www.superheavies.de
c.e.duellmann@gsi.de

News from *TASCA*

Christoph E. Düllmann

for the *TASCA E120* collaboration

Johannes Gutenberg University Mainz

GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt

Helmholtz Institute Mainz

TASCA 11

10th Workshop on Recoil Separator for Superheavy Element Chemistry

GSI Darmstadt, Germany, October 14, 2011

TASCA

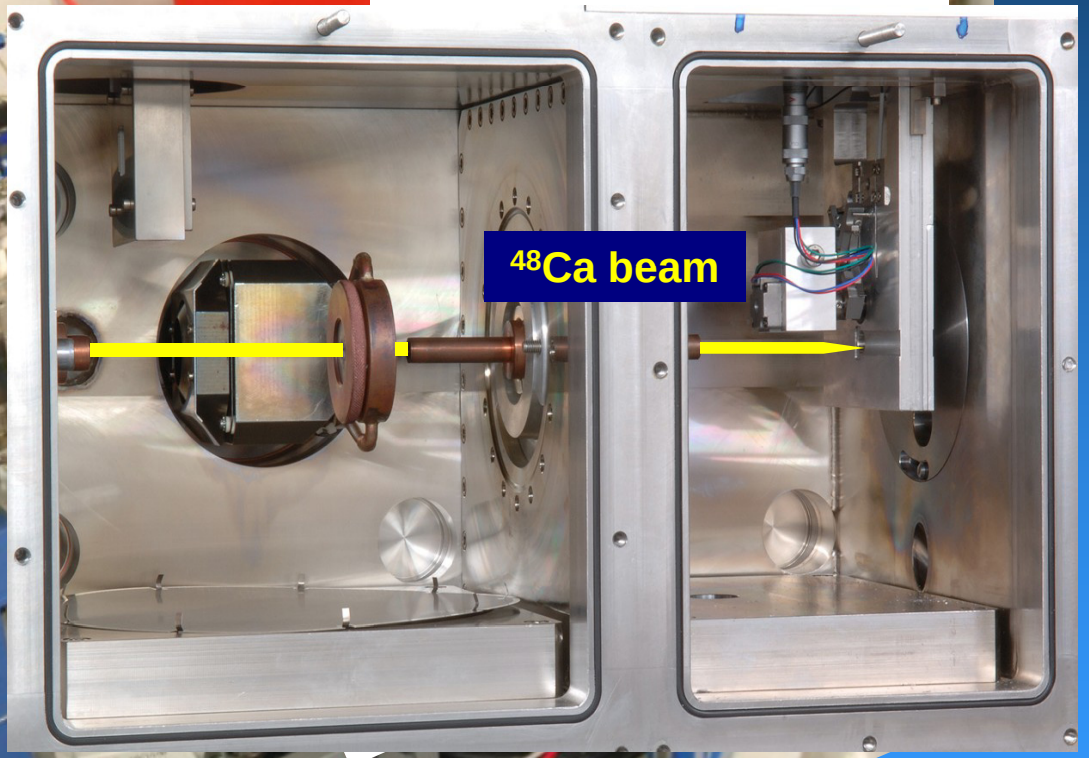
DQQ-configuration

$B\rho_{max} \simeq 2.4$ Tm

www.gsi.de/tasca

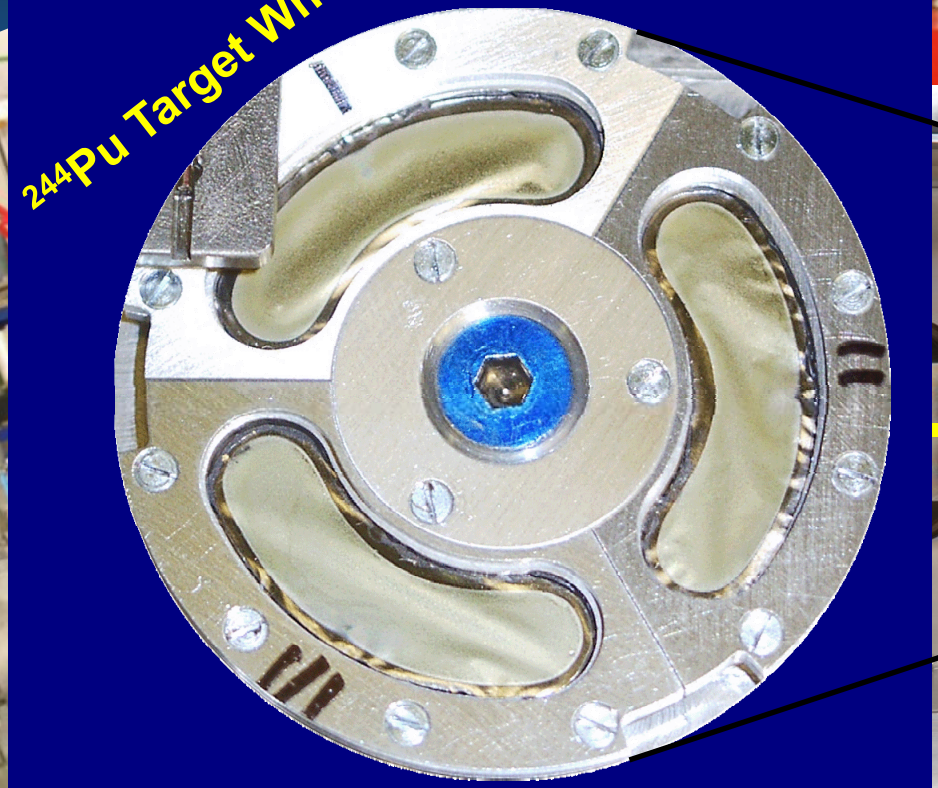
TASCA

Target Chamber
side view

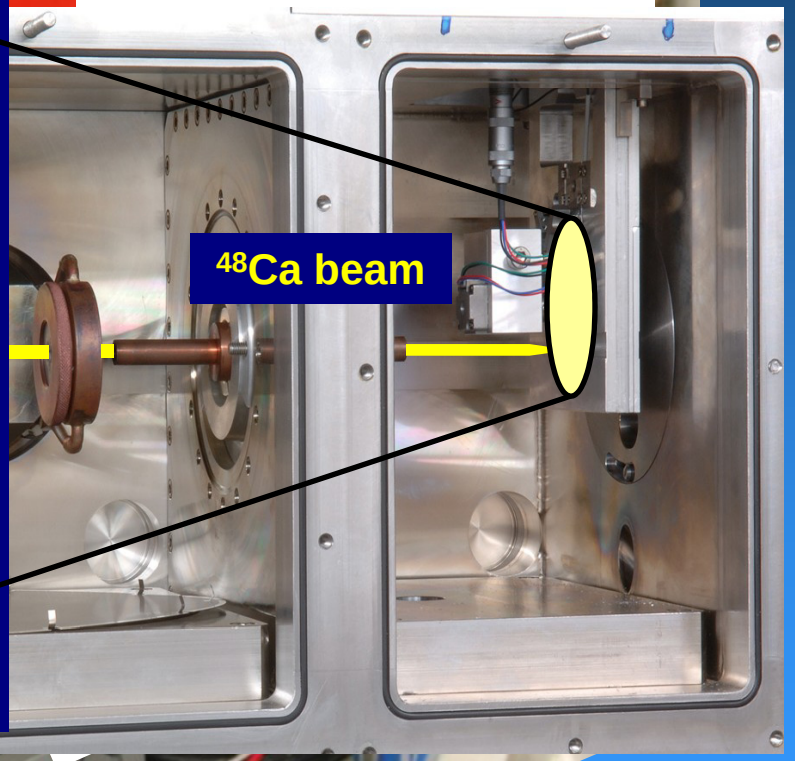


www.gsi.de/tasca

TASCA

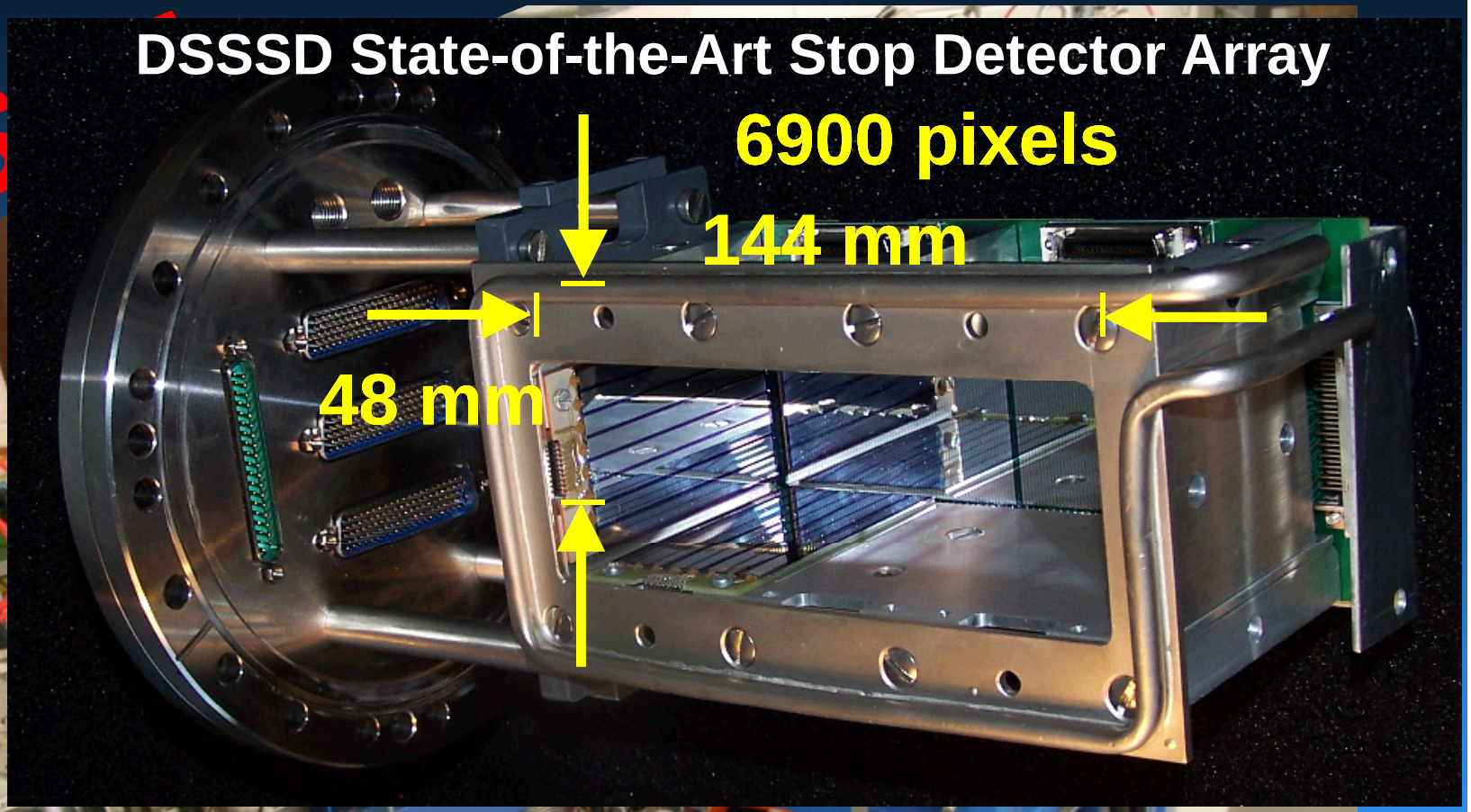


Target Chamber
side view



www.gsi.de/tasca

DSSSD State-of-the-Art Stop Detector Array

