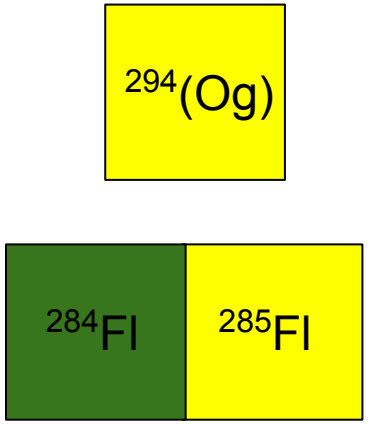
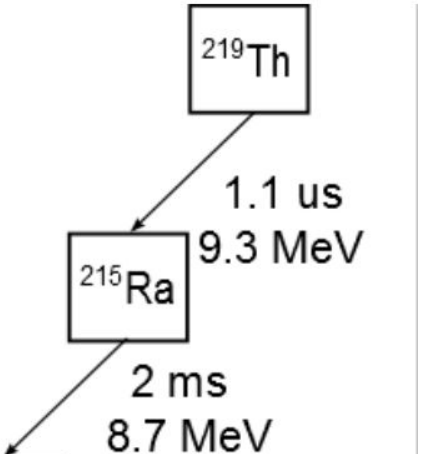
Characterization of new detection system and recent experiments at the Dubna Gas Filled Recoil Separator

V.K. Utyonkov[1], **N.T. Brewer[2,3,4,†]**, Yu. Ts. Oganessian[1] , K.P. Rykaczewski [2] , F.Sh. Abdullin [1] , S.N. Dmitriev [1] , R. Grzywacz [2,3,4] , M.G. Itkis[1] , K. Miernik [2,5] , A.N. Polyakov [1] , J.B. Roberto [2] ,R.N. Sagaidak [1] , I.V. Shirokovsky [1] , M.V. Shumeiko [1] , Yu.S. Tsyganov [1] , A.A. Voinov [1] , V.G.Subbotin [1] , A.M. Sukhov [1] , A.V. Sabelnikov [1] , G.K. Vostokin [1] , J.H. Hamilton [6] , and M.A. Stoyer [7]

1. JINR, Dubna, Russian Federation, 2. ORNL, Oak Ridge, TN, USA , 3. JINPA, Oak Ridge, TN 4.Univ. of TN, Knoxville, TN, USA 5. Univ. of Warsaw, Warsaw, Poland
6. Vanderbilt Univ., Nashville, TN, USA , 7.LLNL, Livermore, CA, USA





