Oslo SHE Chemistry Group (SISAK group)
Plans for TASCA

Presentation at TASCA'08 workshop
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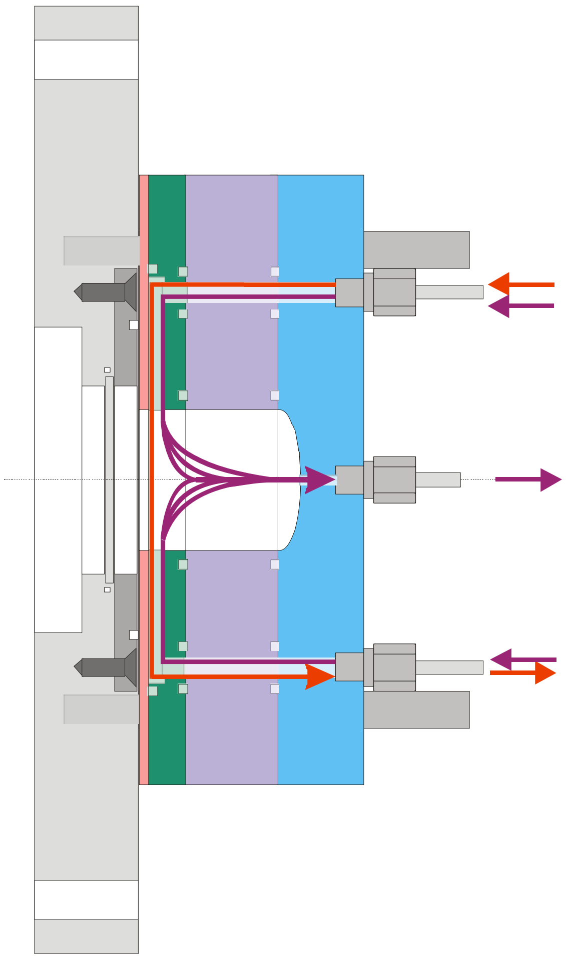
SISAK achievements 2000-2008

2000	-	The transactinide ^{257}Rf detected with SISAK liquid scintillation detectors, proved that studying SHE with SISAK *is* possible.
2001	-	Rf extracted from 6 HNO_3 into toluene with HDBP, first SISAK chemistry experiment on a SHE.
	-	Rf extracted from oxalic acid into toluene with TOA.
2003	-	Rf extracted from sulphuric acid into toluene with TOA.
2005	-	Rf extracted from H_2SO_4, simultaneous detection of both phases enhances yield and precision.
2006-7	-	Knowledge from BGS-RTC used in building two RTC's for TASCA, one large and one small. The small one has much higher yield.
2008	-	New small RTC built for BGS
	-	^{258}Db detected with SISAK LS-detection system.