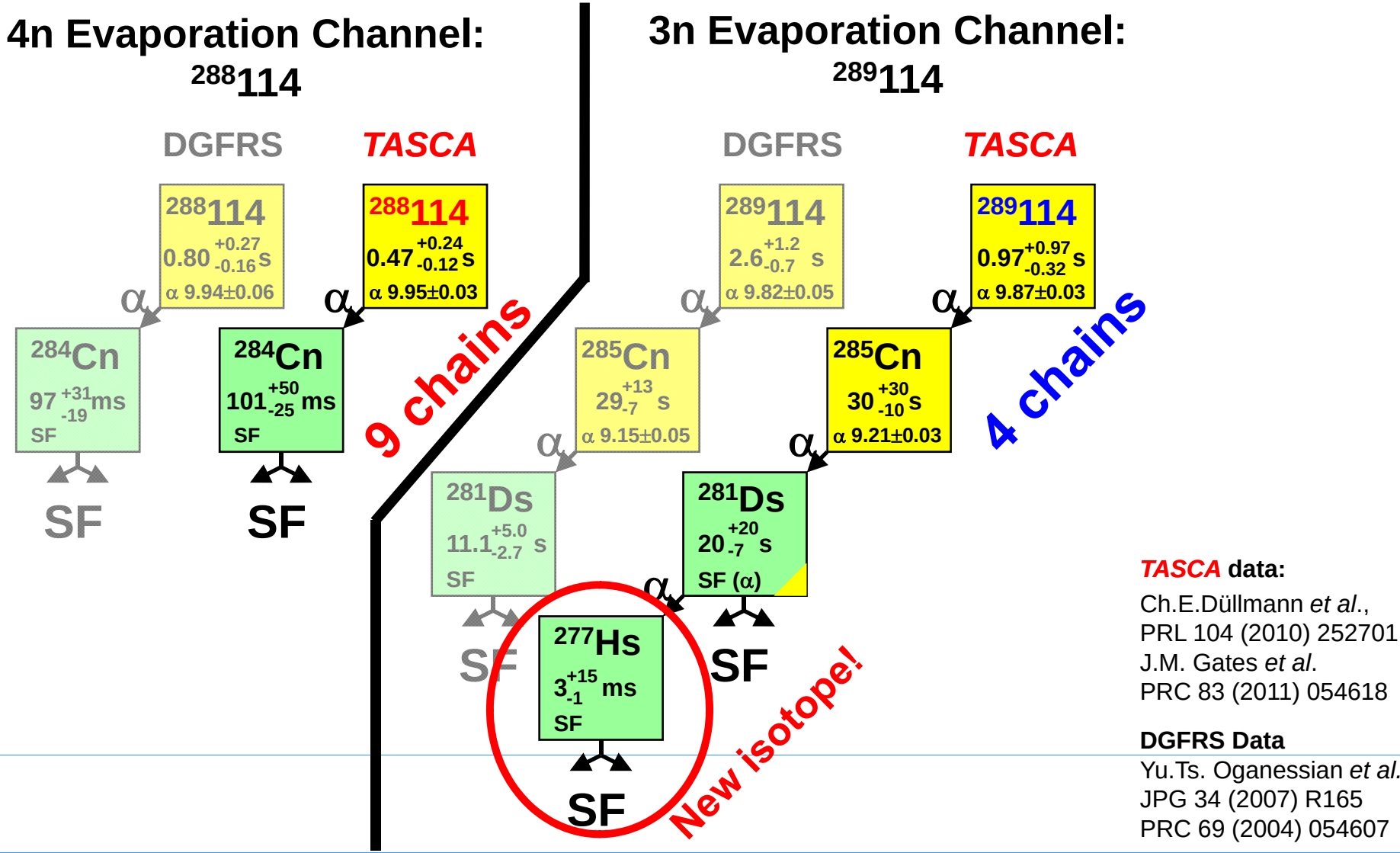


www.gsi.de/tasca

The Element 114 *TASCA* Experiment

13 Decay Chains in 22 Days → Highest SHE Detection Rate

$^{48}Ca + ^{244}Pu \rightarrow {}^{292}114^* \rightarrow {}^{288}114 + 4n$ / $^{289}114 + 3n$



***TASCA* data:**

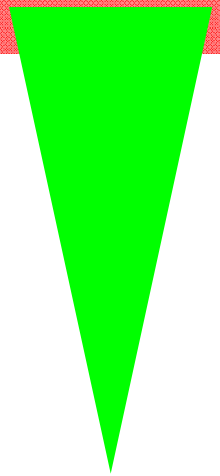
Ch.E.Düllmann *et al.*,
PRL 104 (2010) 252701
J.M. Gates *et al.*
PRC 83 (2011) 054618

