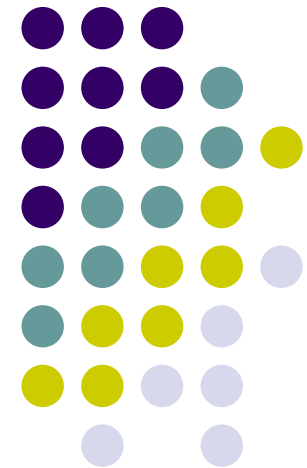


# Update on Radon Emanation Measurements

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G. Zuzel / H. Simgen

MPIK-Heidelberg

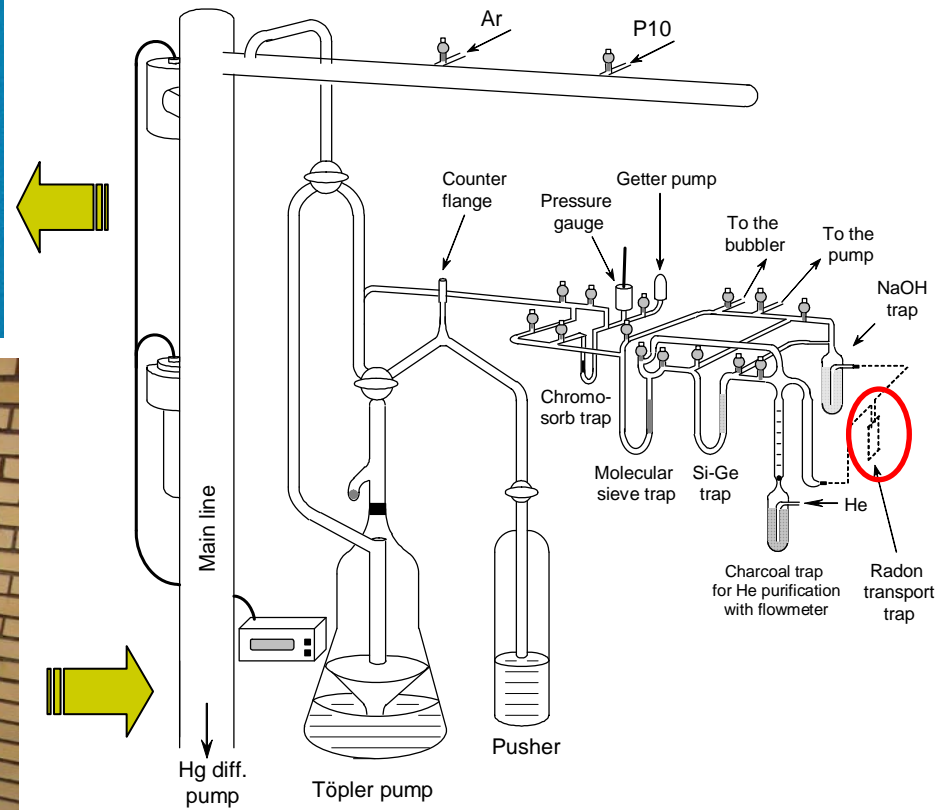
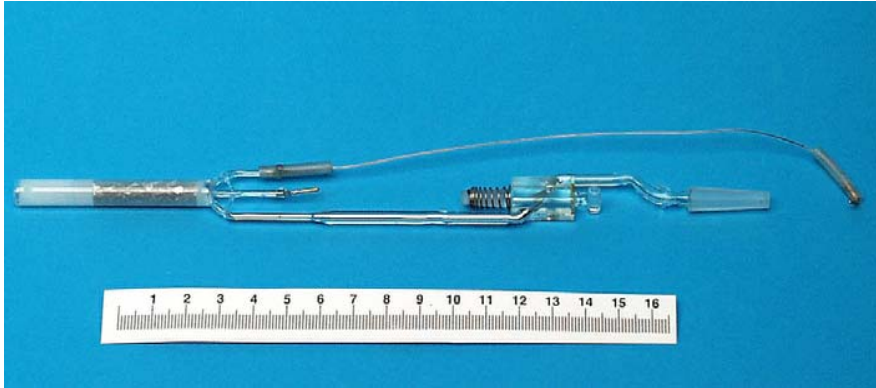
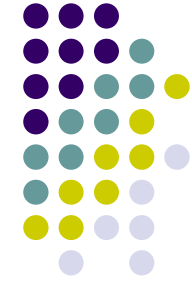