The SISAK collaboration: A Oslo-LBNL-Gothenburg-Mainz collaboration

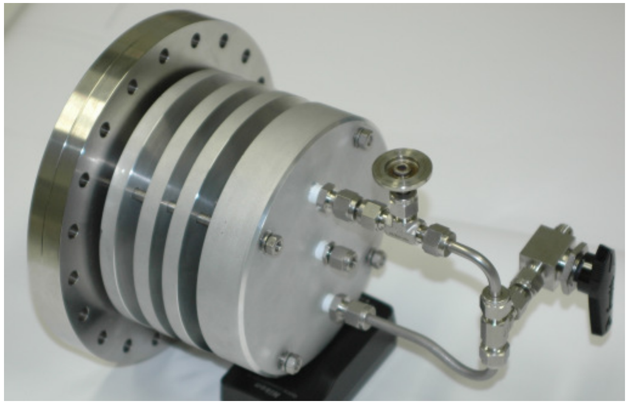
New RTCs – Modular and Flexible

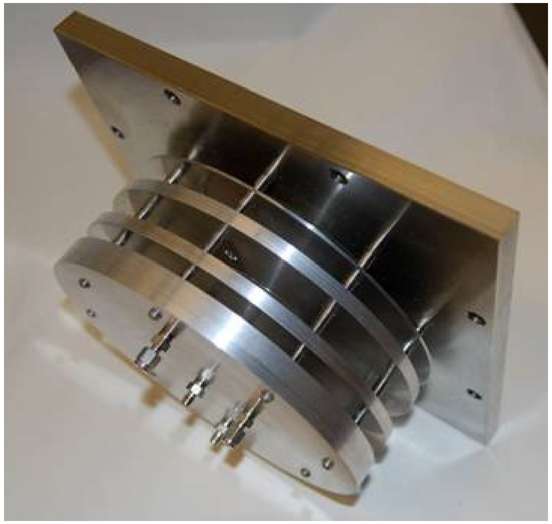


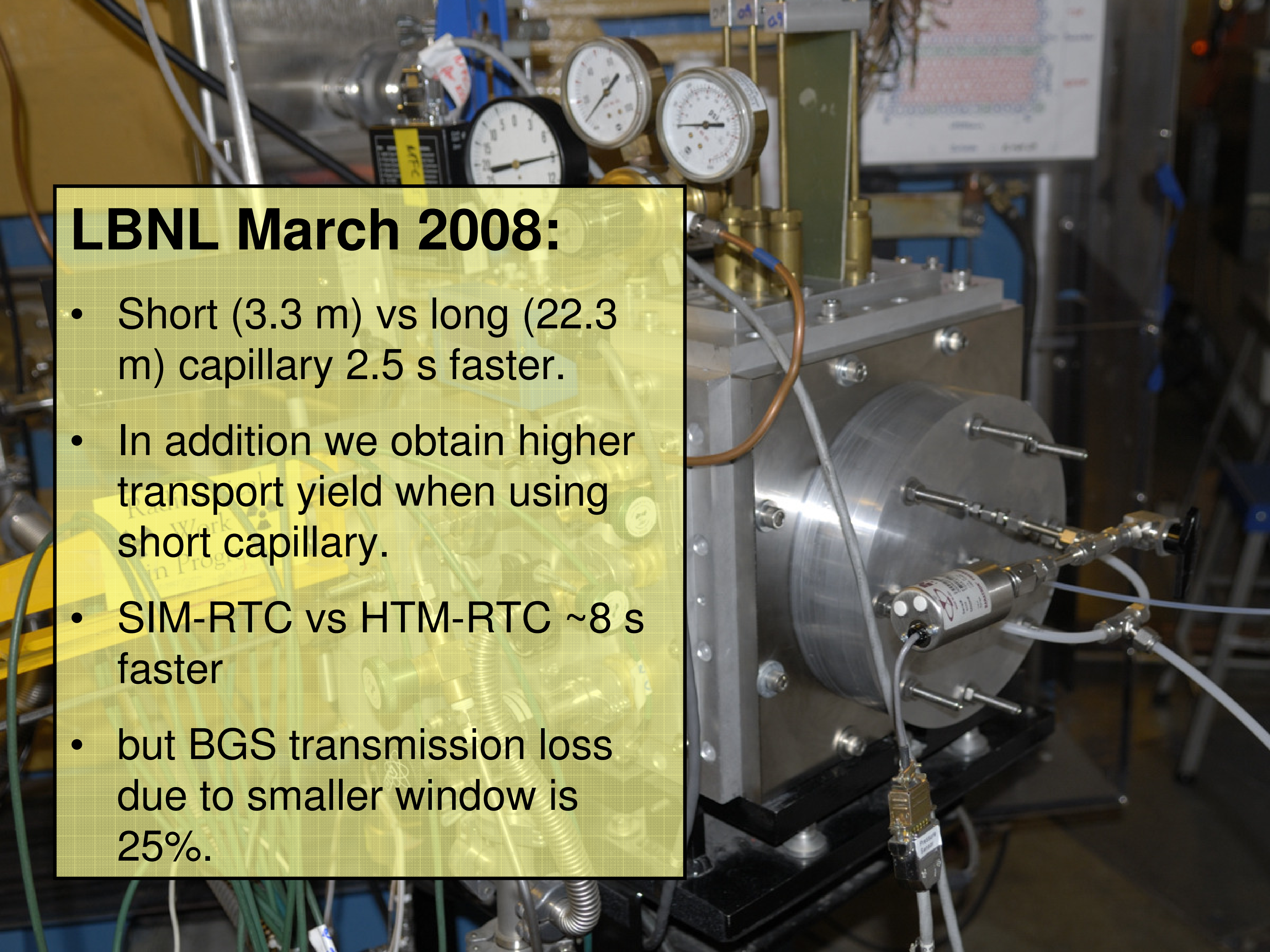
Small Image Mode RTCs at TASCA & BGS

RTCs targeted at particular rapid flushing of aeorosols were built for TASCA and BGS.

