Welcome to the TASCA commissioning kick-off meeting

Please, note and reserve this time:

TASCA 06

5th Workshop on

Recoil Separator for Superheavy Element Chemistry

September 29, 2006

Garching, Germany

!

coming soon:
www.gsi.de/TASCA06

orgainzed by:
A. Yakushev, TU München
M. Schädel, GSI Darmstadt

TASCA commissioning kick-off meeting: PROGRAM

TIME	TOPIC	Speaker
13:00 (10 + 5) min	Opening and report about the TASCA commissioning proposal	M. Schädel
13:15 (10 + 5)	Expected TASCA performance from Monte Carlo-Simulations	A. Semchenkov
13:30 (10 + 5)	Results from first functional tests 24.-26. April 2006	A. Semchenkov
13:45 (10 + 5)	The birth of TASCA – first results 27. April 2006	A. Yakushev
14:00 (10 + 5)	Report from the detector working group	D. Ackermann
14:15 (10 + 5)	Report from the RTC working group	Ch.E. Düllmann
14:30 (10 +5)	Report from the target working group	K. Eberhardt
14:45 (10) *14:55*	MISCELLANEOUS *END*	
15:00 ==> GUEST HOUSE	Get-together to celebrate the TASCA commissioning kick-off	Everybody involved in the TASCA Project !

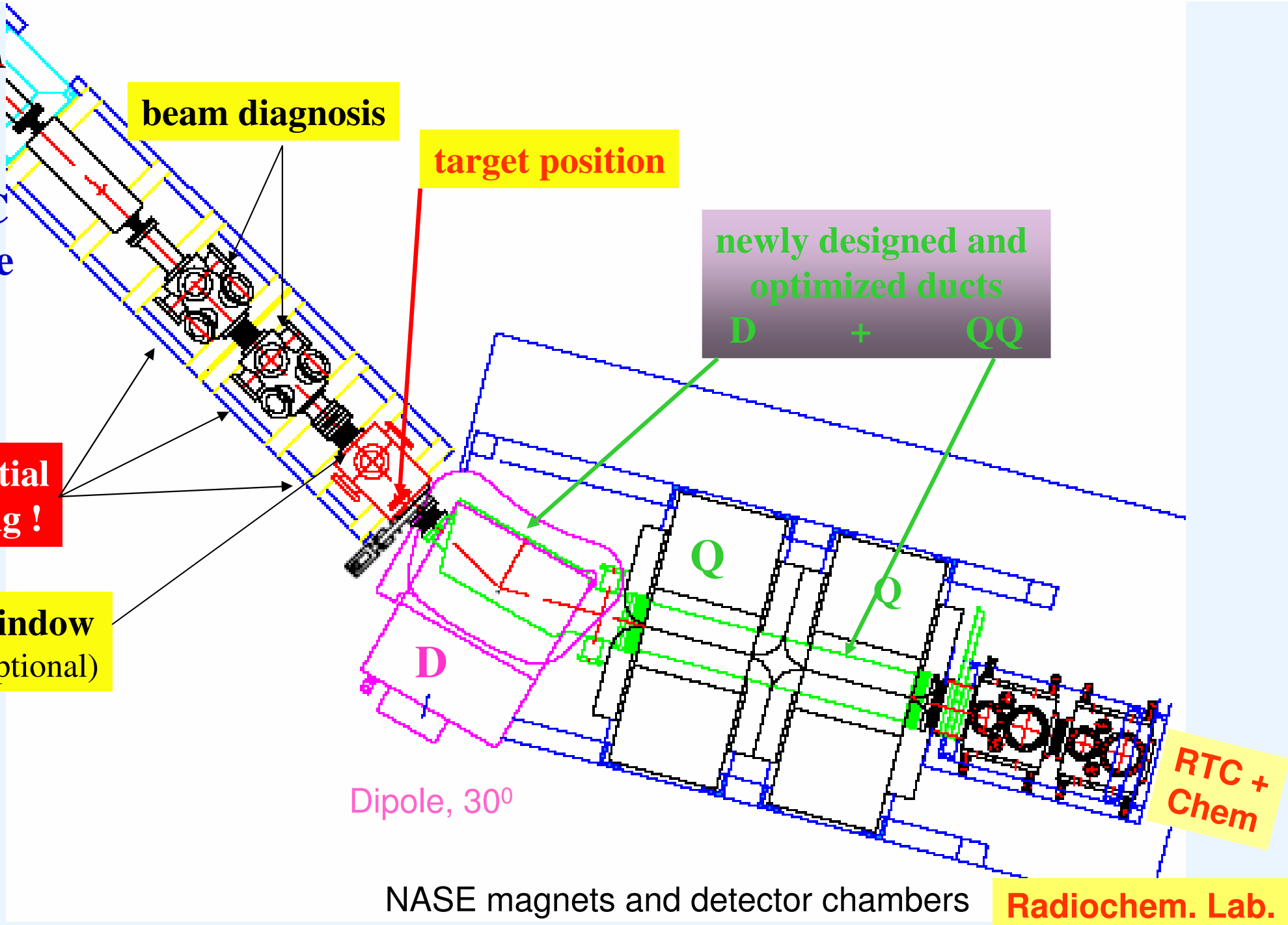
UNILAC Proposal U219: TASCA Commissioning