# Outlook



- $^{222}\text{Rn}$  detection / emanation scheme
- Kalrez gaskets (31 pieces in 10 batches)
- Cryogenic valves
- Other samples
- Summary and plans

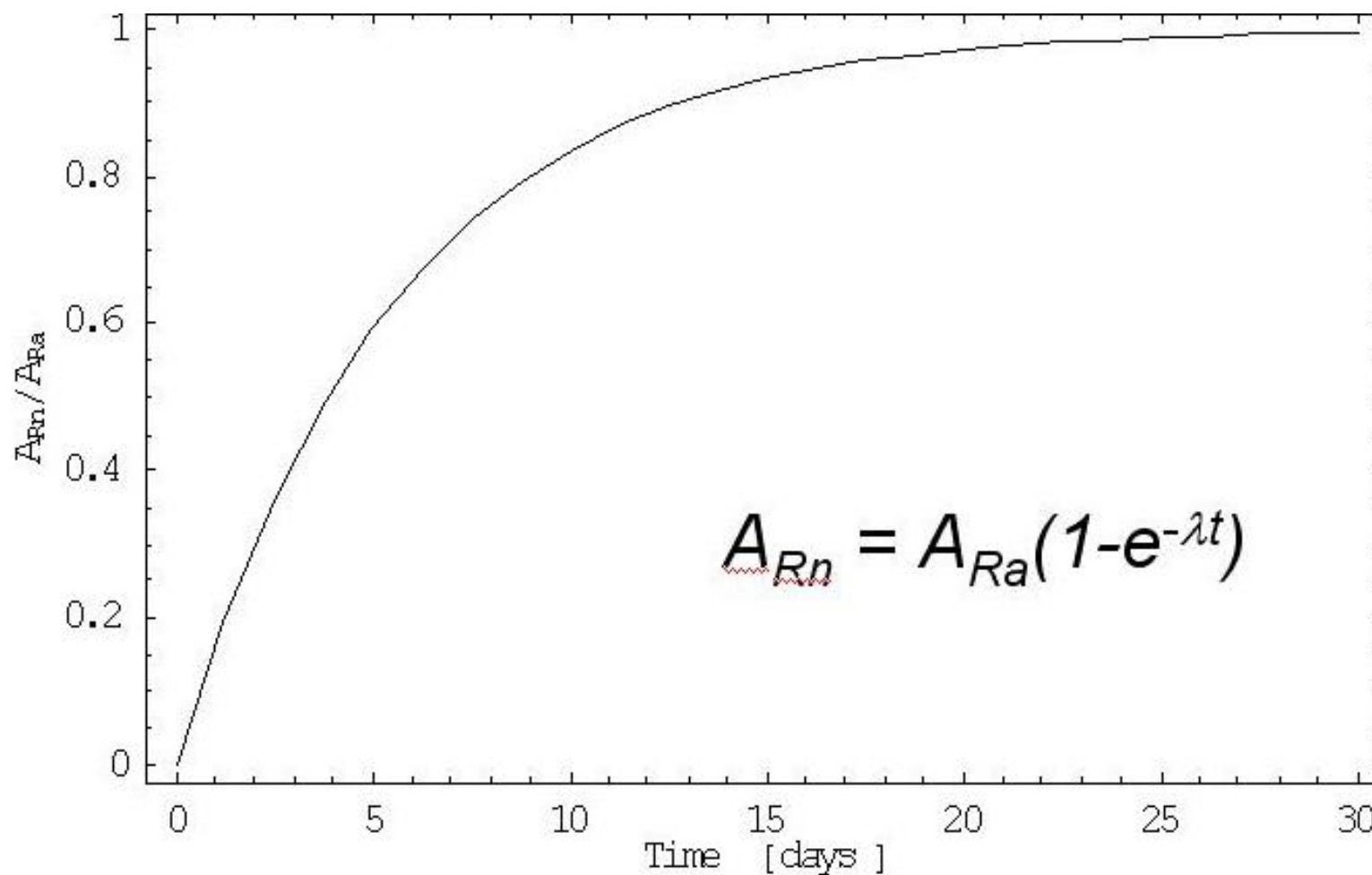
# $^{222}\text{Rn}$ detection



**Absolute detection limit  
30 – 100  $\mu\text{Bq}$  (15 – 50 atoms)**



# Emanation scheme



# Kalrez gaskets



Allgemeintoleranzen

ISO 2768 mK  
Spanndimensionen in Klammern

Tellerdichtung:  
Nr. 327259

Schiebedurchführung  
2x Nr. 327260

Dichtung Isolationsring  
Nr. 327262

statische Stangendichtung  
Nr. 327260

Projektion E

Gezeichnet: DIT / Dabier Th.

