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Experiments Synthesizing Super-heavy Fl and Og Isotopes with Target Materials From ORNL Irradiated at JINR, Dubna

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More than 50 super-heavy nuclei, which have been identified in fusion-evaporation reactions between 48Ca beams and actinide targets [1,2], form what is known as the 'Hot Fusion Island' - a part of the Island of Stability. Most of these nuclei have been discovered in experiments at the Dubna Gas Filled Recoil Separator (DGFRS), using actinide target materials produced at Oak Ridge National Laboratory[3]. These studies have been recently augmented by using a new highly segmented Si detector and digital detection system[4,5] commissioned by the ORNL-UTK team and implemented at the DGFRS. The system has robust analysis capabilities, especially for very short lived activities, and detection efficiency at high beam rate.
The utility of this new system will be detailed by discussing the observation of heavy and super-heavy recoils and the subsequent alpha and/or spontaneous fission radiations. The measurement of several Th activities from the 48Ca + natYb calibration reaction will be shown including activities on the order of 1 μs. Spontaneous fission and alpha decay of heavy implants observed during irradiations of Pu and Cf targets will be shown. This includes the discovery of a new Flerovium isotope[5], recent observations of 294Og, as well as details of the experiment running through February 2017 which may attempt to synthesize a chain of alpha activities which would connect the 'Hot Fusion Island' to the 'Nuclear Mainland'.
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