M. Schädel(Spokesperson), D. Ackermann, K.-H. Behr, W. Brüchle, H.-G. Burkhard, R. Dressler, Ch.E. Düllmann, K. Eberhardt, R. Eichler, H.W. Gäggeler, K.E. Gregorich, F.P. Heßberger, S. Hofmann, E. Jäger, J.V. Kratz, B. Kindler, M. Leino, D. Liebe, B. Lommel, H.-J. Maier, J.P. Omtvedt, B. Schausten, E. Schimpf, C. Scholey, H.-J. Schött, A. Semchenkov, G. Skarnemark, L. Stavsetra, R. Sudowe, J. Szerypo, A. Türler, J. Uusitalo, A. Yakushev

Darmstadt, GSI
Berkeley, LBNL
Bern, Universität
Göteborg, University
Jyväskylä, University
Mainz, Johannes Gutenberg-Universität
München, Ludwig Maximilians-Universität
München, Technische Universität
Oslo, University
Villigen, PSI

Everybody who likes to join is cordially invited to do so!

TASCA @ GSI's UNILAC beam line X 8



TASCA – Status (Spring 2006): Ready for Commissioning

* $DQ_hQ_v + DQ_vQ_h$ Configuration optimized and built ✓

* Installed at beam line X8 - close to a radiochemistry laboratory ✓

* Ion-optical Calculations to optimize the design and operational parameters ✓

* Window-less Operation (differential pumping) for "unlimited" beam intensity ✓

* Control and Safety System designed for use of highly radioactive actinide targets ✓

