., Institute for Nuclear Research, Hungary

[3] S. J. Rose, F. Zeiser, J.N. Wilson, A. Oberstedt, S. Oberstedt, S. Siem, G. M. Tveten et al., Phys. Rev. C 96, 014601 (2017),

[4] D. Gjestvang, S. Siem, F. Zeiser, J. Randrup, R. Vogt, J.N. Wilson et al., Phys. Rev. C 103, 034609 (2021)

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