	TASCA	BGS
Shape	Ø30 mm	40 x 100 mm
Area	7.1 cm^2	40 cm^2
Trans-mission	60%	50%
Yield	?	80%?



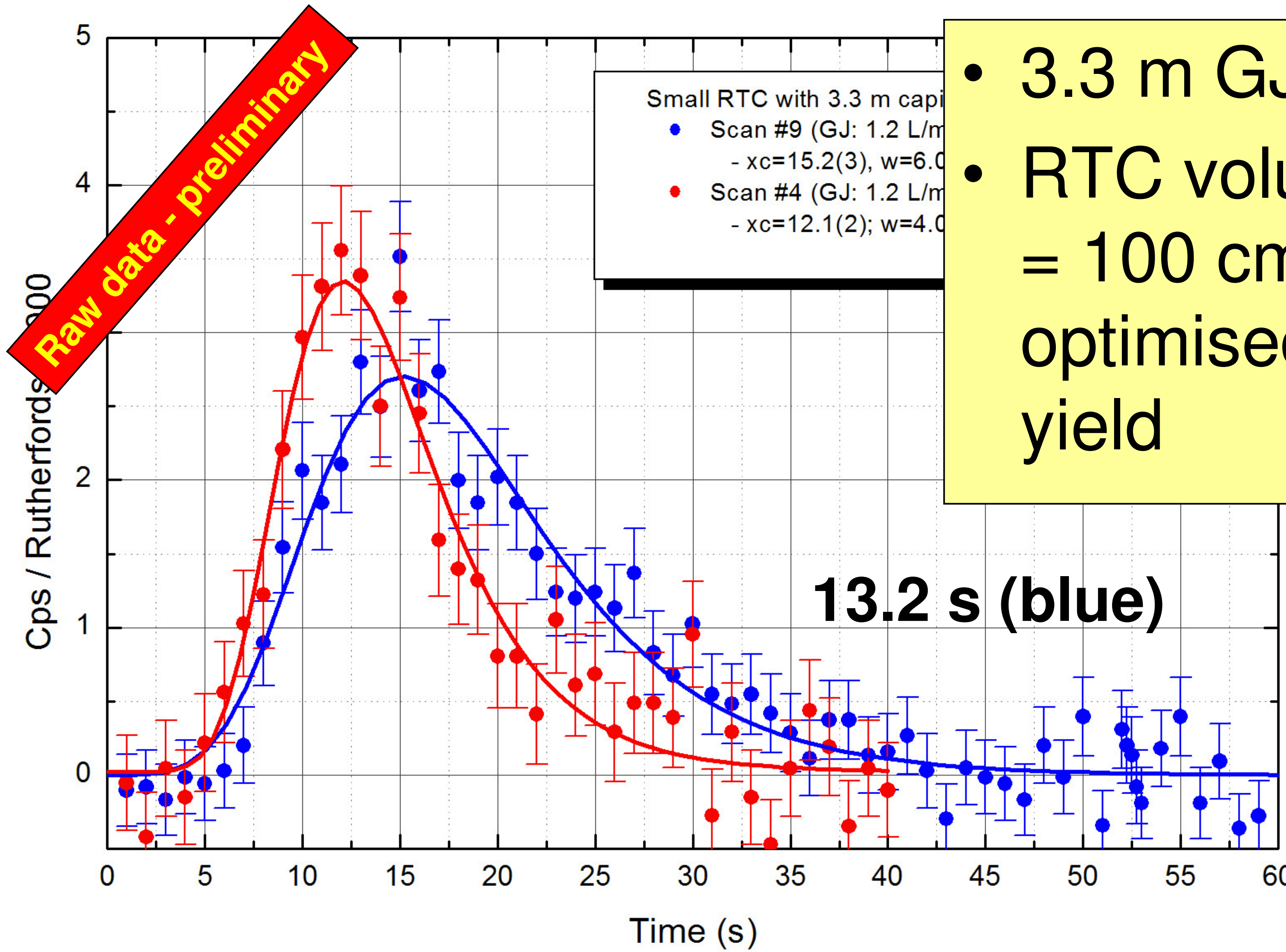




LBNL March 2008:

- Short (3.3 m) vs long (22.3 m) capillary 2.5 s faster.
- In addition we obtain higher transport yield when using short capillary.
- SIM-RTC vs HTM-RTC ~8 s faster
- but BGS transmission loss due to smaller window is 25%.