* Target Wheels for highest beam intensity available + ongoing developments ✓

* Recoil Transfer Chamber (very thin window !) under construction at TUM ✓

* Focal Plane Detector (1^{st} generation) from a spare SHIP detector ✓

* Shielding built for max. future beam intensity; I (^{40}Ar) ≤ 30 μA_{part} ✓

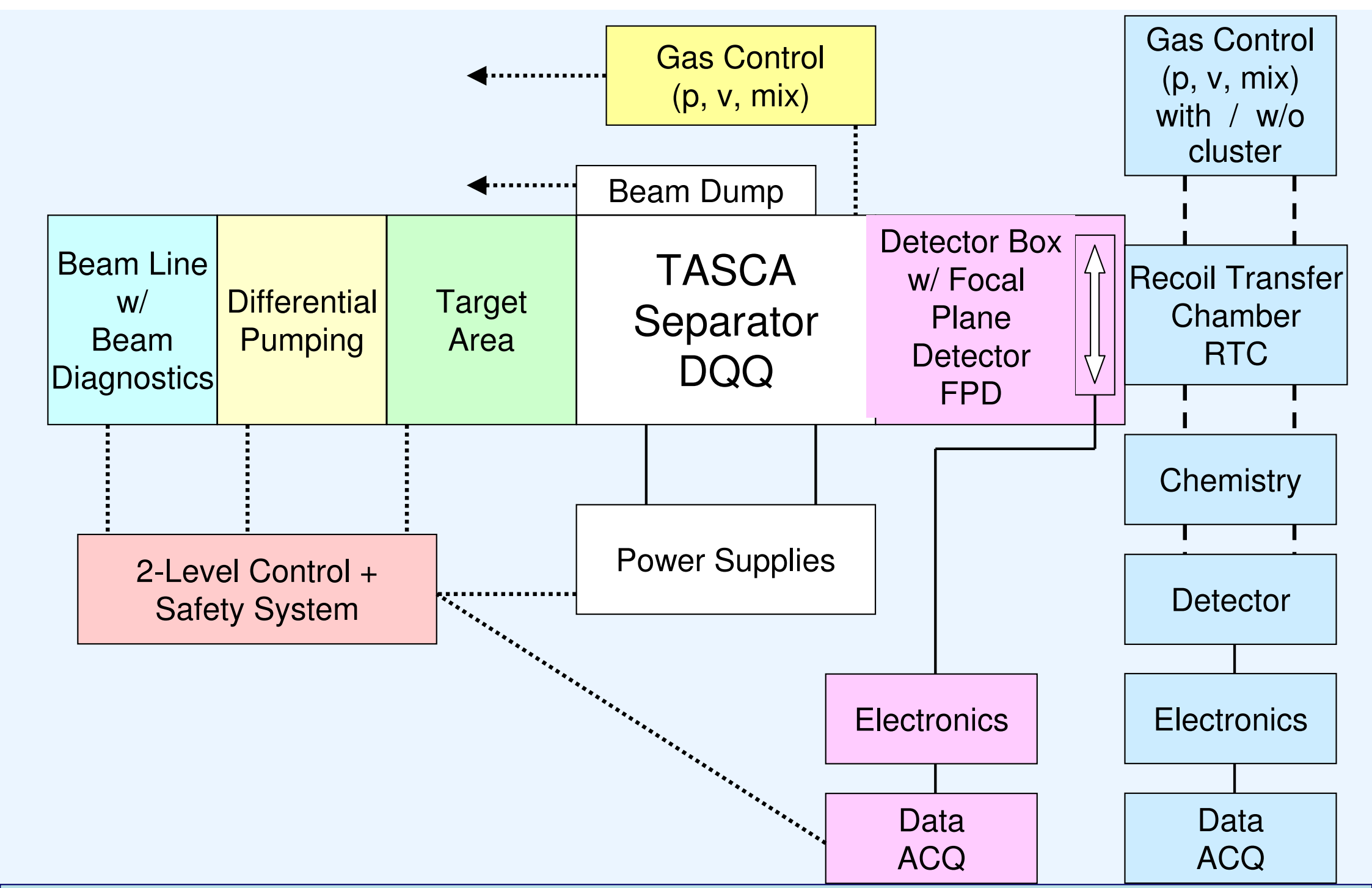
* Operation w/ Various Gases (He, H_2, N_2, Ar, CH_4, ...) planned ✓

Comparison of gas-filled separators in SHE research

Separator	DGFRS	GARIS	BGS	TASCA	TASCA
Configuration	DQ_hQ_v	DQ_hQ_vD	Q_vD_hD	DQ_hQ_v	DQ_vQ_h
Length / m	4.0	5.8	4.7	3.5	3.5
Bend. angle / deg	23	45+10	70	30	30
$B\rho_{max}$ / Tm	3.1	2.16	2.5	2.4	2.4
Dispersion / mm/%	7.5	9.7	20	9	1
Solid angle / msr	8.8	12.2	45	13.1	4.3
Transmission / %	41	40*	49-59	60§	40§

Transmission for
$^{48}Ca + {}^{238}U/{}^{244}Pu \rightarrow 112/114$

§ Monte Carlo simulation
400 µg/cm² target
* Estim. from test reactions; K. Morita priv. comm.