DGFRS Data

Yu.Ts. Oganessian *et al.*,
JPG 34 (2007) R165
PRC 69 (2004) 054607

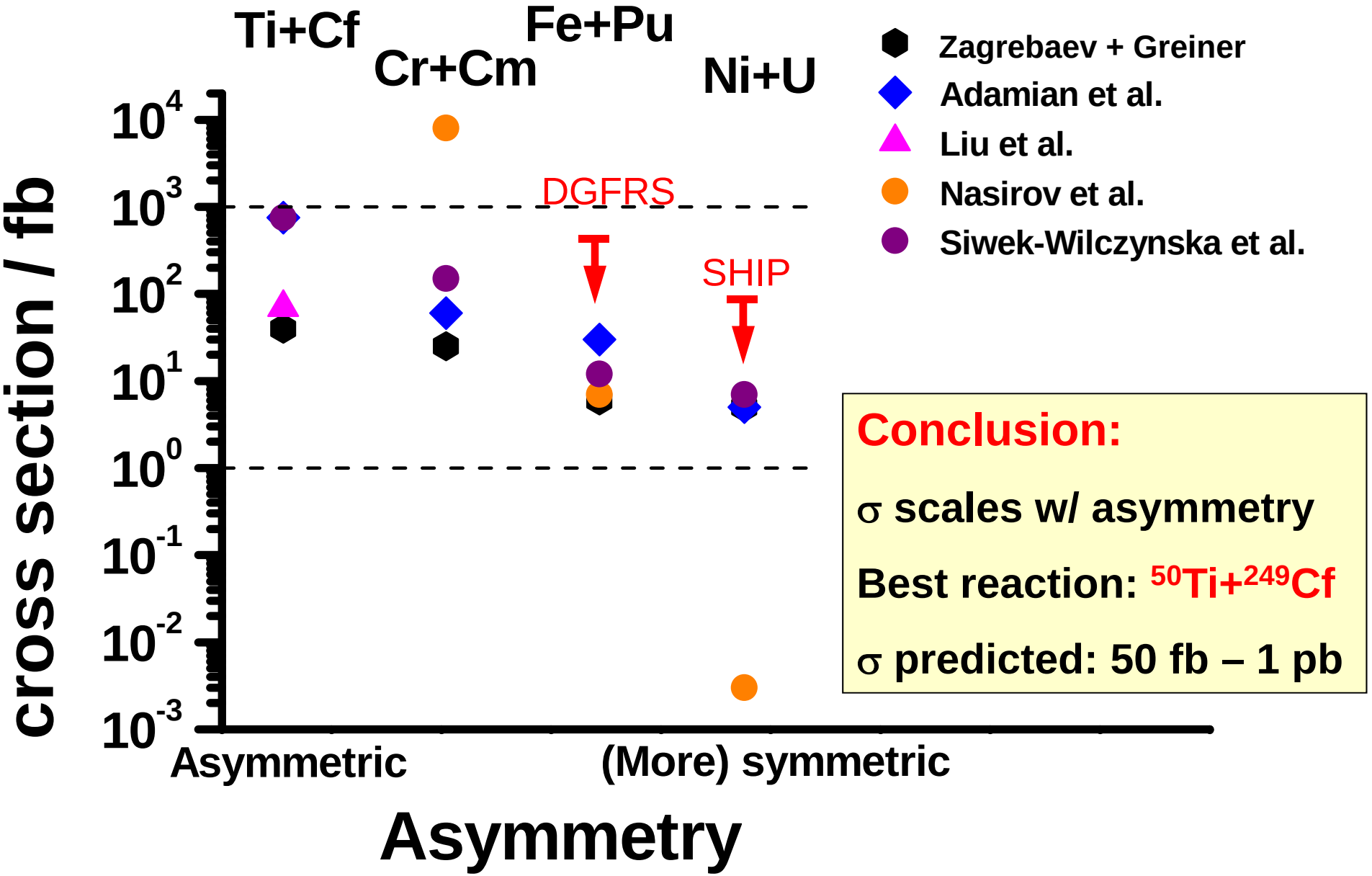
Making new elements

E120

Z_{Beam}	Beam	Target	Asymmetry	$E^*@B_{Bass}$
22	^{50}Ti	^{249}Cf		31.7
23	^{51}V	^{249}Bk		35.9
24	^{54}Cr	^{248}Cm		33.0
25	^{55}Mn	^{243}Am		34.5
26	^{58}Fe	^{244}Pu		33.9
27	^{59}Co	^{237}Np		32.9
28	^{64}Ni	^{238}U		27.3

Similar arguments for E119 hint at $^{50}Ti+^{249}Bk$ as the preferred reaction

Choice of the optimum reaction: example E120



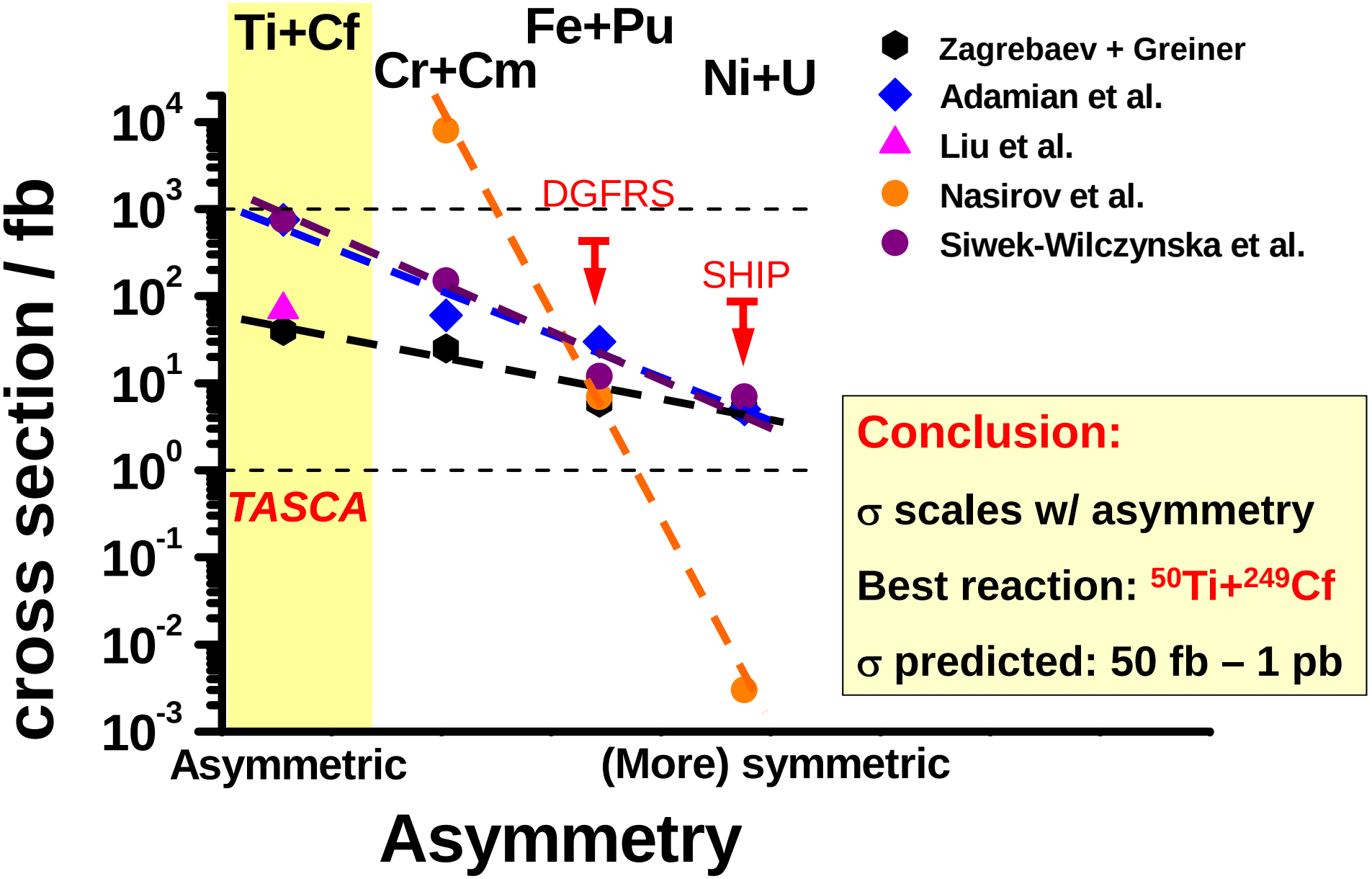
Conclusion:

σ scales w/ asymmetry

Best reaction: ^{50}Ti+^{249}Cf

σ predicted: 50 fb – 1 pb

Choice of the optimum reaction: example E120



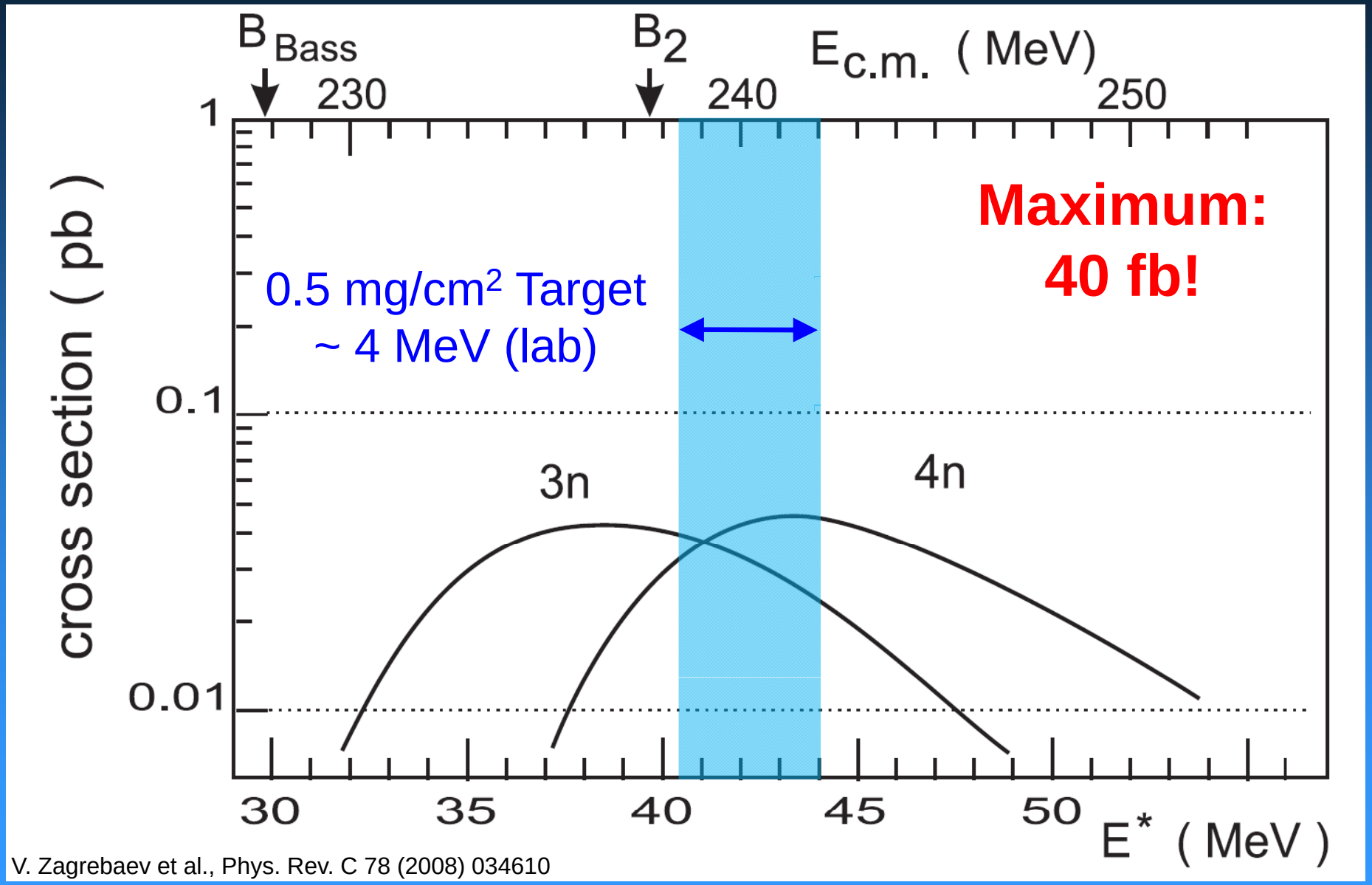
Conclusion:

σ scales w/ asymmetry

Best reaction: $^{50}Ti+^{249}Cf$

σ predicted: 50 fb – 1 pb

$^{50}Ti+^{249}Cf$ Excitation Function

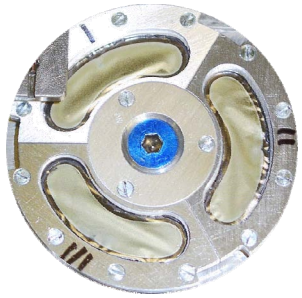


V. Zagrebaev et al., Phys. Rev. C 78 (2008) 034610

A new high-intensity transuranium target wheel for *TASCA*

Used for E114 (2009):