U.S. DEPARTMENT OF ENERGY

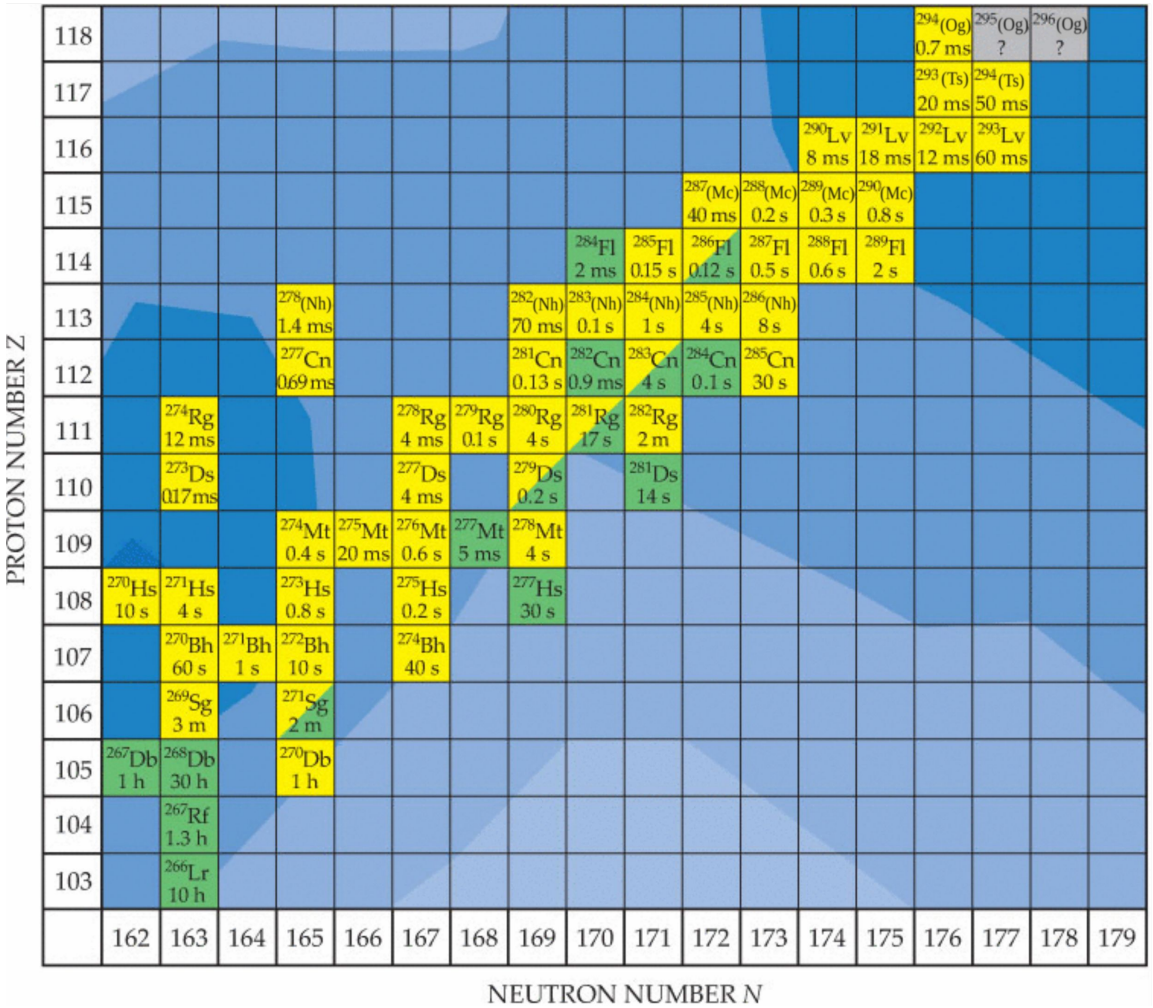
OAK RIDGE National Laboratory

Overview

- ORNL/UTK Contributions to the search for new SHE included Target Development , Detector Development, and Acquisition Development

Adapted From
Yu.Ts. Oganessian
(See Talk on Thursday)
and K.P. Rykaczewski, Physics Today 68(8), 32 (2015)

Showing new provisional names:
113, (Nh - Nihonium),
115, (Mc - Moscovium),
117, (Ts - Tennessine),
118, (Og - Ogannesson)



OAK RIDGE National Laboratory

ORNL - Radiochemical Engineering Development Center REDC

Mixed-Cf target ORNL 2014

~ 40 years old Cf-sources processed at REDC to obtain mixed-Cf material

^{249}Cf (351 y)	^{250}Cf (13 y)
7.6 mg	2.5 mg
48.1%	15.6%
^{251}Cf (898 y)	^{252}Cf (2.65 y)
5.7 mg	0.007 mg
30.3%	0.04%

work on mixed-Cf at REDC

example sector used in 2015/16 experiments

^{240}Pu (98.97%) target made at ORNL and shipped to JINR (~51 weeks to ship)