Gas Control
(p, v, mix)
Gas Control
(p, v, mix)
with / w/o
cluster
Beam Dump
Beam Line
w/
Beam
Diagnostics
Differential
Pumping
Target
Area
TASCA
Separator
DQQ
Detector Box
w/ Focal
Plane
Detector
FPD
Recoil Transfer
Chamber
RTC
Chemistry
Detector
Power Supplies
2-Level Control +
Safety System
Electronics
Electronics
Data
ACQ
Data
ACQ

Commissioning Experiments – Parameter Studies

Beam line, diagnostics *TASCA* components	Magnets, controls + safety system, interlocks, differ. pumping, (actinide) targets@ high beam intensity
Separator in DQ_hQ_v and DQ_vQ_h mode	Transmission (exp. ⇔ model), separation effic., focal spot Target thickness, gas pressure, charge state (50 – 1000) µg/cm^2 (0.1 – 1) mbar ^{40}Ar, ^{22}Ne + Sm, Gd, Au, Th, U → Hg, Pb, Ac, (Fm), No
*F*ocal *P*lane *D*etector and *D*ata *Acq*uisition	Ar+Lu,Ta,Pb→Ac,Pa,Fm; Ne+U→No: **100 µb-20 nb**, *hv* α-α-, α-SF-, α-γ-correlation, rate, fast beam shut-off
*R*ecoil *T*ransfer *C*hamber	Window, transport w/ + w/out cluster, coupling chem.
Final full test, element 104	Cold fusion, ^{50}Ti+^{208}Pb→^{257}Rf: - FPD, excitat. fct.; *vh* (15 nb) - liquid chemistry; *hv* Hot fusion, ^{22}Ne+^{244}Pu→^{261}Rf: - FPD, excitat. fct.; *hv* (4 nb) - liquid+gas chem.; *hv*

➔ *"Understand" TASCA, be ready to perform Z≥104 chemistry + physics experiments*

Summary - Beam Time Request; ≈ 2 year program

Topic	Beam	Shifts
Beam line - beam diagnostics, focusing onto target	#	3
Beam through TASCA (vacuum) - check magnets, calibrations, focusing	#	8
First product beam through TASCA (He)	#	18
Sum - parasitic beam time (8 h shifts)		*29*

 # Any parasitic 12 ≤ A ≤ 50 beam

First full test of FPD, DAQ - α-α-correlations, fast beam shut-off	^{40}Ar	4
First test reaction – FPD spot size, calc. <=> measured efficiency; DQ_hQ_v+DQ_hQ_v	^{40}Ar	10
First RTC and window tests - w/ cluster, - w/o cluster	^{40}Ar	12
Separator efficiency – fct. of target thickness (50 - 1000 μg/cm^2)	^{40}Ar ^{22}Ne	6 12
Rotating target set-up + target stability – safety features w/ beam; transfers	^{40}Ar	3
Transmission + focal spot size - fct. of p(He) (1-0.1 mbar) + charge state, minimizing transfer products; DQ_hQ_v + DQ_hQ_v	^{22}Ne	15
RTC optim. + chemistry set-up coupl. - w/ cluster transport	^{22}Ne	9
Final FPD check - DAQ, SF, test α-α -, α-γ,x-ray coincidences	^{40}Ar ^{22}Ne	6 6
Final test cold fusion - w/ FPD, - w/ "liquid" chemical sep. (SISAK)	^{50}Ti	27
Final test hot fusion – w/ FPD, - w RTC + chem. sep. (aqueous + gas-phase)	^{22}Ne	28
Sum - main beam time (8 h shifts)		*138*

TASCA@GSI

EA accepted (*preliminary* info) 83 shifts