Datum: 02.05.07

Status: Freigegeben

Nennstab: Ursprung

VAT-Artikelnummer: Index

3D Model Nummer

Blatt 1 / 1

Zeichnungsnummer: 341674

A3 232732 VAT/DA

Benennung: R 190 DN 630

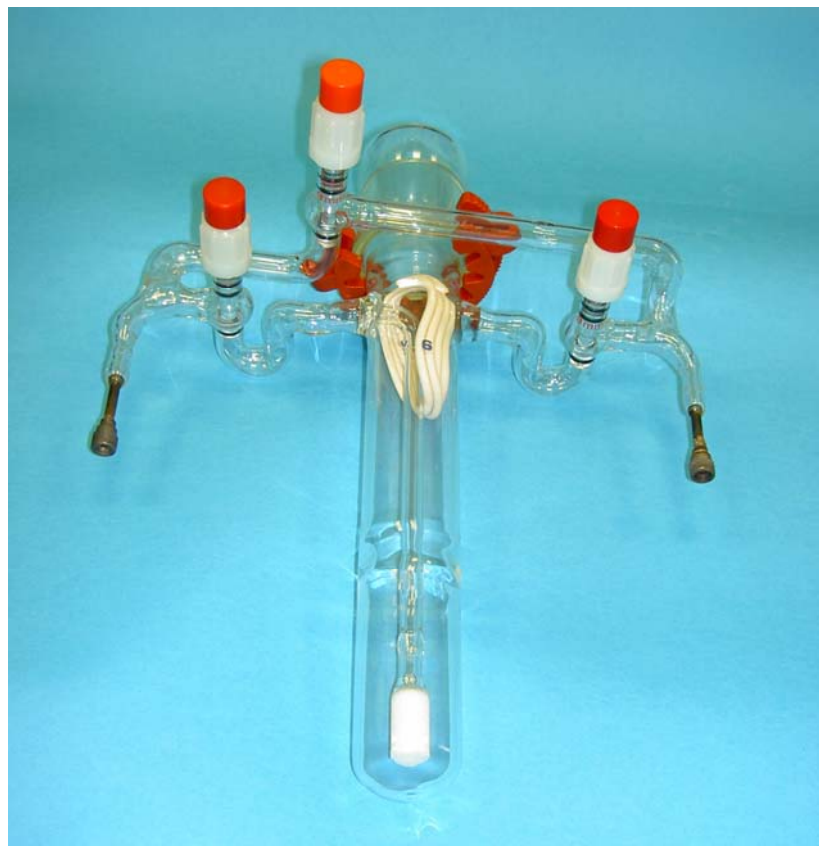
Skizze

**VAT** VAT Vakuumventile AG  
 CH-9488 Wang, Switzerland  
 Tel +41 81 7718181 Fax +41 81 771830

# Kalrez gaskets



4 x 262179



330502



# Kalrez gaskets – results



Art. Number	Amount	Total emanation rate [mBq]	Unit em. rate [mBq]	Remarks
317483	4	$0.64 \pm 0.05$	0.16	Small chamber; (50 $\mu$ Bq)
330502	6	$1.29 \pm 0.07$	0.22	Big chamber, (90 $\mu$ Bq)
330500 + 330501	2 + 2	$1.54 \pm 0.10$	0.39	Small chamber
327259	1	$0.27 \pm 0.06$	0.27	Big chamber
254213	4	< 0.05	< 0.01	V #5
262179	4	< 0.04	< 0.01	V #6
327607	4	$0.26 \pm 0.06$	0.07	V #1
327260 + 327262	3 + 1	$0.06 \pm 0.03$	0.02	V #4

