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SHE facility at RIKEN, construction, commissioning and present status

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To synthesize a new superheavy element, $Z=119$, the RIKEN Nishina Center (RNC) upgraded the existing heavy ion linac system (called RILAC) by partially replacing the superconducting linear accelerator (SRILAC) to increase the final beam energy from 5.5 MeV/u to 6.5 MeV/u, enabling a hot fusion reaction of $51V+248Cm$. The new Superconducting Electron Cyclotron Resonance Ion Source (SC-ECRIS), operating at a higher RF frequency to increase beam currents, was constructed. The new gas-filled recoil ion separator GARIS-III, suitable for hot fusion reaction residues, was also built. This upgrade project, the “SHE Project”, was completed in 2020. The project and its commissioning are described in detail in ref. [1].

After the commissioning of SRILAC, the first step was to measure the Coulomb barrier distribution for the $51V+248Cm$ system to select the optimal bombard energy of the 51V beam. The Coulomb barrier distribution was obtained using the quasi-elastic (EQ) backscatter cross sections at $\theta = 180^\circ$ with GARIS-III, which provided the mean Coulomb barrier height B_0 . The resulting B_0 value is 225.6 ± 0.2 MeV for the $51V+248Cm$ system [2].

The measurement of the synthesis of $Z=119$ was then started and is still ongoing.

This poster gives an overview of the SHE project and describes the current status of the facility operation and the problems encountered during the measurements.

[1] H. Sakai et al., Eur. Phys. J. A 58, 238 (2022).

[2] M. Tanaka et al., J. Phy. Soc. Jpn, 91, 084201 (2022).

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