Transport Time – SIM-RTC



- 3.3 m GJ
- RTC volume = 100 cm^3, optimised for yield

TASCA Experiment

Purpose

Measure RTC transport-time using SISAK degasser and LS-detector

- Suitable reaction:

  $^{120}Sn(^{40}Ar^{8+},5n)^{155}Er$

  ^{155}Er $T_{1/2} = 5.3$ min.

- Need high-intensity 4-s pulse every 120 s.

LBNL ^{258}Db Detector Test

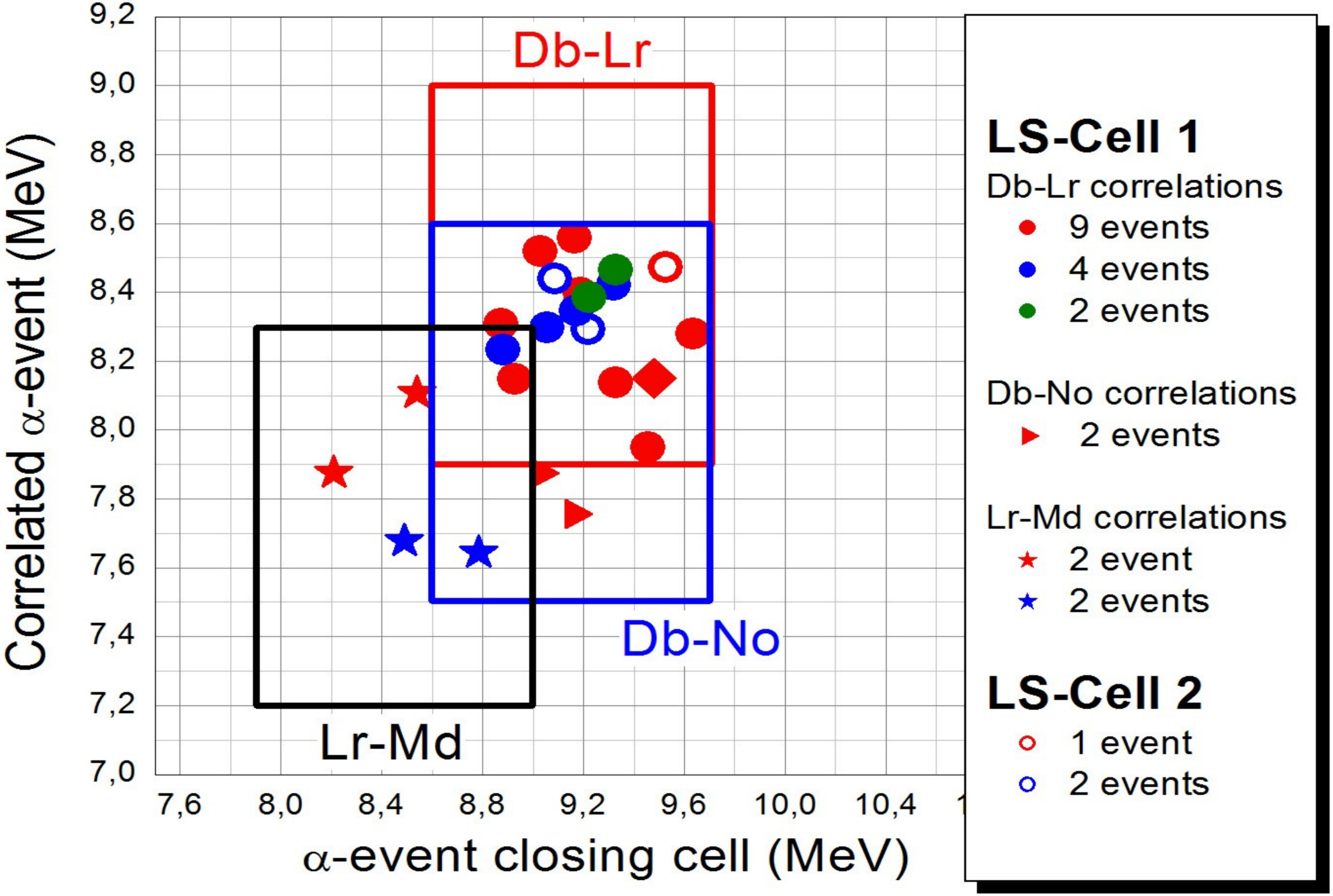
Purpose was:

