

HAW14-2014-020282

Abstract for an Invited Paper  
for the HAW14 Meeting of  
the American Physical Society

### **Fission data by surrogate reactions**

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A project of the fission data measurement for actinides (fragment mass distribution, cross sections and neutron multiplicities) using multi-nucleon transfer reactions is running at Japan Atomic Energy Agency (JAEA). Actinide targets such as  $^{238}\text{U}$  and  $^{232}\text{Th}$  were irradiated with  $^{18}\text{O}$  beam and fission induced by a nucleon transfer was observed. The experiment was performed at the tandem accelerator facility of Japan Atomic Energy Agency. A target of  $^{232}\text{Th}$  ( $\sim 150 \mu\text{g}/\text{cm}^2$ ) and  $^{238}\text{U}$  ( $\sim 80 \mu\text{g}/\text{cm}^2$ ) deposited on a  $100\text{-}\mu\text{g}/\text{cm}^2$  thick nickel foil was bombarded with  $157.7 \text{ MeV } ^{18}\text{O}$  beam. The scattered projectile-like nuclei were detected by a segmented  $\Delta\text{E}$ - $\text{E}$  silicon telescope located at the forward angle with respect to the beam. The thicknesses of  $\Delta\text{E}$  and  $\text{E}$  detector are  $75 \mu\text{m}$  and  $300 \mu\text{m}$ , respectively. From the scattered particle, the compound nucleus was identified. Fission fragments by multi-nucleon transfer fission were detected in coincidence using four multi-wire proportional counters (MWPCs) located at  $45$  and  $135$  degree with a distance of  $224 \text{ mm}$  from the target. Around the reaction chamber, 12 liquid scintillators were placed to detect the fission neutrons. Mass split of each fission event was determined using the mass and momentum conservation. We obtained the mass distributions for  $^{239,240}\text{U}$ ,  $^{239-242}\text{Np}$  and  $^{241-243}\text{Pu}$  using the  $^{238}\text{U}$  target and for  $^{232-234}\text{Th}$ ,  $^{233-236}\text{Pa}$  and  $^{237}\text{U}$  using the  $^{232}\text{Th}$  target. As well as the fission fragment mass distribution, fission cross sections by the surrogate ratio method and the fission neutron multiplicities will also be shown in the conference.