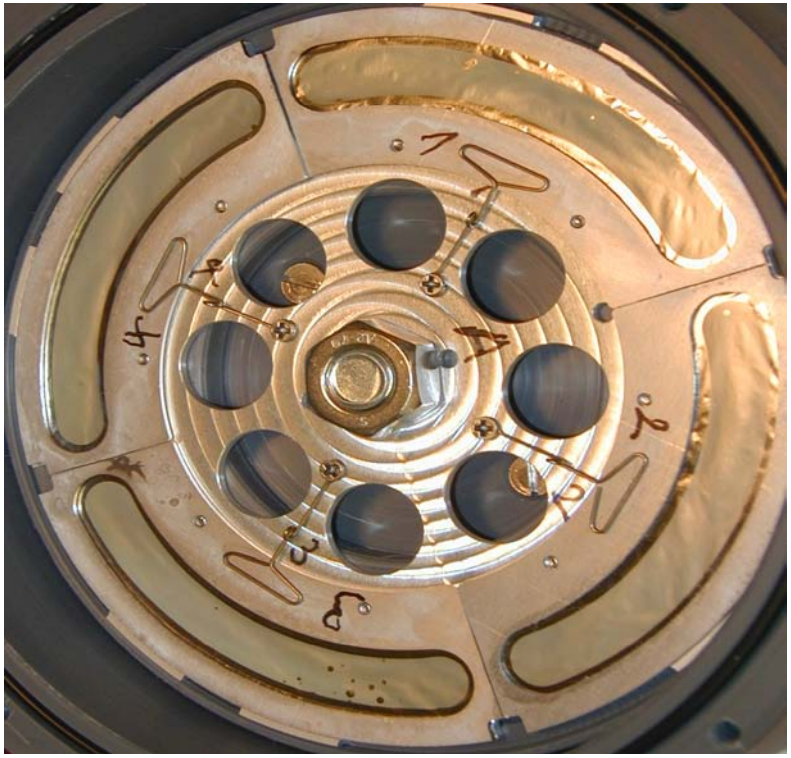
Ø Target Wheel: 32.5 mm
Ø Beam Spot: 6 mm



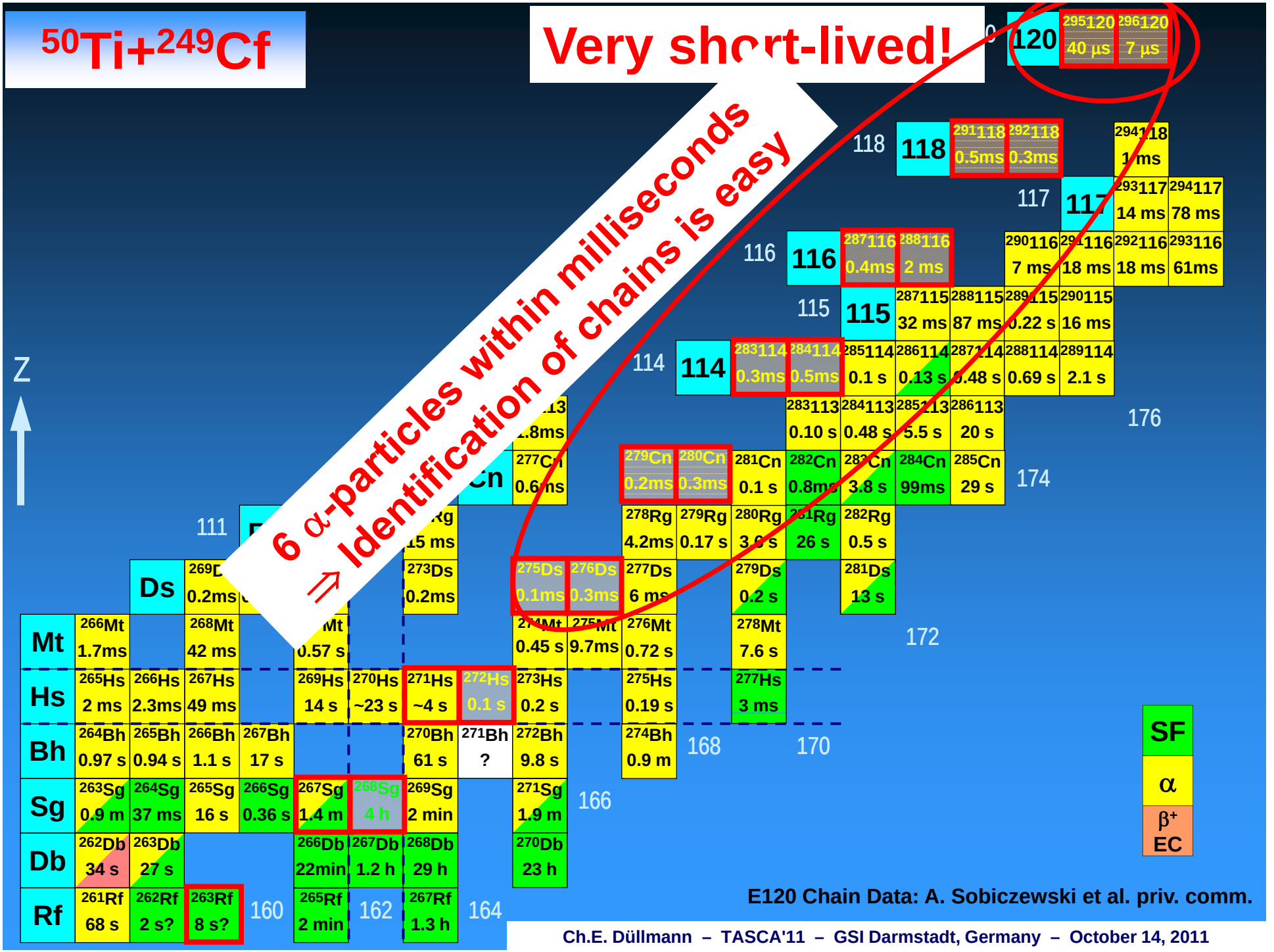
400 particle·nA

Used for E120 (2011):