Prove that SISAK can detect ^{258}Db

(preparation for chemistry experiments)

- ^{209}Bi (238 MeV $^{50}Ti^{12+}$, 1n)^{258}Db
- Cross section is about a factor 4 lower than when producing ^{257}Rf
- BGS SIM-RTC coupled to SISAK degasser with 3.3 m capillary
- Two LS 5.5 mL flow-through cells

BGS-SISAK Db results



Future TASCA SISAK Experiments

- SISAK @ BGS can do ^{257}Rf and ^{258}Db
- Can do chemistry experiments provided at least two events is detected per shift

Should be possible to do
Rf, Db and Sg

LBNL Temporary Setup w. Glove-Box

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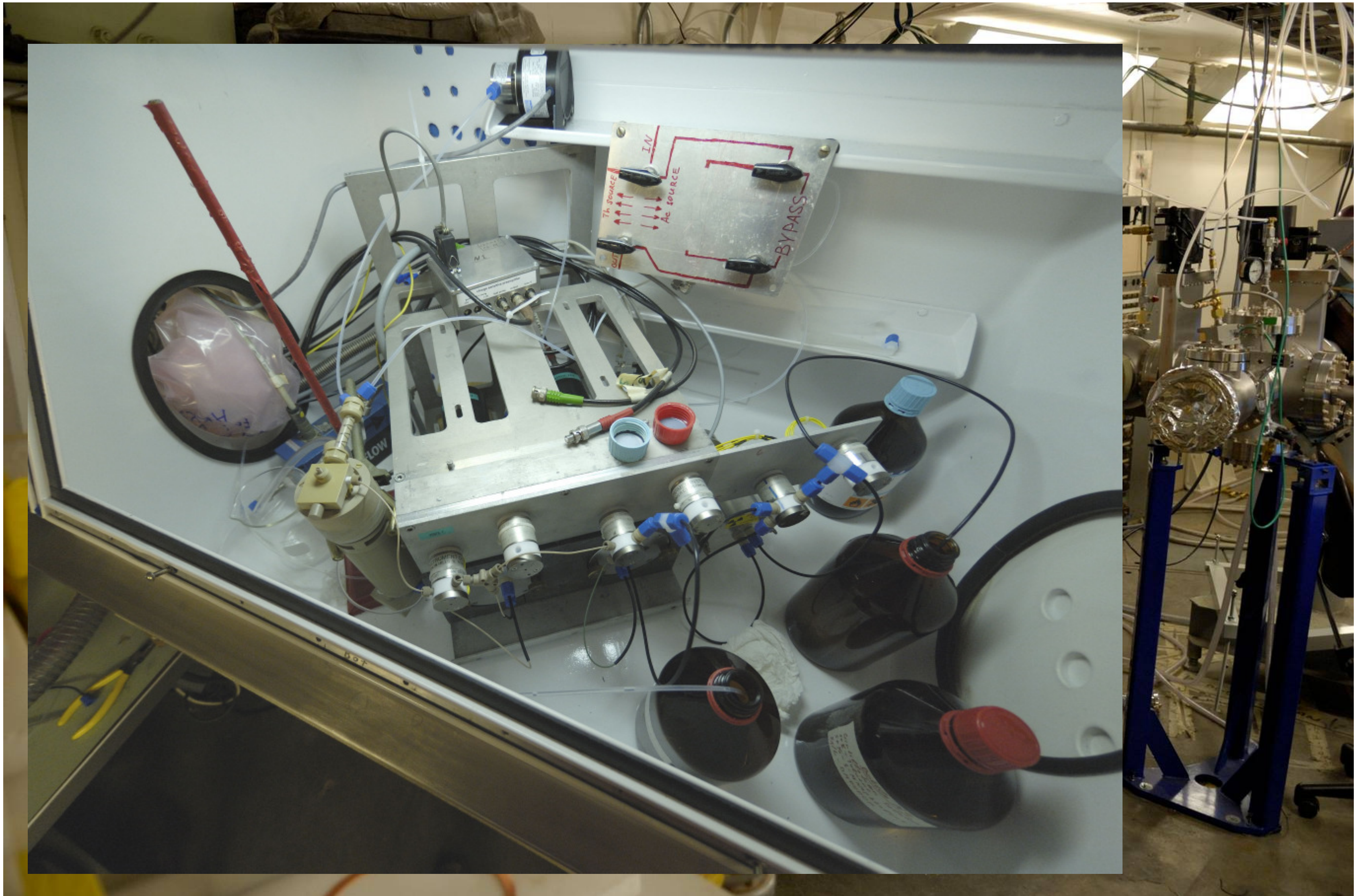
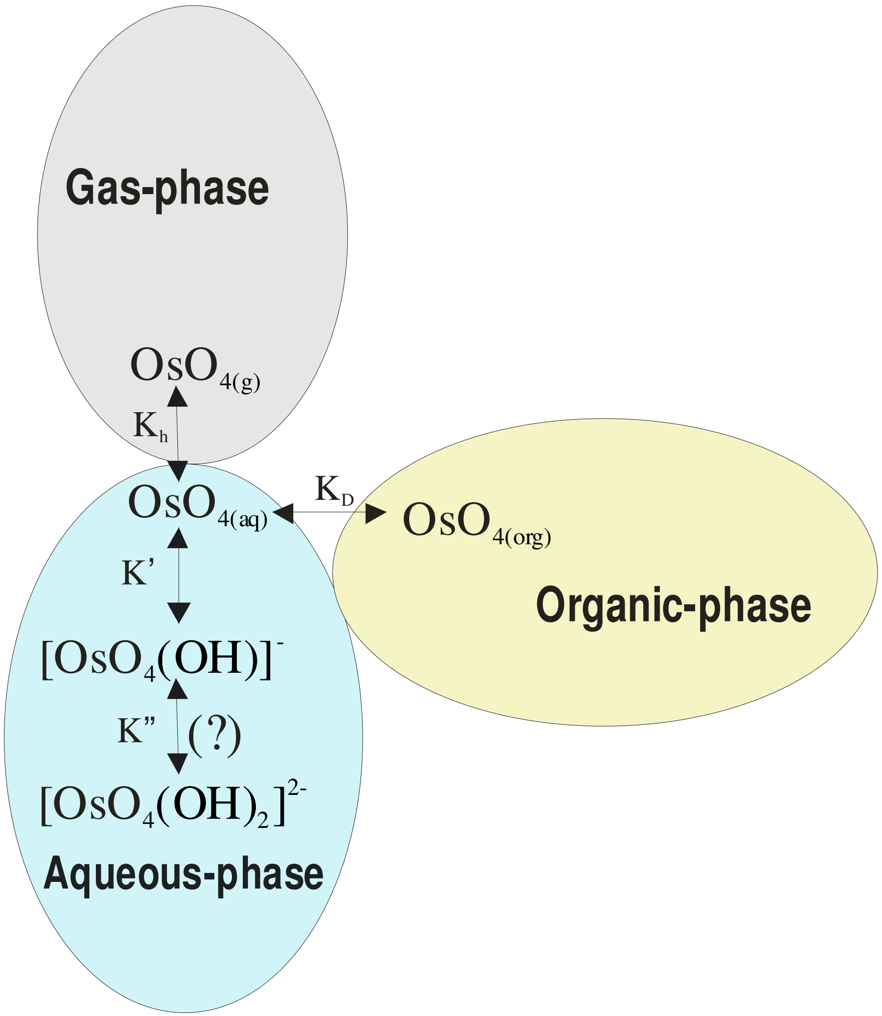