OAK RIDGE National Laboratory

ORNL-UTK detectors and digital data acquisition system

New detectors

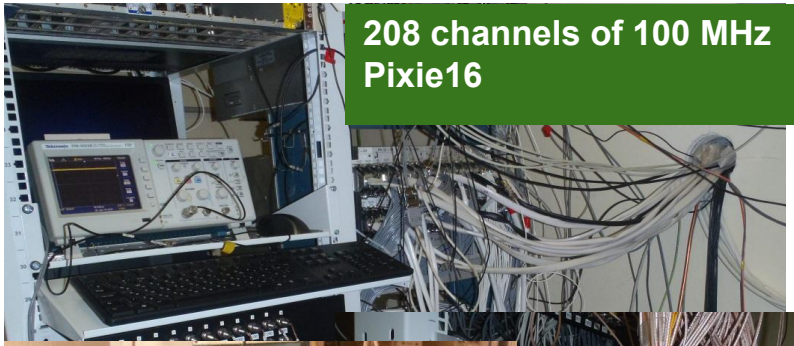
DSSD implantation counter

Si-detector stack

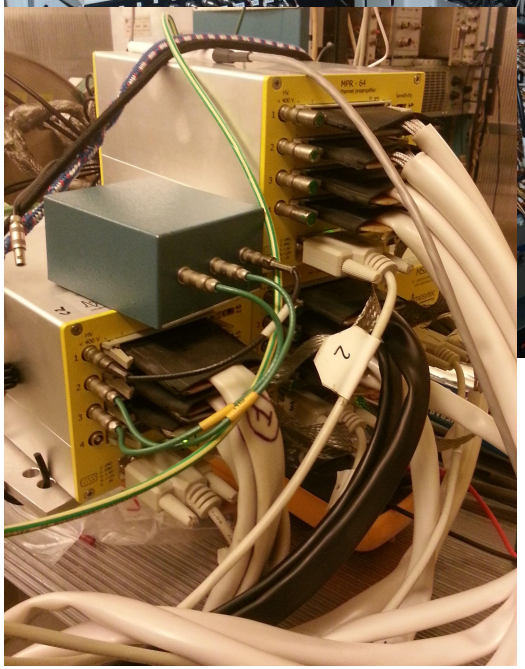
new detectors and temperature monitored preamps
at the focal plane of DGFRS.
Linear preamps with mixed gains in DAQ