# Kalrez gaskets – expected signal



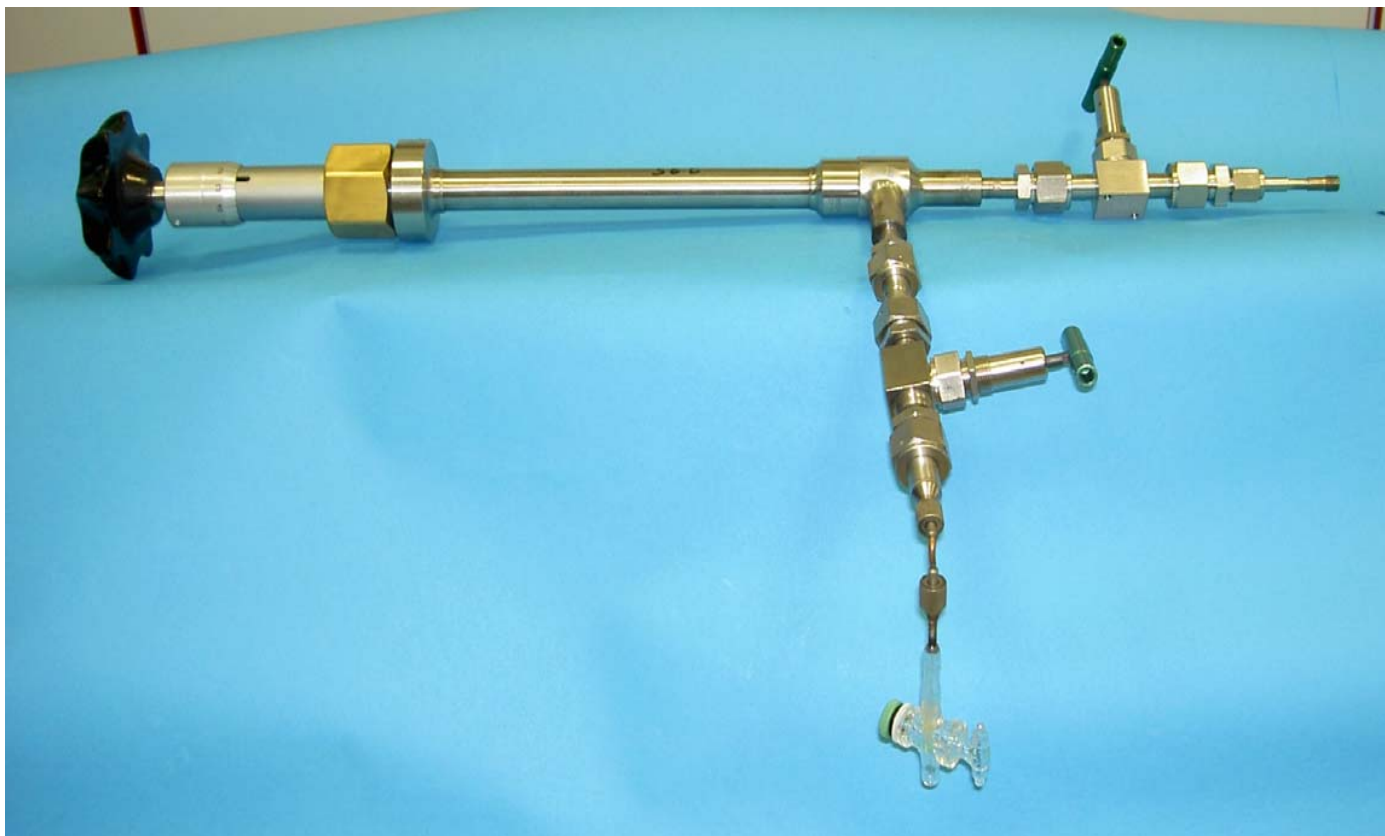
Art. Number	Amount	Total emanation rate [mBq]
317483	1	0.16
330502	1	0.22
330500	1	0.40
327259	1	0.27
254213	2	< 0.03
327607	2	< 0.13
262179	2	< 0.02

$$\Sigma \leq 0.6 \text{ mBq}$$

Allowed emanation from all sources in the cryostat: ~30 mBq  
(0.5  $\mu\text{Bq}/\text{m}^3$  in Ar (STP)  $\rightarrow 10^{-4}$  c/kg/keV/y )