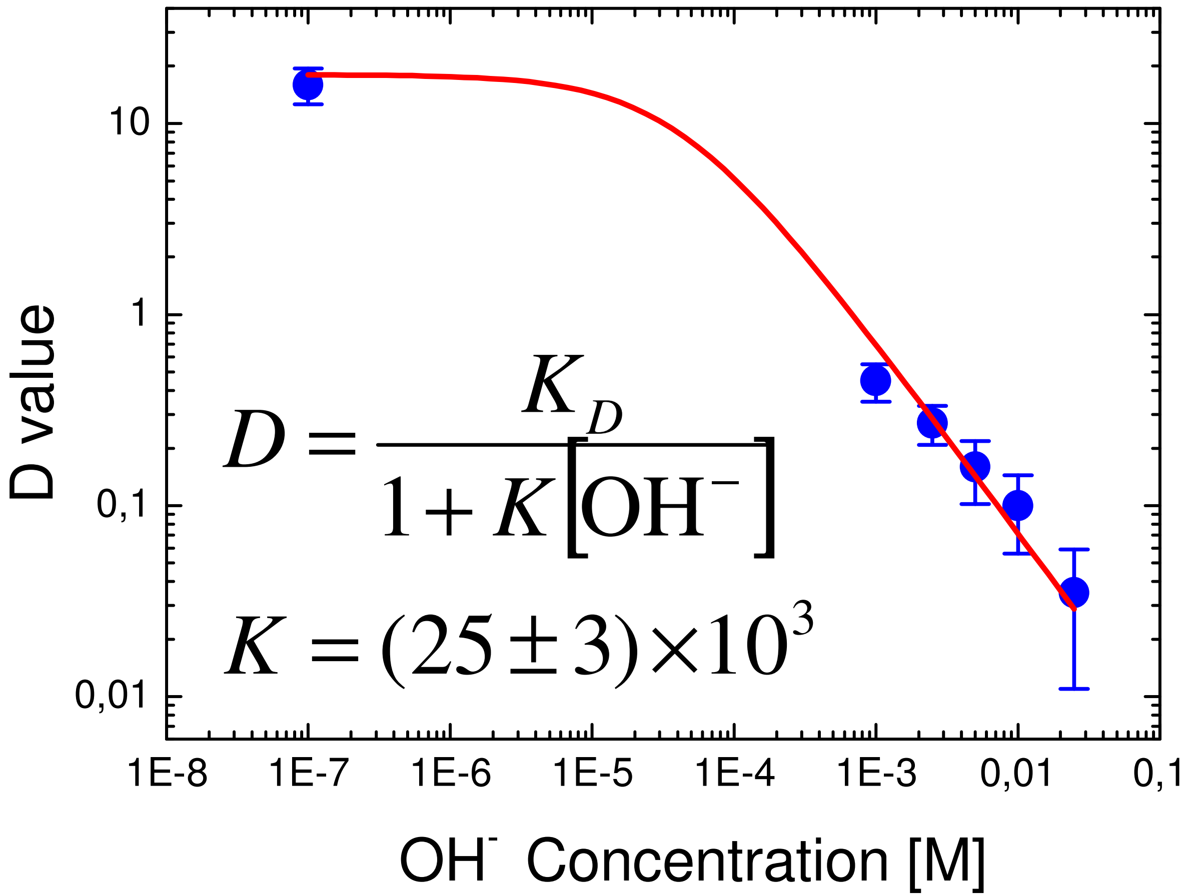
SISAK Hs experiment?



Formation of $[HsO_4(OH)]^-$ in dilute NaOH solutions can be studied with SISAK.

The distribution of HsO_4 between aqueous and organic phase depend on the stability of $[HsO_4(OH)]^-$ in the aqueous phase.

Experiments with Os



Performed at the Oslo Cyclotron Laboratory (OCL)

$^{nat}W(^3He,xn)^{181}Os$

$T_{1/2}$ ^{181}Os = 2.7 min.

F. Samadani et al., in preparation for publication

SISAK TASCA Experiment

- Verifying OCL experiment with α-active Os activity
- Proof of principle before a Hs experiment
- Can be run in parasitic mode?
- Important for PhD project of F. Samadani
- Important to get experience on how to run a SISAK experiment at TASCA

Summary

Priorities of Oslo Group:

1. Os “proof-of-principle” experiment at TASCA
2. RTC transport-time measurements
3. Db or Sg SISAK experiment
4. Hs experiment

Co-workers Mar/Apr 2008 Exp.

- Univ. Oslo: J.P. Omtvedt, K. Opel, A. Sabelnikov, F. Samadani

- LBNL: H. Nitsche, K.E. Gregorich, L. Stavsetra, J. Dvorak, J.M. Gates, M. A. Garcia, S. L. Nelson, I. Dragojevic

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