Ø Target Wheel: 100 mm
Ø Beam Spot: 8 mm



Target wheel tested up to
2500 particle·nA

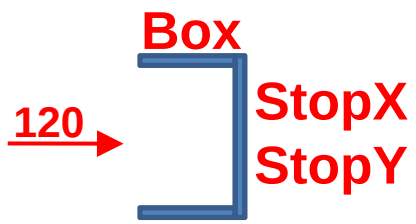


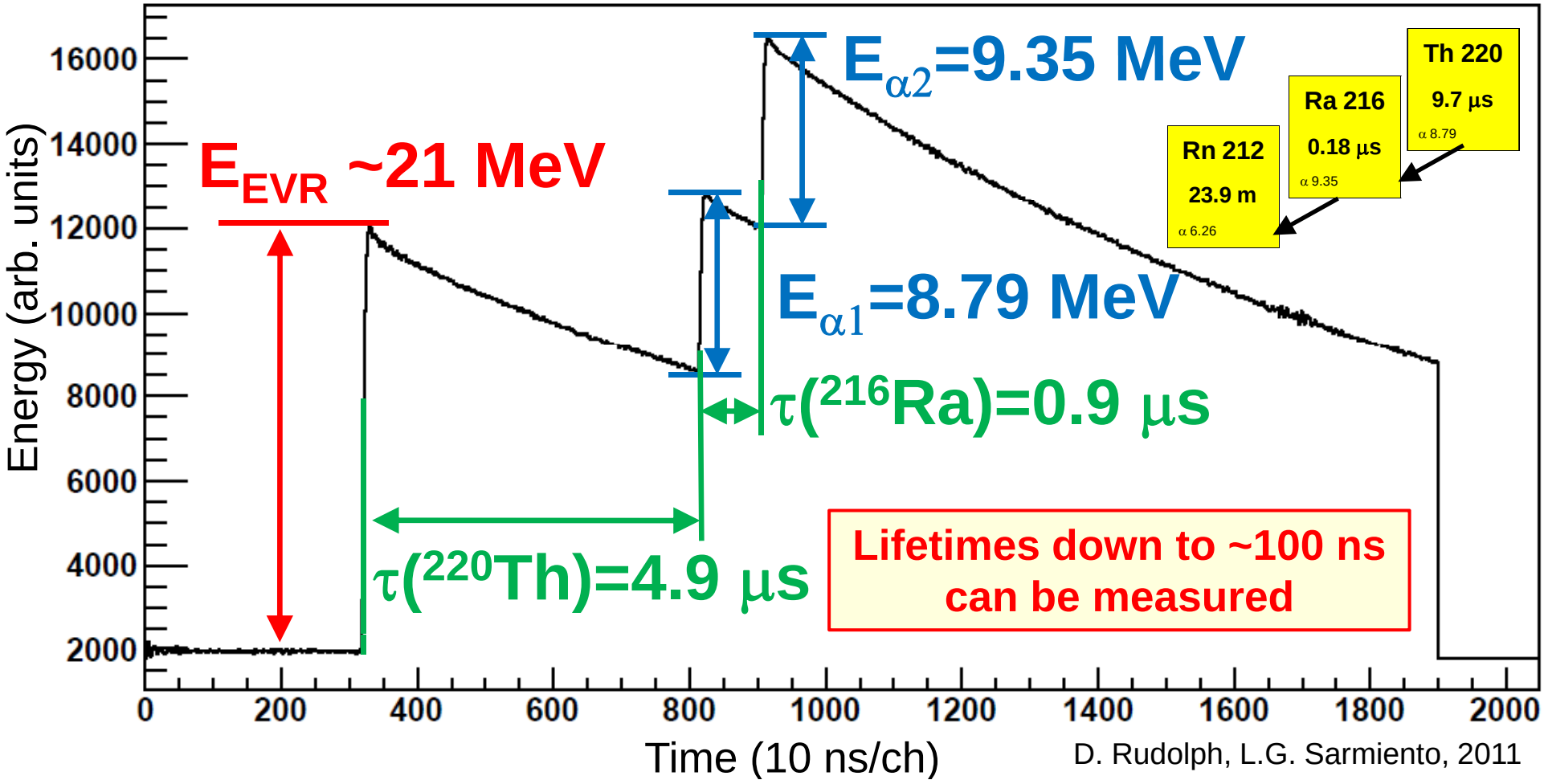
E120 Chain Data: A. Sobiczewski et al. priv. comm.

Detector / Data acquisition system

Fast digital electronics for StopY (48 Ch)
"Analog" electronics for StopX + Box (272 Ch)

Next step (ready to go): digital electronics for all Ch
In-house development, GSI Experimental Electronics Department





D. Rudolph, L.G. Sarmiento, 2011

Publicity so far...