# VEKA – cryo valve



$$A_{Rn} = (78 \pm 14) \mu\text{Bq}$$

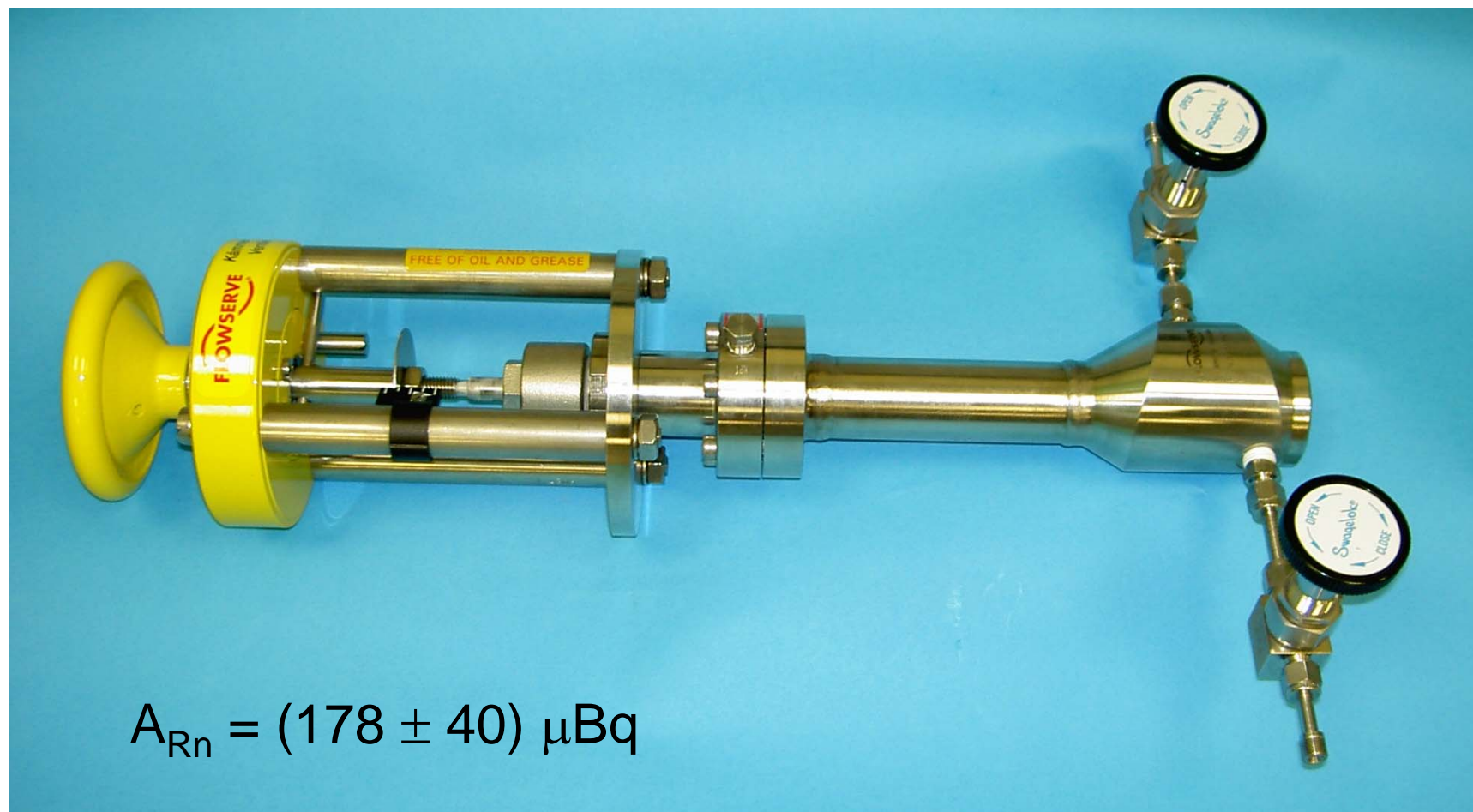
Diffusion tests:

$$A_1 = 150 \text{ mBq}$$
$$C_1 \sim 1 \text{ kBq/m}^3$$

After 10 days:

$$A_2 < 30 \mu\text{Bq}$$

# KAEMMER – cryo valve



$$A_{Rn} = (178 \pm 40) \mu\text{Bq}$$



# HV plugs / Murdtfeld



5 complete plugs with gaskets and pins

$$A_{Rn} \leq 90 \mu\text{Bq} \quad (\text{for all})$$

$$A_{Rn} \leq 18 \mu\text{Bq/piece}$$

---

Murdtfeld

$$A_{Rn} = (0.32 \pm 0.04) \text{ mBq}$$

$$S_{Rn} = (1.0 \pm 0.1) \text{ mBq/m}^2$$

---

Ge detector transport pot

$$A_{Rn} = (70 \pm 14) \mu\text{Bq}$$



# Summary and further plans

- Emanation of Kalrez is acceptable
- Tests of cryogenic valves are ongoing
- Further measurements:
  - HV-feed-througs
  - Magnetic arm
  - Welds
  - Oxygen/water adsorbers
  - Cables
  - Shutter valves