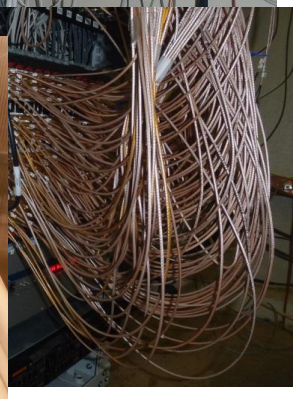
SEE POSTER for Additional Details

Digital ACQ



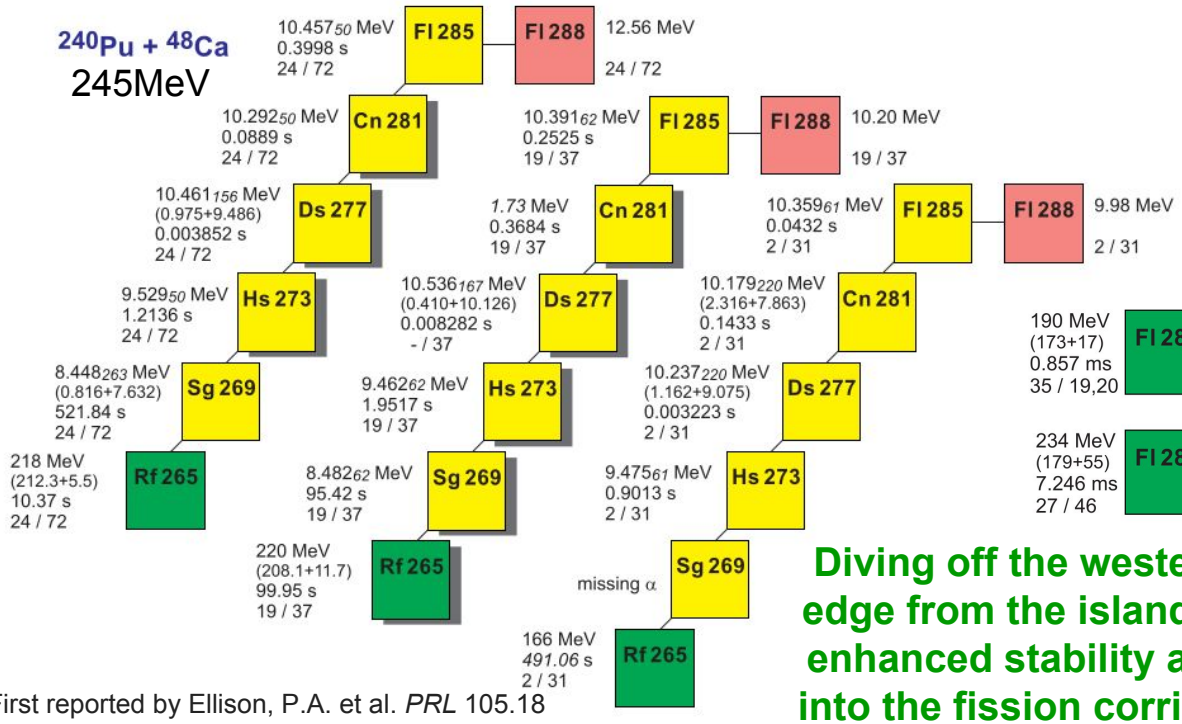
208 channels of 100 MHz Pixie16

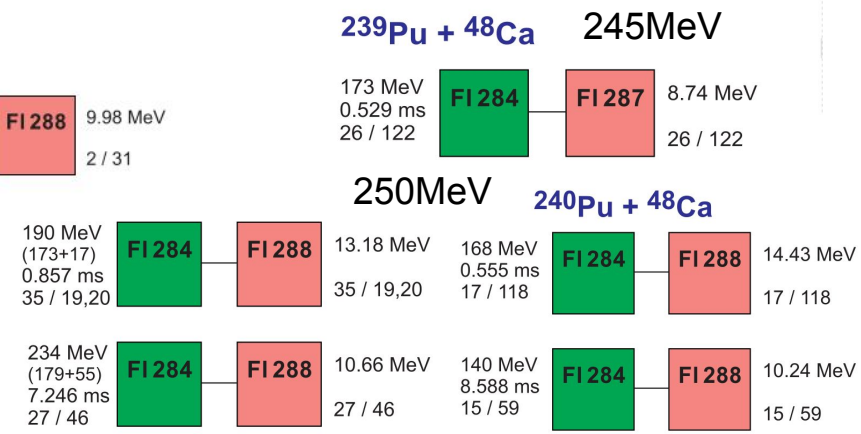




OAK RIDGE National Laboratory

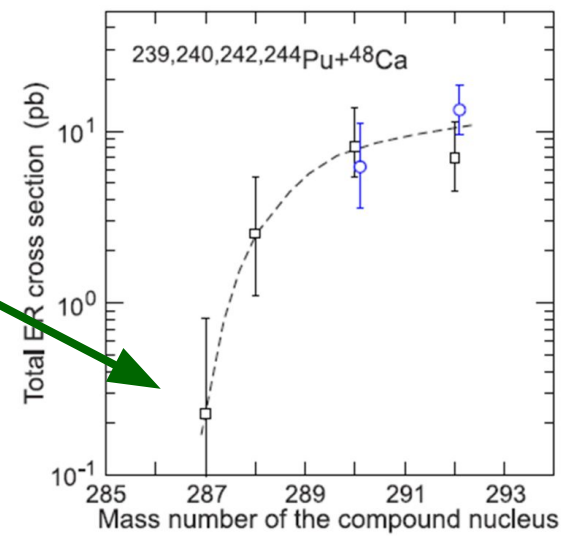
Main new results from ^{239,240}Pu experiments with ^{48}Ca beam



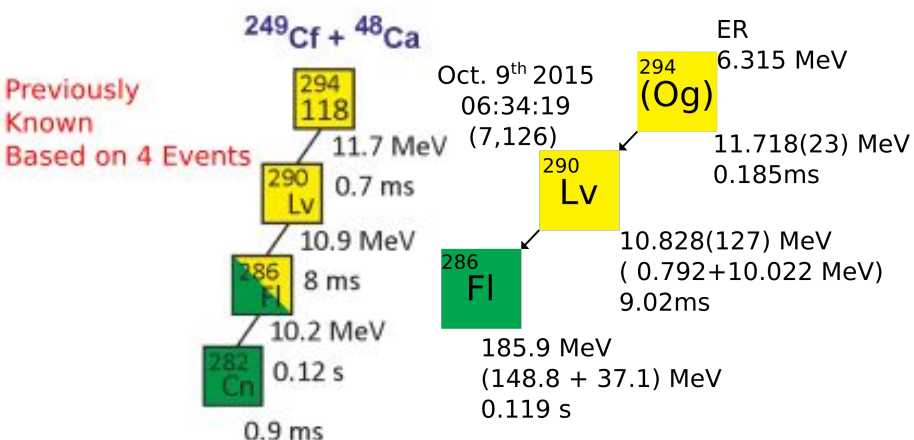


First reported by Ellison, P.A. et al. *PRL* 105.18 (2010)

Diving off the western edge from the island of enhanced stability and into the fission corridor



Results from ^{48}Ca on ^{mixed}Cf



OAK RIDGE National Laboratory

Thank you for your attention,

15 P Phosphorous	1 H Hydrogen	39 Y Yttrium	14 Si Silicon	6 C Carbon	53 I Iodine	16 S Sulfur	117 (Ts) Tennessine

OAK RIDGE National Laboratory