NEWSFOCUS

Science

9 September 2011 | $10

SUPERHEAVY ELEMENTS

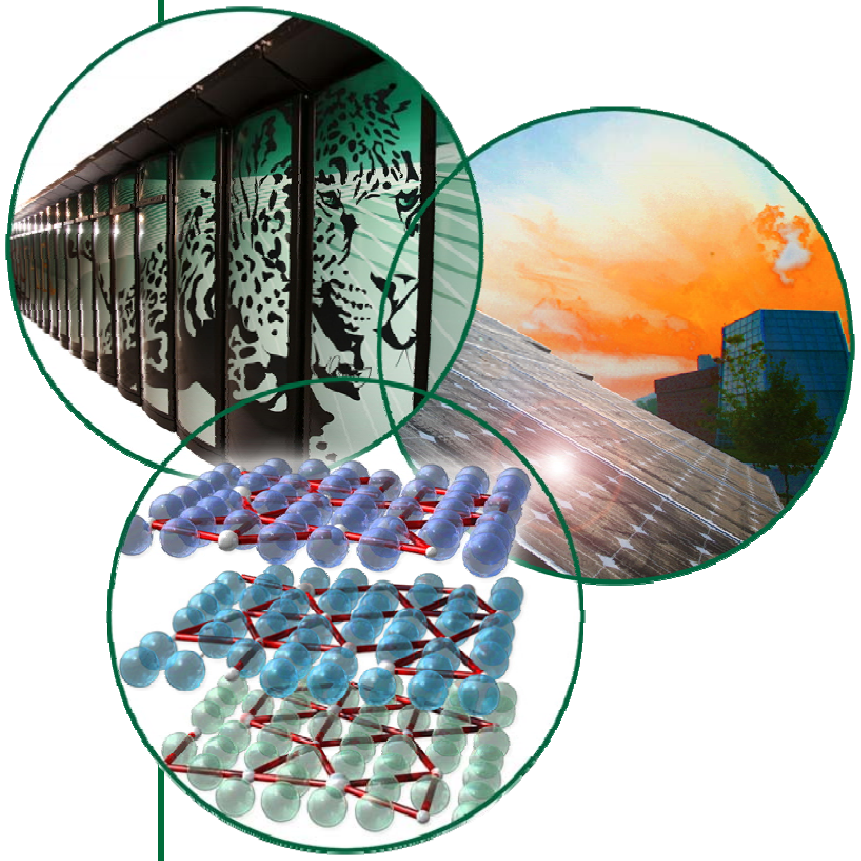
Which Way to the Isla

Last month at the Helmholtz Centre for
Ion Research (GSI) in Darmstadt, Gerr
team of physicists and chemists from
the globe began firing an intense be
titan
nium
and

You @ *TASCA 11*

Status of Bk-249 Target Material

Julie G. Ezold and Jeff L. Binder
Fuel Cycle and Isotope Division
Oak Ridge National Laboratory



Meeting on Super Heavy Nuclei

TASCA 2011

GSI Darmstadt

October 14, 2011

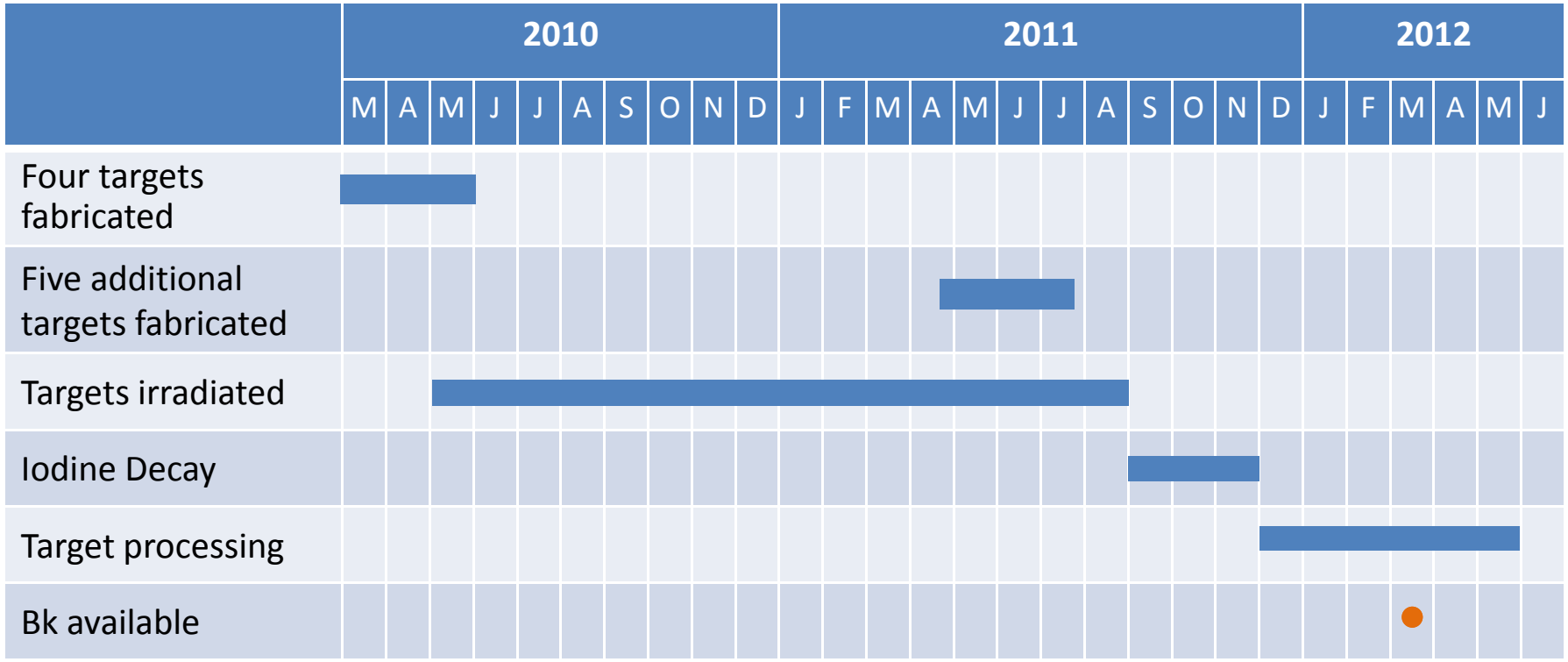
U.S. DEPARTMENT OF ENERGY

OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

Bk-249 Target Material Status

- Nine Cm/Am targets have been irradiated at High Flux Isotope Reactor (ORNL, Oak Ridge) and are “cooling” in the reactor pool to allow for iodine decay
- Total Bk-249 estimated at 20+ mg for full campaign
- Radiochemical processing to begin early December 2011
- Bk-249 to be shipped the first week of March 2012

Timeline of Berkelium-249 Production



Summary: News from *TASCA*

Work at *TASCA* (and many more @ GSI and abroad) in 2011 focused on:

Development of: **-Beam**
-Target
-Background reduction
-Implementation of digital electronics

-for the search of element 120

-and on readiness status of TASISpec for element 115

A first experiment with the reaction ^{50}Ti+^{249}Cf was performed and ended two days ago

Data are under evaluation

It was (and still is) an exciting *TASCA* year!

Outlook 2012: Finding E119 and E120